APPRAISAL PRACTICES BOARD
THE APPRAISAL FOUNDATION
America's Valuation Resource

APB Valuation Advisory #7

Voluntary Guidance on Recognized Valuation Methods and Techniques:

Valuation of Green and High-Performance Property: One- to Four-Unit Residential

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

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Application: **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 guidance is required. One issue identified by the APB is the appraisal of "green" or "high-performance" property. Recognizing the rising importance of high-performance asset valuation to appraisers and market participants, the APB convened a series of Subject Matter Expert (SME) panels to address three specific topics for advisory development:

1. Basic appraiser core competency – Valuation Advisory #6 - *Valuation of Green and High Performance Property: Background and Core Competency*
2. Residential high-performance property valuation – single-unit residential/one- to four-units
3. Nonresidential high-performance property valuation – commercial, multifamily and institutional

Basic appraiser core competency is addressed in APB Valuation Advisory #6, which was adopted by the APB on June 2, 2015. Valuation Advisory #6 contains many concepts underpinning high-performance buildings that comprise real estate industry best practices. In addition, Valuation Advisory #6 references resources and information sources relevant to completing a high-performance building assignment.

Concurrent with Valuation Advisory #6, the APB established two additional panels composed of SMEs to develop advisories for the commercial and residential real estate sectors. This Valuation Advisory (Advisory) covers the appraisal of green and high-performance residential properties. It addresses specific issues related to residential property with the intent of advising the actions, skills, and knowledge expected for developing and communicating such appraisal assignments.

Subject Matter Experts were charged with identifying appropriate resources and considerations pertinent to a high-performance building assignment, including owner documentation, expert reports, building rating systems, prevailing codes and standards, educational publications, and other information. This Advisory identifies areas where high-performance building features and market

conditions impact the valuation assignment process, including scope of work, information gathering and analysis techniques.

An Advisory that is succinct yet thorough is a challenge given the broad-based target audience and the large and varied residential property sector. While this Advisory aims to be comprehensive, the topic and application of high-performance concepts is broad, resulting in practical limitations to the length and depth of the Advisory. The Advisory provides short "how to" sections on areas in the high-performance appraisal assignment that require greater focus when compared to a standard valuation assignment.

Because of the vast amount of resources on green and high-performance building , the SMEs compiled an extensive bibliography that is available online via an Information Atlas:

https://sites.google.com/site/appraisinghpbuildings/

Subject Matter Experts: The APB established this panel to address the evolving influence and applicability of green and sustainable building practices to the residential real estate profession. The APB and The Appraisal Foundation (Foundation) wish to express sincere gratitude to each of the following SMEs and to the US Department of Energy (DOE) for volunteering their time and expertise in contributing to this document:

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Valuation of Green and High-Performance Property: One- to Four-Unit Residential

Section I: Introduction

In the United States, it is becoming more common to build or remodel residential properties with a goal toward greater sustainability and higher performance. This is being accomplished by increasing the focus on energy and water efficiency, indoor air quality, durability, and maintenance needs, as well as by reducing the environmental impact of site development and the sourcing, transportation and disposal of building materials and waste. The market refers to properties with these types of features as being "green" or "high performance."

The terms green and high performance do not, however, imply that a residence has a set of specifically defined, easily labeled, or even readily identifiable green features. Rather, a green or high-performance property may have any combination of a large variety of features.[1] This complicates the data collection and verification process for appraisers. To help identify these types of residences, numerous rating and certification systems have emerged in recent years. Currently, however, most residential properties have undocumented green or high-performance elements and therefore they are difficult to identify.

For residences with green or high-performance features, the typical appraisal question is not as simple as "*Is this a green or high-performance residence?*" but should be "*How green is this property relative to marketplace expectations?"* and *"What features make it a green or high-performance property*?"

In theory, every residence has some feature that could be identified as green. Cooking fans vented to the exterior improve indoor air quality, thermostats help reduce heating and cooling costs, and small residences use fewer building materials. These may seem like minor sustainability features, but at one time they were revolutionary and increased the sustainability of either the property itself or its environment.

As such, green and high performance are not new concepts. Therefore, the intent of this Advisory is to point out that the actual terms or labels "green" and "high performance" are of minimal concern. Appraisers will report the features a property has, how the market identifies those features, and whether those features have any particular relevance to their appraisal assignment. The labeling of green residences is performed by other parties, not the appraiser.

This Advisory addresses general research and analysis concerns and how to identify green features, determine their relevancy, and account for green features in the three approaches to value.

[1] The book *Building Better: Sustainable Architecture for Family Homes*, edited by Sofia Borges, Sven Ehmann, and Robert Klanten (Gestalten: 2014) is an excellent resource that presents vastly different sustainability solutions found in residential properties throughout the world.

Section II: Outline

This advisory addresses the most prominent appraisal issues associated with residential properties exhibiting green features and uses the terms "green" and "high performance" loosely. The structure of this document generally follows the appraisal process and workflow. This Advisory discusses, as it relates to residential properties, the following topics:

- Green and High-Performance Principles
- Identifying Green and High-Performance Features
- Relevancy of Green and High-Performance Features
- Research and Analysis
- Issues Unique to Photovoltaic Systems
- Three Approaches to Value
- Reporting

In addition, this Advisory will make reference to an Information Atlas, which is an online site containing information, supporting documents, and other resources. As of the publication date of this Advisory, the Information Atlas is available at:

https://sites.google.com/site/appraisinghpbuildings/

The Foundation does not necessarily promote or endorse any of the resources in the Information Atlas. Therefore, users will need to apply their own judgment to conclude whether the information is credible, applicable, or relevant to a particular issue.

Section III: Green and High-Performance Principles*

Before data and information can be collected on green features, appraisers must have a general knowledge of green principles to identify what "green" is and what it is not. Advisory #6 elaborated on what constitutes core competency for appraisers in this domain.[2]

While there are a number of green building principles[3], the six most common are:

- Site
- Water Efficiency
- Energy Sources and Efficiency
- Building Materials
- Indoor Environmental Quality, Health, and Safety
- Operations and Maintenance Costs

Each green principle can be incorporated into a residence to any degree and in a number of ways. Single-unit residences may have a combination or percentage of green features, as these principles interact with one another (e.g., water-efficient features also often save energy, building materials often influence indoor environmental quality, and energy system design and choices often influence health and safety). However, each principle will be discussed in separate categories below.

**Note: For a complete understanding of green principles, the appraiser may need to obtain education and knowledge beyond this Advisory. That knowledge and education may be achieved through self-study; however, some clients or situations may require an appraiser to have specific or formal training.*

3.1 Site

A sustainable site is the result of a wide range of possible factors. The sustainability of a site may be impacted by its physical characteristics (orientation, natural shading or landscaping, slope, access, soil composition), legal restrictions (zoning regulations or building codes that call for green and high-performance treatments), proximity to services (transit, utilities, living amenities), and its built environment (predominant building styles, density levels, market expectations). Additionally, various environmental issues can impact a site, including if the site is located near brownfields or if it is in an area that is below sea level, or the presence of an earthquake-resistant property may impact a site's insurability and desirability.

To elaborate, while the greenest building solution for a specific one-acre site may be to cluster ten small, attached, passive-certified residences together and offer a community garden and imposed restrictions such as subdivision covenants. Market demands or even zoning regulations may mandate that the site be developed with only one 5,000+-square foot residence with fewer green features. The goal is to develop an opinion as to whether a property's site has specific sustainability features to be addressed in the appraisal.

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[2] Refer to APB Valuation Advisory #6: *Valuation of Green and High Performance Property – Background and Core Competency*, (Washington, DC: The Appraisal Foundation, 2014) for additional information. Additionally, the US Department of Energy has issued its own guidance on topical knowledge for appraisers. See C.E. Metzger, P. Huelman, and S. Raskin, *Guidelines for Building Science Education* (2015), located at http://www.pnnl.gov/main/publications/external/technical_reports/PNNL-24143.pdf

[3] Other examples include the floor plan shape and design, protection against natural catastrophes, indoor gardens, planning for sewage disposal, illumination, social impacts, innovation and affordability.

This can mean taking into consideration any relevant limitations imposed upon the site (various market forces, regulations, restrictions, etc.) as well as its physical features (location, terrain, likelihood of being exposed to a natural disaster, lot size, etc.). However, not every appraisal will require an in-depth analysis of the sustainability features associated with the site—this is required for only those assignments where sustainability is a relevant feature. If it is a relevant feature, then the appraiser will conclude whether a site meets, exceeds, or fails to meet market expectations as well as what value impact, if any, there is to that site.

When the appraiser is evaluating the relevance of green siting features, further study may be required.

Resources for siting features: www.walkscore.com, environmental maps, termite maps, zoning maps, city planning authorities, utility maps, plat maps, regional radon risk maps, surveys, environmental studies, homeowner association (HOA) documents, public transportation maps, soils maps, flood maps, airport influence zone maps, climate maps, and the insurance industry's Building Code Effectiveness Rating Scale.

3.2 Water Efficiency

Water efficiency relates to how efficiently a property manages, uses, and disposes of water. Virtually every property makes efforts to control water. For example, when a property has indoor plumbing, it typically has pipes to control where the water goes, a controlled water heating mechanism, drains, and even water storage devices. Efforts are also typically made to control how water is collected, disposed of (or recycled), and consumed. It would, for example, be highly unusual for a property to have a continually running hot-water faucet. In that regard, every property with indoor plumbing has some level of water efficiency. It is not crucial for an appraiser to recognize all forms of water efficiency; rather, it is important to recognize when special effort has been made (or when not enough effort has been made) to impact water efficiency. Questions to consider might include:

- How is water managed in the residence? Is this normal for the area?
- Do the market participants appreciate or value special water-efficiency features?
- Is the water efficiency too efficient (i.e., no indoor plumbing, gray water recycling systems in an area where they are not expected, having to collect all available water via rain barrels)?

If special efforts—or too few efforts—are made to manage water efficiency, appraisers should research how the market values these particular features (if at all). Additionally, if certain features meet the expectation of a market segment and those features are common and noted in every residence, then a detailed documentation of those features is likely unnecessary.

