2012-2013 UPDATE COURSE

WHAT *IS* "GREEN" BUILDING?

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Learning Objective: Upon completing this section, licensees should have a better understanding of the primary rating standards used in the United States to certify structures as energy efficient or green and the distinction between a structure that has been certified as "energy efficient" versus a structure that has been certified as "green" or "green built."

INTRODUCTION

In recent years, an increasing percentage of the population has become more aware of and concerned about various environmental and ecological issues, including stewardship of our natural resources and man's impact on his surroundings. This increased sensitivity and awareness has spurred some consumers to assess factors such as energy efficiency and environmental impact when comparing various products to purchase and has prompted some vendors to engage in "greenwashing." The EPA defines "***greenwashing***" as "*[T]he practice of advertising a product or process as "green" or environmentally friendly, when the product really is not, or does not achieve the advertised marketing claims. A false or misleading picture of environmental friendliness used to conceal or obscure damaging activities*."

It has only been within the past two to three decades that attempts have been made to qualify or define what is meant by labels such as "energy efficient" and "green built" to provide guidelines for industry and consumers. This section will explore those labels — what they mean, by what measurement standards, and who certifies compliance. Why? It is important that licensees understand that ***certain terms may have a specific meaning and licensees must use such terms accurately and appropriately when marketing or describing a property's features to avoid negligent misrepresentations***. While numerous "green" standards may exist, whether at the international, state or local level, this Section will mention what are believed to be

the *primary evaluation standards used in the United States* to assess energy efficiency, as well as green construction in residential and commercial structures. The *common elements of the various standards discussed herein are that they were all developed by consensus and require third party verification of compliance to be certified at any given level*.

This section will ***not*** explore the evolution of the green/energy efficient movement, nor provide an economic assessment of the cost/benefits of utilizing energy efficient or green building concepts, nor review various financial incentives available to consumers, of which there are many. **There are numerous resources available to licensees who are interested in learning more about energy efficiency, green building, sustainability and renewable energy sources, including various Real Estate Commission approved continuing education courses on these topics ranging from 4 to 8 hours, longer courses offering specific designations in this area, and a host of websites providing a wealth of information, some of which are referenced at the end of this section.**

BACKGROUND

Social consciousness in the United States concerning "green" considerations in buildings and lifestyles began emerging in the 1960s and 1970s, spurred in part by the spike in oil prices in the 1970s, coupled with a growing environmental movement that championed conservation, stewardship of resources, and consideration of alternate renewable energy sources, rather than reliance on traditional depletable fossil fuels. Various entities, both governmental and private, engaged in research to explore ways of improving energy efficiency and to find and harness sources of renewable energy. While the primary research focus originally was energy efficiency, some pioneers began experimenting with contemporary green building concepts.

Nonetheless, it was not until the *early 1990s that formal attempts were made to develop standards that could be applied more objectively to evaluate how energy efficient a product or structure was and what minimum standards must be met before a structure could be called "green."* These early attempts to promulgate guidelines or standards included the following:

- The American Institute of Architects (AIA) formed a Committee on the Environment in 1989 and published an *Environmental Resource Guide* in 1992, funded in part by the Environmental Protection Agency;

- The U.S. Environmental Protection Agency (EPA) in conjunction with the U.S. Department of Energy (DOE) introduced the ENERGY STAR program in 1992.

- The U.S. Green Building Council (USGBC) was founded in 1993 and published its first version of Leadership in Energy and Environmental Design (LEED) in 1998.

- The National Association of Home Builders (NAHB), which had introduced the term "green building" in the 1980s, formed a Green Building Subcommittee in 1998, held its first annual green building conference in 1999, and developed the Model Green Home Building Guidelines in 2006.

The federal government also initiated several programs during the first decade of this century promoting energy efficient and sustainable building practices in federal buildings. This history is contained in a report by the Office of the Federal Environmental Executive titled "*The Federal Commitment to Green Building: Experiences and Expectations*" which may be found on the EPA's website. The EPA formed a Green Building Workgroup in July 2003 to consolidate the various programs within the Agency that worked with builders and developers to improve environmental performance. It issued its "Green Building Strategy" in 2008 to guide the Agency's green building initiatives.