In summary, to understand what level of water efficiency is acceptable in a market area, appraisers need understand who the typical market participants are and what features they expect in a residence, and how the market values those features.

Resources for water efficiency: building codes, water regulations, utility companies (maps, information on access to utility hookups), municipal health departments (sewer regulations, outhouse regulations), municipal water and sewer tap fees, water reports (health and safety of local water sources), etc.

3.3 Energy Sources and Efficiency

Like water efficiency, energy efficiency manifests as varying levels of performance, achieved through a wide range of specific features or practices. Every residence has a certain level of energy efficiency, regardless of when it was built or under what standards it was built. Appraisers need to understand whether the level of energy efficiency in a residence is better or worse than what is expected in the market and if it is or is not a relevant feature.

Design concepts and products (insulation, air sealing, heating or cooling systems, windows, walls, skylights, floor plans, volume, orientation, building materials, etc.) interact to determine the level of energy efficiency in a residence. Therefore, unless it is within the scope of work of the assignment and within the appraiser's expertise, the level of energy efficiency present in a residence is best verified with a home energy expert.

If an expert has verified the level of energy efficiency, appraisers can judge the usefulness of the information based on things such as:

- The effective date of the information, and whether current efficiency levels match records.
- Whether the information is based on plans and specifications or on a verified level of energy efficiency of the completed as-is residence.
- Credibility and reliability of the information.

Market segments will identify and value energy sources and efficiency differently. Some markets will assign value based on a residence's various levels of performance, while some will value specific features that impact energy efficiency, and some will not value either (or both). Examples include a geothermal heating system or a photovoltaic system. The combined effect of high-efficiency and on-site power generation can result in what is known as a "net-zero energy" (NZE)[4] residence. NZE residences often require special consideration during the appraisal process.[5]

Additionally, it might be necessary to address sources or fuels used to produce energy. For example, oil, propane, and gas fuels may have different costs and levels of efficiency.

Resources for energy efficiency: RESNET, *Do-It-Yourself Home Energy Audits* by David S. Findley, HERS reports, building permits and departments, building codes, energy audits, energy labels or certificates, and utility bills.

3.4 Building Materials

The main characteristics associated with specific green building materials that appraisers should consider include where the materials came from, how much energy they took to produce, whether they fit into their built environment, whether they are cost effective, how durable they are and how easy they are to maintain. Since building materials can have any combination of these characteristics, what is considered a "green" building material will likely vary from market to market.

Thus, there is no one ideal building material for a given property feature. Every residence is built in a different physical environment. Every building material will have pros and cons depending on the

[4] A residence that does not use more energy than it produces on-site.

[5] T.P. Runde, "Net Zero Energy Buildings: An Introduction for Valuation Professionals," *The Appraisal Journal (*Spring 2015): 141-49.

intent of the builder, applicable building codes, the location of the property, the available resources, and cost. The goal is not to understand the strengths and weaknesses of every building material (from a sustainability standpoint); rather, it is to recognize when relevant efforts were made to incorporate or not to incorporate green building materials into a residence. For example, building materials that increase the structure's durability over time—such as hurricane straps—can lengthen the life of the structure, protect it from damage caused by such a natural disaster, and result in lower insurance premiums. If a particular green building material is relevant to a market, this preference will need to be reflected in appraisal opinions and conclusions.

For example, it is probable that a straw-bale residence would have negative marketability or value issues if it existed among historically designated, non-energy-efficient seaside cottages. The straw-bale house may have notable green features, but the market may not accept it. Conversely, in market areas with strong demand for residences with notable green features and sustainable building materials, absence of these green features from a given residence would constitute obsolescence.

Resources for building materials: *Making Better Homes: A Comparative Guide to Sustainable Construction for Homeowners and Contractors* by Chris Magwood.

3.5 Indoor Environmental Quality, Health, and Safety

Good indoor environmental quality[6] (IEQ) results from actively managing the air's moisture, pollutants (dust, cooking fumes, pet dander, etc.), temperature, circulation, and ventilation.[7] There are a variety of programs that evaluate indoor environmental quality. The Leadership in Energy and Environmental Design (LEED®) rating system, for example, considers a list of specific factors contributing to good indoor air quality. If a property has gone through one of these programs, the documentation may be available for review.

[6] See http://www.epa.gov/indoorairplus.

[7] Extensive IEQ resources and a quick checklist of potential uses by appraisers are available in the Information Atlas: https://sites.google.com/site/appraisinghpbuildings/key-topics/indoor-environmental-quality.

Some examples* of different items impacting IEQ positively or negatively:

Sources of Indoor Air Quality Problems
Pesticides
Environmental gases
Mold
Asbestos
Animal dander
Products with formaldehyde
Kerosene heaters
Leaky chimneys
Drug labs
Indoor gardens
Indoor hot tubs and swimming pools
Wood-burning fireplaces
Radon
Cigarette Smoke
Harsh household cleaning products

Mitigation and Risk Management
Adequate temperature control
Heat-recovery ventilators
Proper duck sealing
Fresh-air intakes
Carbon-monoxide detectors
Low-emission building materials
Properly vented combustion appliances
Proper air sealing
Proper moisture venting
Circulation control
Radon mitigation
Proper humidity control
Minimal number of chemicals stored in residence
Clean furnace filters
Electrostatic control systems

**The charts are independent of one another.*

Currently, when a single-unit residence is marketed for sale, its IEQ information is rarely reported, documented, or even mentioned, regardless of the market area. This is likely because indoor air quality is viewed more often as a byproduct of good materials or good design and less as an intended feature. If indoor air quality is a desirable feature, a market will more commonly respond to it in the context of construction/design quality or property condition. If current market trends continue, more consistent recording and reporting of verified IEQ-related features will become common. This would make it easier to evaluate the contributory value of IEQ.

Resources for various sources related to indoor air quality: radon testing results; national maps of indoor radon risk levels; blower door test results; duct leakage test results; any applicable certifications, building checklists, audits or reports available for the property that address indoor air quality; multiple listing service-records; and property disclosure checklists.

3.6 Operations and Maintenance Costs

Every residence has costs associated with both operating and maintaining the structure and the site. Various materials, habits, and building techniques result in different maintenance costs associated with that property. Green and high-performance properties tend to have lower operations and maintenance costs. This may not always be true, as some materials actually increase maintenance costs by exhibiting decreased durability but lower overall environmental impacts (i.e., items such as recycled lumber or living green roofs may decrease durability).

Like indoor air quality, value or marketability may be impacted by operation and maintenance costs and this will most often be reflected in the quality of construction, condition, or design. The exception is when it is possible to calculate the amount of money a residence is saving/costing because of different operations and maintenance costs as compared to other properties. However, consider the context of where the savings/costs figures are derived from and whether they can even be meaningfully compared between two properties. Different occupants operate and maintain residences differently; thus, "savings" may be the result of a thrifty and attentive occupant and not the actual residence.

Resources for operations and maintenance costs: Marshall & Swift® deprecation tables, *Green Remodeling: Changing the World One Room at a Time* by David R. Johnston and Kim Master, building permits, homeowner maintenance records, etc.

Section IV: Identifying Green and High-Performance Features

Just as green principles can be expressed in many different ways, green features can refer to one of many things. They can refer to *an item* (solar hot water), *a system* (an overall design process intentionally resulting in high levels of energy efficiency), or *a measurement, label, rating, or certification* (National Green Building Standard [NGBS] Emerald, ENERGY STAR®, LEED Platinum®). Identifying green features in a property can be a challenge. Some features are clearly visible (multipane windows) while others are hidden (sustainable certified building materials). Others might not even stand out as particularly important (well-fitting windows) but are integral to a more complex system designed to improve performance.

Because there are an untold number of possible green features, it is unreasonable to expect appraisers to have an in-depth knowledge of them all. Having the ability to appraise residences with green features is less dependent on being an expert in green building features and more dependent on using accepted appraisal methodologies to identify and value relevant green features.[8]

To identify green features in a property, use any combination of the following methodologies (the order is not important):

- Firsthand data about the property
- Physical observation of the property
- Third-party documentation and/or certification

4.1 Firsthand Data About the Property

One way to collect information about possible green features in a residence is to obtain resources that have recorded information about the property. The resources can provide specific or general information about the property.

Specific resources include:

Plans and Specifications

If available, a residence's plans and specifications will often show performance-related features and may be a useful resource. These are sometimes located in public records or are available via the homeowner, architect, or builder.

Building Permits and Building Departments

Building permits can provide a wealth of information about everything from costs, specific materials, and manufacturer warranties to contractors' names and the number and types of permits issued. Municipalities, however, will differ in the data they keep and how it is recorded.

[8] The use of technical or otherwise obscure jargon in descriptive materials prepared by specialists may present an additional challenge for appraisers, but plain-language interpretive materials are available. See Rashkin, S. and L. Parker. "Building America Building Science Translator." U.S. Department of Energy. February. 17pp. http://energy.gov/eere/buildings/downloads/building-america-building-science-translator. See also the Glossary provided in the Information Atlas: https://sites.google.com/site/appraisinghpbuildings/.

Multiple Listing Service (MLS), Listing Agent, or Selling Agent

MLS databases are the single most useful resource for information on any property. Old and current property listings may include inspection reports, agent commentary describing the property, property disclosure checklists, energy reports, green features addendums, builder contact information, utility billing reports, actual costs associated with improvements, information about upgrades, etc.

Homeowners or Builders
A homeowner or builder with knowledge about the green features in a residence may have documents, contacts, statements of costs, or other information.

Tenants or Property Managers
Those who rent or manage a green property may be able to provide information on utility savings, rental rates that reflect a demand (or lack thereof) for green features, etc.

Utility Bills
Utility costs are highly variable and depend less on the residence itself and more on the occupants of the residence. However, those actual costs may provide useful information, depending on what information is sought.

General resources include:

Local Builders and Their Websites and Marketing Materials
Many builders provide highly detailed lists of the exact green features in their properties. These lists may be in their marketing materials and/or on their websites.

Builders Associations
A builders association may keep a list of green property builders. National and local associations often provide green building education materials.

Building Codes and Equipment Standards
If a municipality requires and adequately enforces green building codes (this includes energy-efficiency codes), it may be necessary to develop knowledge about these codes.[9] Questions to ask about green building codes may include:

- Which green-building codes (this includes energy efficiency) are in force
- Whether the codes change over time
- Whether the codes vary across the state, county or property type
- When each version of the codes went into effect
- What changes occurred in the codes as each new version was released
- When the applicable codes are expected to be changed again
- Whether there are any exceptions to the codes
- Whether the codes are more (or less) stringent for different property types
- Whether the codes apply only to new construction or to renovations as well

[9] Extensive resources on relevant codes can be found in the Information Atlas: https://sites.google.com/site/appraisinghpbuildings/key-topics/codes-and-standards.

- Whether local builders tend to meet minimal codes or exceed them
- Whether the codes require builders to obtain energy reports (e.g., HERS ratings)
- Whether the codes require tenant-occupied residences to meet certain green standards

To start collecting information on energy codes,[10] the Figure 1 and related websites may be helpful:

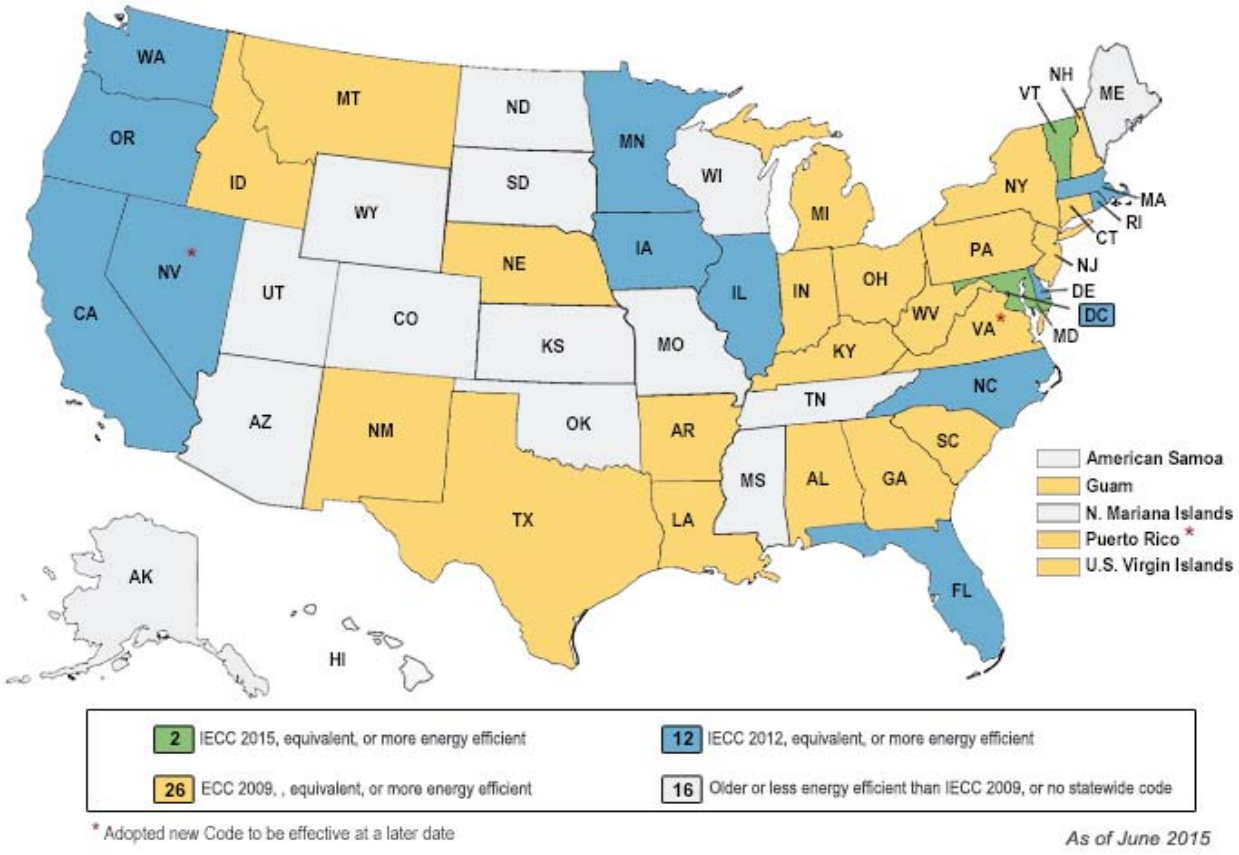

Figure 1: Status of energy-related US building codes, per the US Department of Energy: https://www.energycodes.gov/status-state-energy-code-adoption.

With this information, it becomes easier to understand which green features are mandatory, depending on which code the property was built to meet. For example, this information may help when selecting comparable sales to isolate the potential value of different energy-efficiency levels.

4.2 Physical Observation of the Property

While many green features are not readily observable in a property, some are observable. It is possible to gather information about residences with green features by paying attention to items such as:

- Mechanical systems (efficiency level, age, type, quality, condition, etc.)
- Appliances (ENERGY STAR® classification, age, type, condition, etc.)
- Water and wastewater management (delivery, control, recycling, storage systems, condition, etc.)

[10] More details regarding specific energy codes by state can be located at http://www.reca-codes.org.

- Electricity management (production, delivery, control, storage systems, condition, age, etc.)
- Protection of the exterior and interior from the elements (design, condition, age, etc.)
- Ventilation and air infiltration management (heating and cooling, purification, circulation systems, age, condition, etc.)
- Indoor environmental quality (presence of fireplaces, moisture, noise levels, ventilation, sealing of ducts, etc.)
- Insulation (quality of installation, type, age, condition, etc.)
- Maintenance (costs, durability of materials, etc.)

In many cases, the physical observation of the property will provide the first clues that a residence is a green or high-performance property and that other sources of information may need to be consulted.

4.3 Third-Party Documentation

In this instance, third-party documentation directly refers to specific paperwork for a property (e.g., green certifications, audits and reports, ratings and scores, and checklists).

Many different third-party documents have emerged because it is impossible for any property to be all things green. One property cannot be the most resource-efficient, energy-efficient, easiest to build, cheapest, least environmentally harmful and least wasteful, and the most desirable, marketable, and valuable. Green buildings are the result of the builder deciding which green features will and will not be incorporated into a property. There are a number of ways to build a property with green features.

Even properties with the same labels or certifications can have different property features. For example, a HERS 45-rated residence can be either extremely energy-efficient or it can be a much less energy-efficient residence with a very large photovoltaic system.[11] Similarly, a LEED® rating can be achieved by selecting from among a wide array of strategies.

While this is helpful for buyers and sellers wishing to compare and communicate the overall environmental impact of dissimilar residences, the many different reporting options complicate the data collection process. Challenges faced include:

- Who has the information?
- How do the various reports differ from one another?
- Does the information require a specialist to interpret?
- Is it possible to use the information to compare and contrast with other information?
- How old is the information?
- Is the information credible?
- Is the information complete or are pages missing?
- Is the information available for numerous residences in the area?

Examples related to the challenges of collecting documentation:

[11] Regardless of whether photovoltaic systems are leased or owned, HERS ratings still take them into account in their calculations. Thus, when HERS ratings are relevant and personal property is excluded from a valuation, this will typically need to be addressed. Either the HERS rating can be modified to exclude the impact of the leased photovoltaic system or an alternate methodology can be derived for treating the solar.

- A municipality requires new residences to be built with an increased percentage of green features, based on square footage. In this instance, documentation may be available for several properties but may or may not be recorded in detail or even consistently.
- A particular label may be introduced into the market, but due to poor business management of the company, the label loses credibility over time.
- A certification program can undergo changes over the years; thus, depending on the effective date, the certificate may indicate different things about similar properties.
- Building codes have generally required higher levels of energy efficiency. Therefore, an older residence certified as being especially energy efficient could actually meet the same energy-efficiency standards as newer construction.
- An energy report could be a prediction only (i.e., when it is issued based on plans and specs), and once the residence was built, the actual level of energy efficiency was not verified.

There is, then, no one label that conclusively identifies a property as being green. A property can achieve a "green" label by reaching a certain level of compliance with a specific program, qualifying for a certification, or simply receiving a certain rating. Each label places importance on different aspects of green or high performance. Some place all their criteria on overall energy-efficiency levels, others emphasize construction techniques, and yet others place great weight on the overall environmental impact of the property.

Third-party documents include:

Certifications

A valid certification is verification that a property meets a certain set of green or high-performance standards. There are various authorities that issue certifications, many of which were discussed in APB Valuation Advisory #6. The certifications typically include not just a stamp of approval, but a detailed property report. These reports provide in-depth information that is useful for comparing with other properties or for verifying the green features present in the certified residence.

Examples: ENERGY STAR®, National Green Building Standard™, Passive House

Audits and Reports

Audits and reports are general terms meant to refer to documents that factually record a residence's features, energy/water use, efficiency opportunities, or even health and safety issues. Audits may go beyond visual inspection and include specific diagnostic tests such as infrared photographs (to identify missing insulation, heat loss, or moisture entry), blower door tests (to identify and quantify air leakage), or combustion safety tests on heating equipment. Because audits and general reports are based on voluntary and varied standards, the level of detail they provide will vary. The goal of these documents is not to offer a rating or a score, but rather to reflect what features a property has and also to recommend changes to improve performance levels. These documents often provide information on costs associated with improvements, rebates, quality of construction, and physical depreciation. Some ratings go beyond individual features. For example, Indoor airPLUS is a voluntary US Environmental Protection Agency (EPA) program that provides guidelines on reducing indoor air quality risks in residences.[12]

[12] See http://www.epa.gov/indoorairplus.

Examples: Energy audits, utility company reports, the US DOE's Weatherization Assistance Program inspections, and quality control documents.