The ***common threads*** linking all of these initiatives regardless of source were ***improving energy efficiency to reduce greenhouse gas emissions and the corresponding "carbon footprint" while realizing economic savings from decreased utility costs over the life of the product and conserving our non-renewable energy resources, e.g., fossil fuels***.

What are "Greenhouse Gases" (GHG)?

Approximately 30% of the sunlight hitting the Earth's atmosphere is deflected back into outer space. The remaining 70% reaches the Earth's surface, warming it and heating the atmosphere, and is then reflected upward again as slow-moving energy called "*infrared radiation*." The heat from this infrared radiation is absorbed by gases that slow the heat's diffusion back into space, creating what has been dubbed the "***greenhouse effect***." These thermal gases are necessary to sustain human habitation and our current ecosystem, as scientists estimate that without these thermal gases the average temperature on Earth would be 54 degrees Fahrenheit cooler.

The most abundant ***naturally*** *occurring* "greenhouse gases" in order of their prevalence are:

- water vapor (H_2O)
- carbon dioxide (CO_2)
- methane (CH_4)
- nitrous oxide (N_2O)
- ozone (O_3)

While the foregoing gases are naturally present in our atmosphere, they also result from human activities. For example, both carbon dioxide and nitrous oxide are emitted into the atmosphere whenever solid waste or fossil fuels (oil, coal and natural gas) are burned. Burning wood products releases carbon dioxide. Methane is released whenever organic waste decomposes, whether in landfills or as a result of livestock farming, as well as during the production and transport of fossil fuels. Both carbon dioxide and methane are colorless and odorless (but methane is flammable). Nitrous oxide is colorless, but has a sweet odor, and is released from the production of livestock feed containing large amounts of nitrogen based fertilizers, as well as from livestock waste.

In addition to the naturally occurring greenhouse gases, there is a group of synthetic greenhouse gases known as ***fluorinated gases*** created by various industrial processes. These include *hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF6).*

Hydrofluorocarbons have replaced chlorofluorocarbons (CFCs) which were banned in the 1970s due to their adverse impact on the Earth's ozone layer. While HFCs do not have the same effect on the ozone layer, they still are a potent greenhouse gas because of their ability to retain heat.

Understand that ***not all greenhouse gases are equal in their heat-retaining capabilities***. HFCs and PFCs are the most heat-absorbent gases and are sometimes referred to as *High Global Warming Potential* gases (high GWP gases), but in the naturally-occurring category, nitrous oxide absorbs 270 times more heat per molecule than carbon dioxide, and methane absorbs 21 times more heat per molecule than carbon dioxide, although carbon dioxide still accounts for 60% of the greenhouse effect.

International Code Council

In 1994, three separate model code organizations together formed the *International Code Council (ICC)*, a non-profit organization, for the purpose of developing national, if not international, model codes to provide uniform standards. Originally focused on building safety, the ICC's purview over the years has expanded from building codes to presently include 15 model codes addressing such subjects as energy conservation, mechanical, residential, green construction, zoning, private sewage disposal and numerous other topics. (See www.iccsafe.org.)

The last complete ***energy conservation code*** formulated by the ICC is the *2009 International Energy Conservation Code (IECC)*, although it is being revised in 2012. The 2009 IECC was the springboard for the most recent **North Carolina Energy Conservation Code (NCECC)** promulgated in late 2010 and **effective January 1, 2012**. The 2012 NCECC used the 2009 IECC as a guide, but is not identical, as the NCECC contains amendments and revisions that are specific to North Carolina. The new Code requires improved insulation levels, window performance and building envelope air leakage reduction. The North Carolina Code also includes a "***High Efficiency Residential Option*" (HERO)** appendix that delivers 15-20% more energy efficiency than the base 2009 IECC. Reducing one's energy consumption by 15% is equivalent to parking your car for two months, or planting 200 trees.