Ratings and Scores

A rating is a position on a scale. A score is essentially a "number of points" or a "grade" of some sort. If a property has a score, it has received any number of points based on some standardized system. The points can be either positive (the more the better) or negative (the fewer the better). Since each rating and score are different in what they mean and how they are derived, each system will need to be researched and studied to understand its details .[13]

Examples: LEED®, HERS, Home Energy Score

Checklists

Checklists are the worksheets behind certifications, scores, and ratings. If they are available, they can offer a wealth of detailed information. However, some checklists require experts to interpret; thus, obtaining and understanding the information may be beyond the necessary scope of work for any particular residential appraisal assignment.

Examples: Any checklists used to derive a rating or a score, or to confirm a specific certification level.

The documents noted above may offer useful information about green features in a property, especially those that cannot be verified via a physical inspection of the property. Or, as is reasonable, an extraordinary assumption can be made that the documents accurately report the property's green features.

4.3.1 What If a Green Property Does Not Have Third-Party Documentation?

Without third-party documentation, challenges exist in being able to fully identify a residence's green features. For example, if energy performance is a relevant property consideration, then data contained in third-party documents is necessary information. If the information is needed but not obtainable, the only option is to disclose the steps taken to obtain it and any impact this had on final appraisal opinions and conclusions.[14] Without data, it is impossible to compare and contrast properties with one another.

However, it is also noted that while a certification typically means a residence's green features were verified by a third party and were present as of a specific date, the lack of that certification does not mean a property lacks green features. Many green properties do not have any formal documentation. According to the 2010 US census, there are just over 130 million single-unit residential properties in the US, and of these less than 1% are known to have certifications.[15]

4.3.2 Is Third-Party Documentation Important?

Third-party documents do not indicate market preference, relevance, or value, but they do help classify, identify, and compare various green or high-performance features. The importance of any particular

[13] In addition to The Appraisal Foundation's Advisory #6, a wide variety of scoring and rating systems are summarized in the Information Atlas: https://sites.google.com/site/appraisinghpbuildings/key-topics/rating-systems.

[14] It may also be appropriate to use a hypothetical condition or extraordinary assumption.

[15] Very roughly, just over one million residences are certified and another one million have HERS ratings (the vast majority of which are done at the time of construction). Source: http://housesogreen.com/2013/09/how-many-green-certified-homes-are-there-in-the-us.

document is market specific, and thus the usefulness of the information will likely be handled differently in every appraisal assignment.

4.3.3 Relevance of Third-Party Documentation

The question while working in a market where green features are relevant is either *"Does market evidence indicate third-party documentation is, in itself, a relevant green feature?"* or *"Does market evidence indicate green features are relevant, regardless of the availability of third-party documentation?"*

Once the appropriate question is answered, appraisers will develop an opinion about whether the green features have a positive, neutral, or negative impact on the property. The overall issue of importance, then, is not the documentation itself, but if the documentation has any relevance to the appraisal assignment or to a specific market segment.

Section V: Relevancy of Green and High-Performance Features

Simply having one or more green feature in a property may not be enough to warrant attention in an appraisal. Rather, the green feature (or features) must contribute to value or marketability, be relevant to the scope of work for the assignment, have a notable impact on the cost to construct or operate the property, or affect the income potential of the property. To understand relevancy better, two issues will be covered here:

- Identifying the Appraisal Problem to Be Solved
- Highest and Best Use

5.1 Identifying the Appraisal Problem to Be Solved

Performing an appraisal involving a property with green features requires understanding and defining the appraisal problem to be solved. A very different scope of work will likely be performed if the client is an insurance company wanting the replacement cost of a unique high-performance residence destroyed by a fire than would be performed for a lender client requesting a Fannie Mae-compliant appraisal of a highly conforming residence in a net-zero community. Thus, identifying the problem to be solved makes it possible to plan an adequate scope of work to competently complete the assignment.

5.2 Highest and Best Use

When analyzing the highest and best use of a property, there are a few elements unique to green properties. Examples include:

- Some green features may not be legally allowed. For example, the collection of rainwater may be against state law, or earth berm residences may not be allowed in an urban environment.
- Zoning regulations may impact the determination of the highest and best use of an existing green property. It is possible for zoning regulations to both encourage and discourage green features in properties. For example, a historic district may prohibit installing solar panels or replacing original clapboard siding and single-pane windows with greener products in a 100-year-old residence, but then require the residence to have a certain percentage of green features when it undergoes a major interior renovation.
- A green property may not be financially feasible if its costs are greater than its value. However, as with any property features, costs associated with certain green features may fall below, meet, or exceed value.

Section VI: Research and Analysis

After identifying the relevant green features in a property and before applying any of the three approaches to value (sales comparison approach, cost approach, or income approach), there must be data showing how a market segment views green features. The data will consist of information related to identifying market share of green properties and gauging the market reaction to green or high-performance properties.

6.1 How to Identify Local Market Share

Every market is unique in terms of how, where, and what type of data is available for identifying the market share of green properties. Some of the more common data sources and the data they provide include:[16]

- Certification, labeling, and rating services (e.g., NGBS, LEED®, Home Energy Score, Home Performance with Energy Score) provide general housing statistics for properties they have documented. They often provide detailed information on specific property addresses (see Table A).[17]
- The US Department of Energy's Building Performance Database amasses searchable energy-use data for residential and nonresidential building types, while the Residential Energy Consumption Survey focuses exclusively on households.[18]
- Census reports track energy use, energy efficiency improvements, and housing characteristics.
- Various entities have published studies assessing the market share of green/high-performance residences across the US and in specific regional markets.
- MLS listings often include "green fields." The data provided in those fields can be compiled and analyzed.
- Utility companies, the federal government, and local authorities who offer tax incentives or rebates typically compile data on how often their programs are utilized and by whom.[19]
- Municipal building departments can have both general and property-specific data on the number and types of permits issued for residences with and without green features.
- Market participants (realtors, buyers, sellers, builders, etc.) can be interviewed, and interviewing these individuals is a good starting point when more systematic data sources are not available.

[16] See the Information Atlas (https://sites.google.com/site/appraisinghpbuildings) for more reference material.
[17] For example, the Home Innovations Research Lab has a website that includes access to all properties certified by NGBS. Similar data is available on the Northwest ENERGY STAR® website and on the national ENERGY STAR® website. RESNET also has a database to search for the exact HERS ratings of specific addresses. LEED® is planning an "I-BIG" searchable database. Consult the Information Atlas for these and other sources: https://sites.google.com/site/appraisinghpbuildings/market-data.
[18] For additional information, see http://bpd.lbl.gov and the US Department of Energy's Residential Energy Consumption Survey, located at http://www.eia.gov/consumption/residential.
[19] For example, refer to http://www.dsireusa.org.

One example of general data is noted below. The following pair of charts (Figure B) compare a handful of green and high-performance features in two different locations.[20]

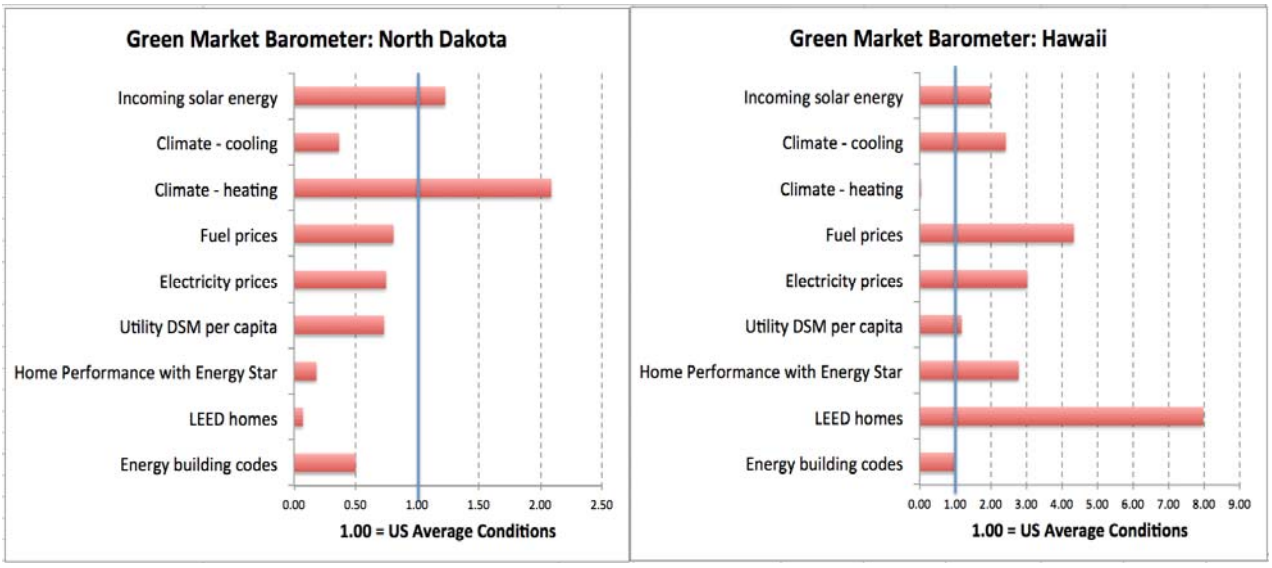

Figure B. *Examples of indices reflecting local market conditions for green and high-performance activity. For context, all values are indexed to US averages (which have the value of 1.00).*

6.2 How to Gauge Market Reaction

Once data sources have been located and considered, market reaction to green features can be gauged. The most common way to do this is with research conducted by the appraiser. However, a secondary option is to utilize studies conducted by others.

6.2.1 Research Conducted by the Appraiser

When conducting research to understand how a market segment views green features, sample questions may include:

- What features do buyers identify as green, and do they value them?
- Does the market have green building codes and regulations, and is compliance adequate?
- Do different ages of residences have different applicable building codes (especially in regard to the International Energy Conservation Code?
- Do building departments expedite permits for certain green features?
- How common are green features in the area?
- Do developers/builders/homeowners voluntarily add green features to their residences, or do they do so only as required by local codes and regulations?
- Do tax incentives or utility programs encourage green building or remodeling, and if so, how widely have they been utilized?
- Do MLS listings make note of green features?
- Do residences with green features sell faster?
- What materials are commonly used to build residences in the market area?