Home Energy Rating System (HERS)

The *Home Energy Rating System* (**HERS**) provides a national standard for measuring the energy efficiency of a home and was developed by **RESNET**, the *Residential Energy Services Network*, a 501(c)(3) corporation officially incorporated in 2002 into which its predecessor, the non-profit Energy Rated Homes of America was merged. RESNET's members include state and national governmental agencies, energy companies, rating providers, academics, and research institutes, among others. RESNET defines the procedures for rating new and existing homes, training and certifying raters, and managing a nationally consistent quality assurance process. All ENERGY STAR certified homes are evaluated by independent raters supervised by a RESNET-accredited HERS Provider.

How Rating Determined

A HERS rating is a number that indicates the energy efficiency of a home and has been likened to the "miles per gallon" ratings for automobiles. The rating is determined by dividing the projected energy consumption of the subject home by the projected energy consumption of a reference home and multiplying by 100. The "***reference home***" *is a home of the same dimensions in the same climate zone that is* ***built in compliance with the standards of the model energy code*** *and has an assigned HERS index of 100*. The software used to calculate the energy consumption of a home considers the areas and insulation values of the walls, windows, ceilings, floors, etc. (often referred to as "the thermal envelope"), the efficiency of the heating, cooling and hot water systems, the lighting systems, the appliances, and energy loss through air infiltration and duct leakage.

Under HERS, homes are rated on a scale of 0-150 with the reference home rated at 100. Most existing homes fall between 120-150. **In *residential* evaluations, the higher the number, the less efficient the structure**. *Each point on the scale is equivalent to a 1% reduction in energy consumption*. Thus, a house with a HERS rating of 70 would be 30% more energy efficient than the reference home built according to the applicable energy code and 70% more efficient than an existing home with a 140 HERS rating. HERS raters often will conduct a "Blower Door test" as well as duct blasting tests to gauge how tight a house is sealed. HERS certified raters are used by various programs to determine eligibility for certifications, including both ENERGY STAR and the NAHB's National Green Building Standards program. ***NOTE however****, that a property may have a HERS rating* ***but not be certified*** *as either ENERGY STAR Qualified or "green-built."*

ENERGY STAR PROGRAM

The EPA first introduced the ENERGY STAR program in 1992 as a voluntary labeling program to identify and promote energy efficient products in hopes of reducing greenhouse gas emissions. Initially, the program applied only to computers and monitors, but expanded significantly over the next three years to include office equipment and heating and cooling systems. In 1996, the EPA partnered with the DOE to develop guidelines for various product categories, and ultimately expanded its ratings programs to include residences and commercial and industrial buildings.

According to the EPA's 2010 ENERGY STAR report, the program now encompasses *more than 40,000 products in more than 60 categories* including major appliances, office equipment, lighting, home electronics, and heating and cooling systems. Additionally, the ENERGY STAR program has established *energy performance rating systems* for new homes, existing homes, commercial and institutional buildings, as well as manufacturing facilities. Note that ***ENERGY STAR focuses* SOLELY *on assessing energy efficiency and performance***. It does **not** evaluate other aspects or features typically considered in "green building" that will be discussed later. Information concerning the rating standards for any given category or product may be found at www.energystar.gov.

The ENERGY STAR website frequently refers to "green building" or "green homes" which, unfortunately, may give the public the impression that ENERGY STAR certification means a building is "green-built," which technically is *not true*. The criteria for qualifying a structure as "***green-built***" go far beyond considerations of energy efficiency alone. The ENERGY STAR website acknowledges this reality in subtle statements such as "energy efficiency is the place to start" when looking for a green home and that a homeowner will have addressed "two critical green home elements" when purchasing an ENERGY STAR Qualified home that is also certified under ENERGY STAR's IndoorairPlus standard that assesses indoor air quality.