[20] Much of the data behind these indices is available at a more granular geographic scale (e.g., for individual cities). More information is in the Information Atlas: https://sites.google.com/site/appraisinghpbuildings/market-data.

- Do residences with green features have lower insurance rates? Is this relevant to the market?[21]

Performing a local market study will provide the most accurate evidence of green/high-performance market share and trends, lending support to any warranted adjustments. Sometimes, however, others may have completed market studies that are useful. These studies can be national, local, or even internal office studies.

6.2.2 Research Conducted by Others

Many studies have been conducted to estimate the value of green and high-performance residences, the earliest of which date from the 1980s.[22] The studies fall into two broad categories: small-sample studies (that is, case studies of individual residences) and large-sample studies (i.e., a statistical analysis of large groups of residences). Both types can have data that is relevant to an appraisal assignment.

As with any information, care should be taken to review the soundness of the underlying methodology and relevance to the particular assignment. For example, academic and commercial organizations might conduct a market study using hedonic modeling or national surveys. If the methodologies and reasoning used are understood, then it is possible to judge how credible and applicable the findings are to a specific appraisal assignment.

For example, a credible study containing a small sample size[23] conducted for the state of Colorado found that the sales prices for 26 specific residences reflected a specific market premium for green features. This conclusion is best utilized as general data and information and not as a finding to be directly applied to another appraisal assignment. That is, the conclusions reached in the study may not be true for any other residence, even in the same market area and under the same market conditions.

Any study should be scrutinized to see whether it has passed through a formal peer review process and to see who those peer reviewers were. All studies, whether performed by appraisers or by proprietary entities (as distinct from academic or publicly funded ones), may be susceptible to error, bias, or selective reporting (either toward or against green factors). Appraisers need to develop a supportable opinion as to the soundness, credibility, and applicability of any study's findings. No study will provide concrete answers applicable to all appraisal assignments.

6.3 How to Deal with Incomplete or Inconsistent Data

Incomplete or inconsistent data is a common obstacle, regardless of whether or not a property is a green or high-performance residence. However, many green features can only be identified via physical documents, and these documents are often not available. Incomplete or inconsistent data is very common for properties with green features. Currently, incomplete or inconsistent data is considered the most significant problem associated with understanding, verifying, and valuing green property features. This is because most market areas have yet to establish a consistent and reliable way to archive these documents. This makes it particularly important to seek relevant documentation from parties such as property owners—not unlike when other reports (such as structural reports, property disclosures, covenants or surveys) are sought.

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[21] See the "Insurance" section in the Information Atlas: https://sites.google.com/site/appraisinghpbuildings/key-topics/insurance.
[22] The studies referenced here can be found in the Information Atlas: https://sites.google.com/site/appraisinghpbuildings/valuation.
[23] Lisa K. Desmarais, *An Early Look at Energy Efficiency and Contributory Value*, Colorado Energy Office (2005).

The quality and completeness of the data may be an indication of how acceptable and important green property features are to a particular market. If a market segment has no interest in retaining information pertaining to green features, this is a market reaction. On the other hand, if the market is clearly working toward establishing a way to record and provide documentation of green features to market participants, this may be an indication of buyers increasing their demand for green features.

In the end, inconsistent and incomplete data will be a common occurrence (as it is with many property features). Whatever data is available should be judged for its:

- Accuracy
- Adequacy
- Appropriateness
- Credibility
- Consistency
- Reliability
- Relevancy
- Timeliness
- Quality
- Quantity

All data—even the absence of data—is an indication of how relevant and important a green feature is (or is not) to its market segment.

Special Note: The Secondary Market

A major end user of many residential appraisals is the secondary market, which includes participants such as Fannie Mae. Fannie Mae has general guidelines relating to green or high-performance issues, especially in regard to energy efficiency and photovoltaic systems. While a more complete reference list is located in the previously referenced Information Atlas available on the internet, some examples of specific guidelines can be located at the following links:

https://www.fanniemae.com/content/guide/selling/b2/3/04.html
https://www.fanniemae.com/content/guide/selling/b4/1.3/05.html

Additional Note: Financing Energy Efficiency and the Secondary Market

In some municipalities, homeowners can qualify to finance up to 100% of the costs associated with energy efficiency, water efficiency, and renewable energy improvements. In particular, the Property Assessed Clean Energy (PACE) program allows homeowners to add the cost of the improvements to their property tax bill and pay it back over time.[24] The loan is tied to the property, not the individual. Thus, when considering costs and how those costs are financed, appraisers need to understand whether their particular market segment allows PACE loans and whether these loans impact value or marketability in any way.

Additionally, Fannie Mae sometimes offers special financing or incentives for green properties. Some

[24] See http://energy.gov/eere/slsc/property-assessed-clean-energy-programs.

examples can be found at the following links:

https://www.fanniemae.com/multifamily/green-initiative
https://www.fanniemae.com/multifamily/green-initiative-financing

Section VII: Issues Unique to Photovoltaic Systems

Solar photovoltaic (PV) systems are now a prominent green feature in many markets. The vast majority of PV systems are connected to a public utility grid ("grid tied"). These grid-tied PV systems present several appraisal issues specifically related to cost, income, and ownership.

7.1 Cost

The cost of installing a PV system is usually quoted on a price-per-kW (or per-watt) basis. The cost figures can be obtained from national cost data sources, local installers, or municipal permit information. Since the reported costs depend on the size of the system, the complexity of the installation, who is recording the cost figures, and the consideration of any rebates or incentives,[25] the cost figures will reflect different things. After the particulars of the cost figures are known, the costs can be utilized to develop the cost approach.

Example of cost data gathered from building permits:

Address	Date of Permit	Total Cost	kW	Cost per kW
Donly Circle	04/10/2012	$31,387	6.75	$4,650
Johnstown Way	01/06/2012	$29,984	5.76	$5,206
Buckle Court	04/01/2012	$40,900	7.78	$5,257
Midway Avenue	02/10/2012	$30,000	7.50	$4,000

7.2 Income

Any electricity produced by a grid-tied PV system is essentially an opportunity to earn income. This income can come in two forms: (1) the money a homeowner saves when not purchasing electricity from a utility company; and (2) production credits from the utility company.

7.3 Energy Produced by a PV System

The amount of electricity a PV system will produce over its lifespan can be reasonably estimated.[26] The estimate can be derived[27] using the exact specifications[28] of a specific PV system or obtained from the installer.

It is not, however, always reasonably possible to obtain the exact specifications of any specific PV system. The information may not be disclosed in an MLS listing, available to a listing agent, retained

[25] For example, the Database of State Incentives for Renewables & Efficiency is available at http://www.dsireusa.org. However, this database may not be up-to-date at any given time.
[26] A data source can be found at http://pvwatts.nrel.gov.
[27] For more information, refer to the Income Approach Section of this Advisory.
[28] It is beyond the scope of this Advisory to discuss the exact specifications needed. Refer to the Appraisal Institute's *Residential Green and Energy Efficient Addendum* for guidance. Additional sources related to photovoltaic systems are noted in the Information Atlas.

by a homeowner, or noted in the municipal permit information. If the details of a specific system cannot be obtained, it may be appropriate to make any of the following statements in an appraisal:

- The steps taken to attempt to collect the information
- The extraordinary assumptions (if any) made about the system
- The opinions reached and conclusions drawn about the system

Utility bills sometimes identify electricity produced by grid-tied solar systems. When an estimate of energy production is available, it may be appropriate to compare these figures with the electric utility bills. This will indicate whether the system is working as intended, and it will provide backup support for the estimate of energy production. This, however, assumes it is within the scope of work and expected expertise of the appraiser to understand and interpret utility billing statements.

When an estimate of energy production is not available, there may still be enough market data to derive a range of values for PV systems. Some markets may not value PV systems based on income, but rather based on only a few of the PV system's features, such as its size, age, and condition. Again, while this information does not utilize the income associated with the system, this may be the most accurate reflection of market behavior. Just because a feature produces income does not mean the market places value on that income.

EXAMPLE OF A VALUE INDICATION USING ESTIMATED ENERGY SAVINGS

Once the details of a PV system are known, they can be entered into an online energy valuation tool at https://www.pvvalue.com. The user manual states that the tool: "...considers the present value of projected future energy production along with the estimated operating income and maintenance costs that are anticipated to occur during the PV module power production warranty timeframe."

The online tool indicates that a specific 4.7kW, two-year-old system may reasonably have a value indication of $2,500. Values will vary greatly based on the location of the system, its age, and the cost of electricity.

It is beyond the scope of this Advisory to explain the details of https://www.pvvalue.com.

7.4 Production Credits

Many utility companies pay homeowners for energy their PV systems produce, even if the homeowners use the electricity themselves. This is direct income, which can be capitalized.[29]

These payments, however, can be very difficult to track down. To collect and verify payment information, access to the program details must be available, including the amount and schedule of any past and future payments. Expertise in deciphering electric utility bills and a working knowledge of the actual production credit program is also necessary. Even so, once the production credits are verified, it is possible the payment amount may be insignificant. Thus, the payments can only be taken into consideration when they are available and are relevant to the market and to the appraisal assignment.

[29] For more information, refer to the Income Approach section of this Advisory.

7.5 Ownership

PV systems are leased to a homeowner or owned by the homeowner. While technically there is a third form of ownership—a Power Purchase Agreement (PPA)—this advisory will, for simplicity sake, use the term "lease" to refer to any PV system not fully owned by the homeowner. PPAs have the same general types of appraisal issues as leases.

7.5.1 Leased Photovoltaic Systems

If a system is leased (and most leases run for 20 years), then either periodic lease payments are being made or the lease has been paid in full. Regardless, a leased PV system is personal property (not real property), and personal property is usually excluded from value in many residential appraisals. However, the actual written leases are not personal property, as they encumber property rights.

As such, some users of appraisals have written policies stating when they will purchase loans on properties with PV systems.[30] When an assignment is for such users, a copy of the lease will need to be obtained and its terms and conditions compared with their policy. This can be done by any party, as long as that party is able to understand the terms of the lease. Most appraisers are not experts in interpreting legal documents such as leases; therefore, they may need to rely on the lender or another third party to make a determination. If a property with a leased PV system does not meet the user's guidelines and does not qualify for funding, this may impact the marketability or value of the real property.

If a PV system is leased and the assignment conditions do not involve taking secondary market conditions into account, the terms and conditions of the lease may still need to be understood. It might be appropriate to interpret the lease, require another party to interpret the lease, or disclose any extraordinary assumptions made about the lease.

Another complication with a lease is when a property has a HERS rating and the HERS rating includes the energy efficiency impacts of a leased PV system. If a leased photovoltaic system is personal property and therefore not given any consideration in the appraisal, it may be necessary to address this issue. It is plausible that the HERS rating may need to be modified to exclude the energy efficiency impacts of the leased PV system.

Last, even though the leased PV system is classified as personal property, there may still be other circumstances where this personal property (or the lease associated with the system) impacts value, marketability, or the final sales price of a property.[31] While the details of these possible circumstances are too varied to discuss in this Advisory, the more important issue is, as is necessary, being able to research and support opinions regarding the impact to value for leased photovoltaic systems – even if the systems themselves are personal property.

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[30] Refer to *Fannie Mae Selling Guide #SEL-2014-16*, the *Fannie Mae Selling Guide* or the *FHA 4000.1* handbook for specifics.

[31] Will Wade, "Rooftop Solar Leases Scaring Buyers When Homeowners Sell," *Bloomberg News Wire*, June 24, 2014, http://www.bloomberg.com/news/articles/2014-06-23/rooftop-solar-leases-scaring-buyers-when-homeowners-sell.

7.5.2 Owned Photovoltaic Systems

Currently, in almost all markets, public data does not identify whether a PV system is owned or leased. That information can typically only be obtained via a property owner or real estate agent. Even then, however, not all parties aware of the PV system will know its ownership status. Some property owners confuse an owned PV system with one that has a fully paid lease. Others may have acquired the property through an estate or as a foreclosure and therefore have no knowledge of the history of the property or the particulars of the PV system. As a result, if paperwork is unavailable for a specific PV system, it would not be unusual to make an extraordinary assumption[32] as to the ownership status of the PV system.

7.5.3 Considerations for Leased and Owned Photovoltaic Systems

Regardless of ownership, grid-tied photovoltaic systems typically entail a written agreement between the owner and the servicing utility company. That agreement can include clauses such as:

- The system may not be moved.
- The system may only be disconnected for a short time period (e.g., to install a new roof).
- The system must remain on the residence for 20 years.

These types of clauses might impact the value or marketability of a property. For example, while the highest and best use may be to tear down an existing residence (that has a PV system on its roof) and replace that residence with a five-unit building (without a PV system), the utility agreement associated with the existing residence's PV system may impact the ability to do this. Thus, just as is the case with a lease, the appraiser should interpret any signed agreements, require another party to interpret the agreements, and disclose any extraordinary assumptions made.

[32] Assuming an extraordinary assumption is appropriate for the assignment.

Section VIII: Three Approaches to Value

All three approaches to value (sales comparison, income, and cost) may be applicable to appraising residential properties with green and high-performance features.

8.1 Sales Comparison Approach

The sales comparison approach is applicable when there are comparable sales available. If residences with green or high-performance features exist in a particular area, there may or may not be sales of these residences.

8.1.1 When There is Adequate Comparable Sales Data

If there are sales of green residences in an area, they can be found through various sources, some of which include:

MLS[33]

Many MLS systems have areas where real estate agents can provide information on green or high-performance features. This includes "green fields" and the ability to attach green documents to a listing. While MLS data is the most common source for comparable sales, the data can be utilized in many other ways: regression analysis, paired sales analyses, statistical graphing, trending, absorption rates, etc.

Builders

Although builder data is not technically public information, it is common for builders to provide data and information about specific sales to appraisers. Green property builders have a vested interest in appraisers having access to sales data.

Rating, Labeling, and Certifying Entities

As noted earlier, entities that provide ratings, labels, and certifications are starting to offer public information on specific property addresses. Therefore, it may be possible to research these specific addresses to see when they last sold.

When there is adequate comparable sales data, the sales comparison approach has the same strengths and weaknesses for green properties as it does for any other property type.

8.1.2 When There is Inadequate Comparable Sales Data

A lack of comparable sales stems from one of three things: (1) a market has residences with green features, but none have sold (or sold recently); (2) a market has residences with green features, but the market participants do a poor job of recording those features; or (3) a market has few or no residences with green features. For example:

- The subject property is the first in its community to be built with certain green features (i.e., the market only has residences without green features).
- The most recent comparable sales are from two years ago (i.e., the market has residences with green features, but none have sold *recently*).

[33] For more information, go to http://www.greenthemls.org.

- The subject property is in a new community where all the residences have notable green features, but all of them have been custom built. The properties have never been offered for sale on the open market but are clearly the type of residence the market prefers (i.e., the market has sales, but market participants do a poor job of recording those features in an accessible repository).
- The subject property is one of numerous near net-zero properties with considerable green features, but the market is so strong, builders and realtors aren't adequately disclosing relevant features in venues beyond direct communication with buyers; the information isn't recorded where it is accessible to appraisers (i.e., the market has sales, but market participants do a poor job of recording those features in an accessible repository).

In such cases, there will be a need to explain why there is a lack of comparable sales, what was done about this lack of comparable sales, and what conclusions were drawn. An appraiser is dependent on what data can be extracted from the market and can only reach conclusions based on what specific data is available or not available. Not having data available is just as important to the appraisal conclusions as having data, since both speak to how relevant and important green features are to market participants.

8.1.1 Adjustments in the Sales Comparison Approach

Adjustments for green features are no different than adjustments for other property features: they can be derived with quantitative measures (paired sales analysis, cost data, depreciated cost data, income data, regression analysis, etc.) or qualitative measures (relative comparison, ranking analysis, etc.). The strengths and weaknesses of any data will need to be taken into consideration, and if the assignment includes a written report, conclusions and methodologies utilized should be disclosed within the report.

8.1.1.1 Example A: Sales Comparison Approach Using a Paired Sales Analysis (small data set)

In this example, four properties in one subdivision all underwent major remodeling. All were built around 1950 and are similar in square footage, quality of construction, lot value, and function. The four properties underwent nearly identical levels of renovation, with one exception: Property 4 opted to have the residence certified as a green building by a national company. To do this, Property 4 had to include numerous green upgrades, including materials efficiency, energy efficiency, water conservation, and improved indoor air quality measures.

The before and after sales prices of the four properties show that Property 4 realized a premium for its green features:

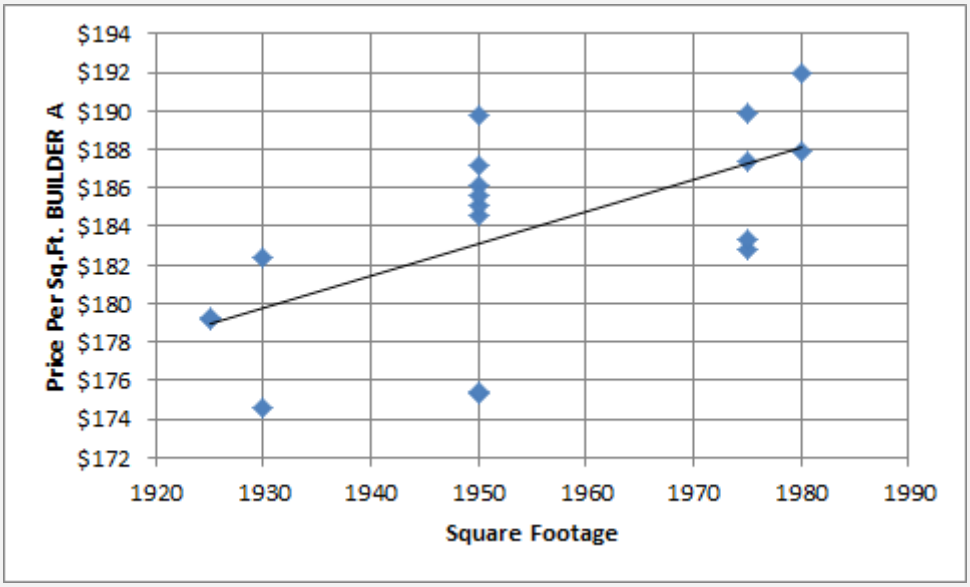
	Property 1	Property 2	Property 3	Property 4 (green)
BEFORE REMODEL	Sold 01/2012 for $150,000	Sold 02/2012 for $160,000	Sold 01/2012 for $145,000	Sold 02/2012 for $150,000
AFTER REMODEL	Sold 06/2012 for $250,000	Sold 05/2012 for $270,000	Sold 06/2012 for $255,000	Sold 06/2012 for $275,000
	$100,000 increase	$110,000 increase	$110,000 increase	$125,000 increase

As noted in the chart, the green property realized a market premium that was between $15,000 and $25,000 more than the properties without the green features.