Qualifications and Assurances

Even though ENERGY STAR qualification technically is *not* synonymous with green *built*, it still is *highly significant and hugely important* as consumers rightfully anticipate reaping savings on their utility bills in addition to the feel-good aspect of environmental stewardship through more efficient, and thus less, energy consumption, conserving the planet's resources and lessening carbon pollutants. The ENERGY STAR label confirms that one of the major goals of green building, e.g., energy efficiency, has been accomplished. ***ENERGY STAR is the only government backed certification program for energy efficiency and it independently establishes the qualification criteria in the various product categories to earn the ENERGY STAR label***. Typically, in the residential arena, to qualify for ENERGY STAR certification, a house must be at least 15% *more energy efficient* than one built in compliance with the applicable energy conservation code, as the *code establishes the minimum requirements* with which *all* new construction must comply. What structures are eligible for ENERGY STAR qualification, what does the certification mean, and what may the consumer reasonably expect?

Residential Structures

Any ***residential structure three stories or less*** may apply for ENERGY STAR certification including (per EPA's website): "*site-constructed homes, attached or detached homes, single or low-rise multi-family buildings, manufactured homes, systems-built homes (e.g., SIP or modular), log homes, existing homes, or retrofitted homes*." A home may qualify for an ENERGY STAR rating by following a "*Prescriptive Path*" if it meets or is less than the "*Benchmark Home Size*." The benchmark home size currently is 1000 square feet for a one bedroom home, and adds 600 square feet for each additional bedroom, e.g., 2 bedrooms = 1600 SF, 3 bedrooms = 2200SF, etc. If the "conditioned floor area" (square footage) exceeds the benchmark home size, then the home must qualify via the "*Performance Path*." The Performance Path utilizes energy modeling to determine an ENERGY STAR HERS Index Target which is different for each home and depends on the size, location and orientation of the subject home.

Features of an ENERGY STAR qualified home

The EPA lists six components that comprise an ENERGY STAR evaluation. If the label is granted, then consumers know that the features listed below have been tested and certified as

performing satisfactorily according to the standards required by whatever ENERGY STAR Version was applied to evaluate the home. There have been at least 4-5 versions of the standards and the ENERGY STAR label will indicate certification under a particular ENERGY STAR Version *X*. ENERGY STAR Version 3.0 rating criteria was just released and became effective January 1, 2012. Each successive version establishes more stringent standards. Copies of the current and prior ENERGY STAR Versions may be found at www.energystar.gov.

Residences for which permits were first issued *after 1/1/2012 must comply with Version 3.0*. Structures initially permitted between 4/1/2011 and 12/31/2011 may be qualified under ENERGY STAR Version 2.5 **IF** the final inspection occurred prior to July 1, 2012. If the final inspection occurred after July 1, 2012, the structure must satisfy Version 3.0 standards to be qualified. Thus, as a practical matter, all homes seeking ENERGY STAR certification must now satisfy ENERGY STAR Version 3.0 standards. If granted, ***the ENERGY STAR label is to be affixed to the circuit breaker box in the home*** *and the Certificate of qualification under ENERGY STAR Version 3.0 (at present) is given to the owner*. The energy efficiency of a home constructed in compliance with *both* the 2012 NCECC *and* the optional *High Efficiency Residential Option* (HERO) is believed to be comparable to that of a home certified under ENERGY STAR Version 3.0.

According to the national ENERGY STAR website, any residential property bearing the ENERGY STAR label will possess the following characteristics.

1. **Effective Insulation**. The floors, walls and attic will have been inspected to ensure that not only was the proper grade of insulation used, but that it was *properly installed* as well. "Proper installation" requires that the insulation be in contact with all surrounding surfaces, front, back, top, bottom, and both sides, to be fully effective. Effective insulation promotes uniform temperatures throughout the house, physical comfort, and reduced energy costs.

2. **High-Performance Windows.** Energy efficient windows are mandatory; often they have protective coatings and more efficient frame assemblies that help keep heat in during winter and out during summer in addition to blocking ultraviolet sunlight that may discolor carpets, rugs, furnishings or artwork.

3. **Tight Construction and Ducts.** Perhaps one of the most important factors in achieving energy efficiency is a well built, well-sealed home. Energy efficient appliances or HVAC systems cannot offset a house that's built like a sieve. Thus, sealing around *all* openings (doors, windows, ductwork, recessed light canisters, cracks, etc.) within the structure's "envelope" is critical to reduce, if not eliminate, leaks, drafts, moisture, dust, pollen and noise. A tightly sealed structure with controlled air exchanges maximizes energy efficiency, thereby reducing utility bills, and substantially improves both comfort and indoor air quality. The standards also require the rater to assess the adequacy of the flashing and moisture barriers to keep water from roofs, walls and foundations to improve both durability and indoor air quality.