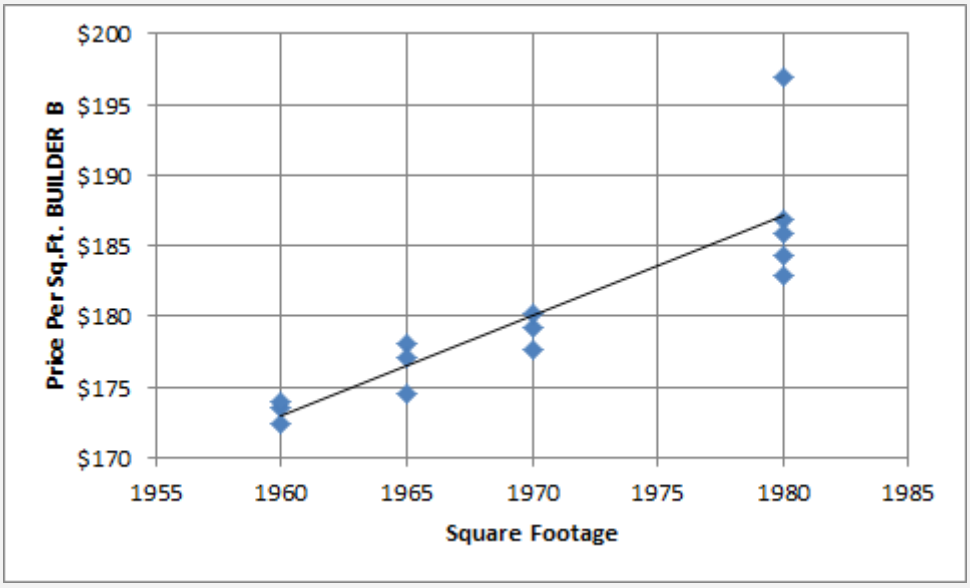
8.1.1.2 Example B: Sales Comparison Approach Using Linear Regression

In the following example, two builders constructed properties in a new subdivision. Builder A constructed residences to meet HERS ratings of 60-65, while Builder B constructed residences with an upgraded "green package." Builder B reports the green features add $5,000 to the sales price and the residences now meet HERS ratings of 50-55.

Because the MLS data recorded the vast majority of the sales in the subdivision, it was possible to download the 30 sales that occurred in the subdivision in the past year (the past year was a stable market). The sales were sorted by builder and graphed:



Builder A sold residences with sales prices that ranged from $175 to $192 per square foot. The average was $183 per square foot.



(*continued on following page*)

Builder B sold residences with sales prices that ranged from $173 to $198 per square foot. The average was $180 per square foot.

The average sales price is $3 per square foot more for Builder A. Therefore, a 1,970 square foot residence, on average, would sell for $5,910 more for Builder A than for Builder B. This supports Builder A's statement that the "green" upgrades add $5,000 to the value of its residences.

8.1.1.3 Example C: Sales Comparison Approach Using a Ranking Analysis

A property is a semi-custom residence in a diverse market area. There are three generally similar comparable sales available. The subject property is one-year-old and has a LEED Gold® rating. To rank the comparable sales, arrange them based on overall similarity:

	Sale 1	**Sale 2**	**Sale 3**
Sale Price	$1,100,000	$900,000	$950,000
Green Rating	Similar	Inferior	Inferior
Quality of Construction	Superior	Inferior	Similar
Lot Value	Similar	Inferior	Similar
Square Footage	Similar	Superior	Similar

In the above example, Sale 1, overall, is superior to the subject property, and both Sales 2 and 3 are inferior to the subject property. The information can be used when reconciling the comparable sales. Sale 3 and Sale 2 are the most similar and thus will likely be given more weight in the reconciliation of values.

8.2 Cost Approach

Every green feature that impacts the cost to construct a residence is taken into consideration in the cost approach. In theory, this is simple. In reality, however, there may be barriers to gathering, disseminating, and judging the quality and dependability of the cost data related to green features. The type of cost data available will vary depending on whether the residence is new construction or is an existing residence.

8.2.1 New Construction and the Cost Approach

The actual cost data for a new residence may be available from the owner, builder, or mortgage lender. It is not unusual for this information to be accessible with new residences. However, the costs are typically neither standardized in how they are presented nor consistent in what they reflect. One builder may delineate all specific costs associated with green features, while another builder may only provide lump sum costs associated with the entire residence. Also, the pricing structures can either be the final expected costs ("guaranteed maximum") or they may only reflect starting costs ("cost plus").

Ideally, costs associated with green features would be delineated into incremental cost differences separate from conventional features. However, most builders do not track the costs this way and instead only have total cost data. This might be a problem for the appraiser trying to reflect a cost impact related to specific green features. If it is not possible to extract which costs are directly related to green features, then the available cost data may be limited in its usefulness. However, the Northwest Energy Efficiency Alliance has produced a *Cost Data Addendum for High Performance Homes* tool that may prove useful in some situations.[34] The addendum can be filled out by any qualified party and thus can provide supporting documentation for the cost impact of green features.

If exact cost data is available for one green residence, it can be compared with the costs of another residence with fewer or no identifiable green features. This includes comparing the sales price of a new green residence with the developed cost approach of a non-green residence.

8.2.1.1 Example A: Using the Cost Approach in New Construction

A local builder experimented with new construction methods which minimize waste, while maintaining the same functionality and energy efficiency which could be attained by the old methods. In the example below, the builder calculated the difference in construction cost when using two different methods. The conventional technique involved double walls (2 x 4 walls, studs 16" on center, constructed 5.5" apart). The second technique used double-wall construction of a type which required less framing lumber and slightly less R19 insulation. The differences in construction cost are illustrated below:

Conventional construction techniques				
Item	Qty		Unit $	Subtotal $
Studs	1250	ea @	$1.20	$1,500.00
Headers	425	bf @	$0.75	$318.75
Plates	252	bf @	$2.50	$630.00
Plate ties	26	ea @	$11.00	$286.00
Framing labor	1	ea @	$2,600.00	$2,600.00
Insulation installed	2365	ft @	$1.40	$3,311.00
Total				$8,645.75

Construction with conservation of materials during the process				
Item	Qty		Unit $	Subtotal $
Studs	950	ea @	$1.20	$1,140.00
Headers	160	bf @	$0.75	$120.00
Plates	126	bf @	$2.50	$315.00

[34] See http://neea.org/neea-newsroom/press-releases/2012/10/15/northwest-appraisers-welcome-real-market-green-building-cost-data.

Plate ties	26	ea @	$11.00	$286.00
Framing labor	1	ea @	$1,200.00	$1,200.00
Insulation installed	1500	ft @	$1.10	$1,650.00
Total				$4,711.00

Conventional construction techniques		$8,645.75
Conservation of materials techniques		$4,711.00
Estimated construction cost savings		$3,934.75

In this example, the builder saved $3,934.75 when building a residence utilizing fewer building materials than are typically used in conventional construction. This illustrates the possible cost savings attributed to a green building concept regarding the conservation of materials during the construction process.

8.2.1.2 Example B: Using the Cost Approach in New Construction

One way to extract cost figures for green residences is to compare the recent market sale of a green residence with the appraiser-generated cost figures associated with that same building as if it were a conventional residence. In the following example, the residence is 2,500 square feet (above grade), without a basement or a garage.

COST APPROACH USING THE SALE PRICE OF A PROPERTY:
The subject property's lot value was $300,000 (based on land sales).
The residence sold for $800,000.
Therefore, costs associated with the residence were:
$800,000 - $300,000 = $500,000.

$500,000
$500,000 / 2,500 (square feet above grade) = **$200 per square foot**

COST APPROACH USING THE MARSHALL & SWIFT RESIDENTIAL COST HANDBOOK:
The subject property's lot value was $300,000 (based on land sales).
Marshall & Swift indicated that the cost to construct the property (to code) was $750,000.
$750,000 - $300,000 = $450,000

$450,000
$450,000 / 2,500 (square feet above grade) = **$180 per square foot**

In conclusion, the above data suggests a $20-per-square-foot adjustment for the green-built residence, based on cost data alone. The cost data would then be tested against other market indicators before being utilized.

8.2.2 The Existing Residence and the Cost Approach

To utilize the cost approach for existing residences, cost data can be extracted from similar new residences or from nationwide services providing cost data. To adequately utilize the cost data, it is necessary to understand exactly what the costs reflect. For example:

- Do the costs reflect only code-built features?
- Do the costs reflect green features?
- Do the costs reflect additional costs associated with emerging green features (which often have higher costs as the market works out the most efficient ways to incorporate and build these newer features)?
- Is the cost estimate generated with an adequate amount of data?
- Do the costs reflect typical market costs or just one specific custom residence?
- Does the cost data reflect local costs (materials as well as labor rates)?
- Do the costs include profit and marketing costs?
- Is the data reasonably recent?

8.2.3 Depreciation and the Cost Approach

In addition to judging the quality and applicability of the cost data, depreciation associated with green or high-performance features will also need to be addressed. Depreciation includes obsolescence (functional and external) and normal wear and tear (physical).

Functional Obsolescence

Green features will have functional obsolescence if they are superadequate (overbuilt or otherwise in excess of what the market desires) or if they cause a deficiency in the property. A 30kW photovoltaic system may be considered too large for residences in a particular market segment, unless perhaps the market appreciates surplus power that can be resold to the utility. A residence can be built with too great of an emphasis on green features. Examples include the minimization of windows to a point where view- and light-related amenities are compromised (deficiency), or cumbersome or overly complex control systems (superadequacy).

External Obsolescence

External obsolescence in green properties stems from changes in influences that are outside of the property. The most common way to measure the impact of external obsolescence is with a paired sales analysis. If, for example, a neighborhood places great value on high levels of energy efficiency and is suddenly given access to subsidized energy, the neighborhood may no longer place any value on this feature. Hence, each property in the neighborhood did not change; the market changed around it. A comparison of these residences with ones in a similar neighborhood—that pay substantially more for energy—will likely provide data on any impacts to value or marketability.

Normal Wear and Tear

Green features may depreciate at the same rate, a slower rate, or a faster rate than other features in the residence. Depending on whether green features are inseparable from other features (i.e., the overall level of energy efficiency or sustainable building practices) or not (a solar photovoltaic system), it may not always be possible to adequately reflect or calculate their depreciation.

8.3 Income Approach

For green features, "income" is the money a homeowner (or tenant) will likely save based on things such as lowered utility bills or spending less money to maintain a property. To develop the income approach, a discounted cash flow (DCF) analysis or a gross rent multiplier (GRM) can be utilized.

8.3.1 DCF Analysis

A DCF analysis provides an indication of present value of future income. Energy cost savings can be capitalized using a reasonable capitalization rate (such as a local utility capitalization rate or a current mortgage interest rate).

One example of a DCF analysis involves a grid-tied solar PV system. PV systems generate electricity. The electricity generated allows the homeowner to purchase that much less electricity from a utility grid, and this savings results in income for the owner. Using a DCF analysis, this production amount can then be converted into a specific dollar amount (i.e., future value), then discounted to a present value.[35] Savings attributable to energy efficiency features represent benefits similar to those from a PV system, but are less commonly considered and currently more difficult to quantify.

Thus, while a DCF analysis can technically be utilized with any estimated income (e.g., energy supply or savings) amount, it is not always reasonable to do so, depending on what the income figures reflect and how reliable they are. When the income being analyzed is based on *estimated savings* and not on a *known income* (e.g., the monthly rent a landlord collects under a lease is a *known income* amount), then the savings figures need to be closely examined. For example, when the cost approach or the sales comparison approach has identified superadequacies in a property, the value indicated by a DCF analysis may not be reflective of the market. This would occur when the features associated with energy savings are undesirable to prospective buyers. Note: Green and high-performance appraisal considerations for income properties are treated in more depth in Advisory #6.[36]

Example of a DCF analysis:

A property has two HERS reports. One was issued prior to an energy-efficient remodel and the other was issued after an energy-efficient remodel. Before renovation, the property had a HERS rating of 210 and estimated annual utility costs of $2,000. After renovation, the property had a HERS rating of 70 and estimated utility costs of $1,350, an annual savings of $650.

In this instance, the estimated annual utility cost savings are known and supported with reliable documentation. Also, the estimated utility savings are reflective of information widely available in the marketplace. Therefore, it was reasonable to use the $650 annual estimated cost savings to develop the income approach.

[35] Sandia National Laboratory offers a free DCF analysis tool for photovoltaic systems at http://www.pvvalue.com, and the Appraisal Institute's Residential Addendum provides forms for collecting the data.

[36] The Appraisal Foundation, Valuation Advisory #6*: Valuation of Green and High Performance Property – Background and Core Competency*, 2015.

A present-value calculation was made using the "Economics of Energy Efficiency" free software tool available at www.energytools.com.[37]

INPUTS:

Useful Life: 20 years
Annual Energy Savings: $650
Financing Interest Rate: 4% per year

Net Present Value: $8,834

The income approach indicated a contributory value of $9,000 (rounded up from $8,834).

The three entities most commonly providing savings figure estimates are third-party certifiers, utility companies, and the manufacturers of specific features.

Third-Party Certifiers

Many entities that rate, label or certify properties may provide utility estimates in their reports. These figures can be either the estimated annual utility *costs* or the estimated annual utility *savings*. Both can be useful figures, but they should not be confused with one another. Once the type of utility estimate provided is understood, these figures can be compared with the figures from other properties. The monetary difference between them can be used to develop the income approach—assuming this is reflective of the appraiser's market segment.

When comparing utility expenditures for several properties, it is important to note the effective date of the data and whether any notable changes were made to the residences after this. Older estimates (and just how old "old" is will be market dependent) and estimates in existence prior to changes being made to a residence may no longer be reliable indicators of utility costs or savings.

Utility Companies

Information and data from a utility company can be either public or private. If the data is available publicly, it may be possible to acquire utility costs for multiple properties. With a large enough data set, it is possible to calculate a pattern or trend between actual utility use and market value. However, it should be noted that since actual consumption is heavily influenced by occupant behavior, a property's specific utility bills may be a less reliable measure of overall performance than its estimated annual utility costs, such as noted above. If both the estimated and the actual annual utility costs are available, this provides an even more powerful and credible data set to analyze. Differences between these values help quantify the effect of a specific occupant's behavior that results from standardized operational assumptions—thermostat settings, laundry usage, cooking, etc.— as is done in benchmarking methodologies (e.g., the Home Energy Score).

Manufacturers of Specific Features

It is very common for the manufacturers of individual green features (e.g., high-efficiency furnaces, windows, appliances, water heaters, windows) to provide estimated annual utility costs for *a* particular

[37] The online tool is a shortcut way to perform a DCF analysis. The formula uses the same calculations an appraiser would enter into an HP-12C calculator. For an in-depth discussion of the formula used for a DCF analysis, refer to page 55 of the Appraisal Institute's publication, *Residential Green Valuation Tools* by Sandra K. Adomatis, SRA, LEED® Green Associate™ (2014).

product. These figures, however, typically only prove useful if the product is a stand-alone feature (e.g., a solar photovoltaic system) and not a feature that interacts with others (e.g., the efficiency of a furnace depends on it being right-sized and having the appropriate ductwork, and its energy use depends on how efficient the building envelope is). This is because estimates associated with features that interact with others do not denote the product's *actual* impact on the overall residence's performance levels (unless, of course, an energy audit or performance testing is conducted). Thus, since performance is an intertwined entity, estimates of utility figures derived from just one interactive product are typically not indicative enough of utility savings to justify using the income approach.

GRM

If the utility savings or total utility costs can be adequately quantified compared with that of other properties, it can be capitalized using a market-derived GRM. For example, an appraiser can capitalize the average monthly savings realized with a PV system using a locally developed GRM—when such savings are both quantifiable and relevant to the market segment.

Example of the Income Approach Using a GRM

A property investor purchased a residence for $200,000. The residence was typical and conforming for the area. At the time of purchase, a tenant whose lease had just expired was paying market rent of $1,400 per month. The GRM therefore was 143 (the accepted market GRM).

After purchasing the residence, the investor immediately installed a 5kW photovoltaic system. The installer provided documents showing the system would save $60 per month in electric bills. Using this information, the investor advertised the property for rent at $1,500 per month ($100 over typical market rent). Two renters were immediately interested in the property at $1,500 per month, and one signed a year lease (for $1,500 per month). Both tenants were very interested in paying lower utility bills.

The value indication using the actual savings is $60 x 143 = $8,600 (rounded).
The value indication using rent increase is $100 x 143 = $14,300 (rounded).

Depending on other market data the appraiser gathers, one or both of the indicated value figures may be appropriate to cite in the appraisal.

Section IX: Reporting

There are various ways to report the presence, relevancy, and impact of green features when a written appraisal is part of an assignment. While some clients request that specific language or standardized forms be utilized, most do not. For example, to date, most end users (that is, Fannie Mae, Freddie Mac, FHA and VA) of residential appraisals have no specific form dedicated to green property features.

This is likely because it is easy to add any information to their generic forms. Within these generic forms, there are ways to address any notable green or high-performance features. For example, Fannie Mae's 1004 form includes several different *sections* (e.g., "Site," "Improvements") and *fields* (e.g., "Additional Features," "Quality of Construction," "Functional Utility," "Energy-Efficient Items"[38]) that can be used to report green features. Although space is limited on the actual form, additional information can be placed in an addendum or attached to the report.

Even though these clients do not require a special form for reporting green features, they have guidelines for addressing green features—especially energy-efficiency features.[39] Since the guidelines are updated and change often, they will not be summarized here. Competency involves having knowledge of the assignment conditions, including these secondary guidelines, as they are applicable to the assignment.[40]

Last, what information and which attachments (if any) are included in the report will be assignment specific and determined by the appraiser. The appraiser can provide any amount of narrative or any number of exhibits, or retain documents in the workfile and make reference to them in the written report. While the *Uniform Standards of Professional Appraisal Practice* have no unique requirements related to reporting green features, the appraisal profession and its interested associates have developed several different special forms just for reporting green features. That said, there are a few general forms that may be useful in some instances:

Fannie Mae form

Although retired, the *Fannie Mae 1004A/Freddie Mac 70A Energy Addendum* provides areas to:

- Provide a checklist of energy features
- Describe special features or construction techniques
- Report estimated monthly savings associated with certain improvements
- Show any calculations used to make any adjustments for energy cost savings

Appraisal Institute form

The Appraisal Institute has developed the *Residential Green and Energy Efficient Addendum*, providing a way to report green features (including energy-efficient features and solar PV systems) and incentives associated with those features. The form also provides a basic overview of the elements of green building and some of the more common terminology used by the building industry.

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[38] This field, however, can become confusing. The 1004 Fannie Mae form was originally designed when energy efficiency was thought of as an "item." Today, energy efficiency is more often identified as a "level" and not just an "item." Therefore, it may be necessary to explain when a particular market segment identifies energy efficiency by "level" and not by "item."

[39] For example, see the following: *Fannie Mae Selling Guide* sections B4-1.3-05, B5-3.3, and B5-3.3-01, and Fannie Mae's *Mortgage Loans with Energy Improvement Features on Existing Properties* (04/09/2013).

[40] The Information Atlas contains contact information for each major secondary market participant.

While any party can fill out the form, it is preferable the form be auto-populated by a HERS energy rater, as many of the items noted in the form are not readily visible during the appraisal inspection. The filled-out form can be provided to an appraiser familiar with valuing these types of properties, and this will help determine the scope of work necessary for the assignment.

Northwest Energy Efficiency Alliance (NEEA) and Social Environmental and Economic Consulting, LLC (SEEC, LLC) form

The NEEA and SEEC, LLC form is titled the *Cost Data Addendum for High Performance Homes*.[41] The form offers a way to report the actual incremental[42] construction costs for green components in a specific new residence. The addendum is intended to be filled out by the builder/contractor and, like the Appraisal Institute form, covers many different components related to green building and rebates, as well as certifications, labels, and ratings.

[41] Available on the Northwest ENERGY STAR® website: http://www.northwestenergystar.com/partners/home-builders?tid=All&page=2.

[42] One weakness is that builders may not complete their cost bids using an "incremental cost" concept.

Section X: Conclusion

Not all green or high-performance features will be relevant—or even necessary—to identify in an appraisal.

Green and high-performance property features should undergo the same level of scrutiny as any other property feature, regardless of how much data is or is not available. Lack of data is not an issue unique to residences with green or high-performance features. For every market segment, there will be different data sources available with different information and levels of reliability.

The level of research, documentation, and disclosure of green property features will be determined on a case-by-case basis and thus will be unique for each appraisal assignment. Every market will define green and high-performance features differently, place different importance on these features, and value them differently. It will always remain the appraiser's job to determine which green principles are relevant to a particular assignment, regardless of what is common in the international, national or local market.

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