4. **Efficient Heating and Cooling Equipment.** While a tightly sealed house will require less heating and cooling because less energy is escaping, the HVAC system in an ENERGY STAR qualified home must also be energy efficient. Such systems cost less to operate, are quieter, reduce indoor humidity, improve the comfort of the home, and often are more durable, requiring less maintenance than standard models.

5. **Lighting and Appliances.** While ENERGY STAR qualified homes most likely will also have other ENERGY STAR certified products, such as refrigerators, stoves, dishwashers, washing machines, lighting fixtures, ventilation fans and compact fluorescent bulbs, all of which would result in even greater energy efficiency, it does not appear that such features are absolutely required, if a home otherwise meets the stated energy efficient standards.

6. **Third-Party Verification.** Only verifications performed by an approved HERS rater who certifies that the structure meets or surpasses the ENERGY STAR standards dictated by the applicable Version are accepted. A builder may qualify through either the "Prescriptive Path" or through the "Performance Path," as mentioned earlier, and the procedures for each differ. Builders must be approved ENERGY STAR partners with a written partnership agreement, and HVAC contractors must be credentialed by an EPA-recognized HVAC Quality Installation Training & Oversight Organization. Information regarding Version 3 training, standards and applicability may be found at www.resnet.us/energystar.

Commercial Buildings

Commercial buildings may also qualify for ENERGY STAR certification through the **ENERGY STAR Commercial Builders Program**, although the criteria are not as exact or precise as those established for the residential certification process. In the commercial/industrial arena, the ENERGY STAR website offers a "Portfolio Manager," a tool that allows managers of certain types of buildings to input various information concerning the property and obtain an energy performance score. *This rating is calculated on a* ***scale of 1 to 100 based on surveys of similar buildings*** *in the national population*. The peer group is identified through the *Commercial Building Energy Consumption Survey (CBECS)* conducted every four years by the Department of Energy.

The survey gathers information from those who agree to participate and submit the requested information regarding actual energy consumption of buildings in various categories and the scale is then devised from this information for the next four years. ***A score of 50 means the building is performing energy-wise at the industry average***. *Contrary to the rating system for residential buildings* where lower scores are more energy efficient, when rating ***commercial buildings the higher the score the more energy efficient the building is.*** **A score of 75 or higher is required to obtain an ENERGY STAR label for a commercial building**. The factors considered in the equation are the type of building, its operating characteristics, and its energy data. Presumably, the benchmark will continually rise as more and more commercial structures improve their energy efficiency, thereby increasing the "industry average" in a given category.

Type of Building

To be eligible to obtain an energy performance rating, ***more than 50% of the building's gross floor space***, excluding parking lots and garages, must fall within one of the following fifteen categories, namely:

- Bank/financial institution
- Data Center
- Hotel
- Elementary/Primary School (K-12)
- Municipal Wastewater Treatment Plant
- Residence Hall/Dormitory
- Senior Care Facility
- Warehouse (refrigerated and non-refrigerated)
- Courthouse
- Hospital (general medical and surgical)
- House of Worship
- Medical Office
- Office
- Retail Store
- Supermarket

Several other limitations may also apply depending on what other space types are within the building that do not fall in the primary use category, but these additional limitations are detailed and well beyond the scope of this discussion. One enters data into the Portfolio Manager tool concerning key operating characteristics for each space use in one's building. The standards set minimum and maximum thresholds for certain values to "make sure that your building falls into an operation pattern consistent with that of the peer group used for comparison." One example of a threshold minimum is a requirement that:

1) all buildings minimally must have 5000 square feet *except*: a) banks and houses of worship may be as small as 1000 square feet; b) hospitals must be at least 20,000 square feet; and c) data centers have no minimum square footage requirements;

and

2) the facility must be in operation at least 30 hours per week *except* a) houses of worship and b) buildings for which no hours of operation are requested, e.g., hospitals and hotels.

To obtain an energy performance rating, one must input energy data from all active meters for an 11 consecutive month period.

ENERGY STAR Statistics

How many ENERGY STAR Qualified buildings are there? The following statistics are taken from the **2010 ENERGY STAR Annual Report** which may be found at www.energystar.gov. .

New Home Construction: 126,000 ENERGY STAR Qualified homes were built in 2010, representing 25% of housing starts in the United States. Total ENERGY STAR Qualified homes increased from approximately 25,000 in 2000 to more than 1.2 million as of 2010 and the number of ENERGY STAR building partners increased from 1600 in 2000 to 8400 in 2010.

Home Improvement: The ENERGY STAR home performance improvement program was implemented in 2001 or 2002. In 2010 alone 35,000 homes were retrofitted through this program, bringing the total to 110,000 homes. This program is being transferred from EPA management to the Department of Energy. The EPA offers an *online Home Energy Yardstick* that allows owners to compare their home's energy use to that of others across the country. Nearly 100,000 consumers used this interactive tool in 2010.

Commercial Buildings: The number of existing commercial buildings with an ENERGY STAR score increased from 4200 in 2000 to more than 200,000 in 2010 and eligible building types increased from only 2 in 2000 to 13 in 2010 (now 15). Between 2000 and 2010, the number of existing commercial buildings that had been certified grew from 545 to more than 12,600. Whereas there were no new commercial buildings designed to earn the ENERGY STAR designation in 2000, as of 2010, there were more than 300.

Total estimated utility savings from **all** ENERGY STAR products in 2010 was $20 billion, resulting in reduced greenhouse gas emissions equivalent to 38 million vehicles.

GREEN BUILDING

While energy efficiency is a key component of a green built structure, the requirements to be certified as "green built" go well beyond energy efficiency alone. Thus one could say that all green built structures will be energy efficient, but not all energy efficient buildings are "green built." The EPA launched a Green Building Strategy in 2008 the purpose of which is to "facilitate the mainstream adoption of effective green building practices" through public education and strengthening the scientific, technical, economic and institutional foundations of green building.

Traditionally, building codes have focused more on human safety and how the environment affects buildings. *Green building standards consider how buildings impact or affect the environment*. Buildings account for almost 40% of the total energy usage in the United States and 68% of total electricity consumption. They generate 40% of the national carbon dioxide emissions and consume 12% of the freshwater usage.

The EPA defines "***green building***" as, among other things, "*the practice of creating structures and using processes that are environmentally responsible and resource-efficient* ***throughout a building's life cycle*** *from siting to design, construction, operation, maintenance, renovation, and deconstruction*. This practice expands and complements the classical building design concerns of economy, utility, durability and comfort. Green building is also known as a sustainable or high performance building."

The goal of green building is to reduce the overall impact of buildings on the natural environment and human health by:

- efficiently using energy, water, and other resources;
- reducing waste, pollution and environmental degradation; and
- protecting occupant health and improving employee productivity.

The environmental benefits include protecting biodiversity and ecosystems, improving air and water quality, reducing waste streams, and conserving and restoring natural resources. Economic benefits include reduced operating costs, optimizing life-cycle economic performance, improved occupant productivity, and expanding markets for green products and services. While green building concepts may be integrated into buildings at any stage, the most significant benefits are realized when the design and construction teams take an integrated approach at the outset of a building project.

Existing Rating Standards

The first standards governing **residential green building**, titled *Model Green Home Building Guidelines*, were created in 2005 by the National Association of Home Builders and were developed in consensus with 64 other interested parties. Originally, the Guidelines applied only to new residential construction. These model guidelines became the springboard for the development of the International Code Council's **(ICC) 700-2008 National Green Building Standards (NGBS)**, which were approved by the American National Standards Institute (ANSI) in 2009. Certifications of compliance are performed by the NAHB Research Center. The ANSI-approved National Green Building Standards have now replaced the former *Guidelines*.

National Green Building Standards (NGBS)

The NGBS establish design and construction practices for ***residential*** projects including:

- new detached single-family homes, townhomes, duplexes, tri-plexes and quad-plexes;
- new multi-family residential buildings;
- residential portions of mixed-use buildings;
- single-family home additions that equal less than 75% of existing square footage;
- renovations of single-family or multi-family buildings;
- renovations and additions to single-family homes;
- renovations of pre-1980 residential buildings;
- renovations changing non-residential buildings into residential uses;
- individual sections or phases of residential or mixed-use developments, as well as the entire development or subdivision.

Note that ***renovations and additions to existing residences, which comprise approximately 90% of the housing market, may now be rated, as well as new construction***. The NGBS criteria rate buildings in six categories, namely:

1) **lot and site development** that minimizes disruptions and preserves open space;

2) **resource efficiency** considers materials and techniques used, such as wood alternatives, recycled building materials, and sustainably harvested lumber, as well as the local availability of these materials and costs to transport;
3) **energy efficiency** reviews the level of insulation used, the efficiency of the HVAC systems, and the presence of energy efficient appliances, lighting, and high performance windows;
4) **water efficiency/conservation** assesses use of water-efficient appliances and fixtures, filtration systems, *as well as* whether the landscaping is low maintenance or drought resistant;
5) **indoor environmental quality** considers the HVAC equipment, formaldehyde-free finishes, low-allergen materials, and use of products with minimum off-gassing or low volatile organic compounds (VOCs);
6) **homeowner education** through manuals and operating guides.

A minimum number of points must be scored in each category in order to receive one of ***four green certifications - either bronze, silver, gold or emerald***, with bronze being the lowest and emerald the highest certification. While there are some mandatory requirements that must be satisfied, the standards prefer to give designers, builders and owners a range of options or features from which to choose with each option having a corresponding point value. The specifications are incredibly detailed and complex and will not be reviewed here. However, the *energy efficiency component* of the rating must exceed the standards set in the 2009 International Energy Conservation Code for each level as follows: Bronze - 15% more efficient; Silver = 30% more efficient; Gold = 50% more efficient, and Emerald = 60% more efficient.

Leadership in Energy and Environmental Design (LEED)

The LEED standards originally were created by the United States Green Building Council (USGBC) through a consensus based process in 2000. *The standards are a nationally accepted benchmark for the design, construction and operation of high performance green buildings. Originally applicable to commercial buildings only, the standards have expanded to include new construction, major renovations, existing buildings, commercial interiors, schools and more recently, homes*. Rating systems for neighborhood development, retail and healthcare are currently being pilot tested. As with the NGBS, LEED is a *point based system*. Projects are rated in seven categories and must satisfy certain prerequisites, in addition to amassing the necessary points. There are five primary categories and two optional.

What LEED Measures

The five primary environmental LEED rating categories and the features they assess as described on the USGBC website are:

1) **sustainable sites:** encourages building on previously developed land or infill sites near existing infrastructure and away from environmentally-sensitive areas, promotes control of stormwater runoff and reduction of erosion, light pollution, heat island effect and construction related pollution, encourages regionally appropriate landscaping and smart transportation choices.

2) **water efficiency:** encourages more efficient appliances, fixtures and fittings inside and water-conscious landscaping outside.

3) **energy and atmosphere:** encourages a variety of energy-wise strategies including efficient design and construction, monitoring energy use, installing efficient appliances, systems and lighting, and using renewable and clean energy sources generated either onsite or offsite.

4) **materials and resources:** encourages use of sustainably grown, harvested, produced and transported materials and reducing waste through reuse and recycling.

5) **indoor environmental quality:** promotes strategies that improve indoor air and provide access to natural light, outdoor views and improved acoustics.

There are a total of 100 base points maximum from the above five categories. Additionally, a maximum of six points may also be earned in the optional **Innovation in Design** category which addresses sustainable building expertise as well as design measures not covered under the first five categories and rewards projects for including a LEED Accredited Professional on the team. The standards also allow up to four points in the other optional "**regional credits**" category for projects that address environmental issues facing their region. The LEED rating system is scheduled to be reviewed and possibly updated in 2012. The four current levels of LEED certification and the points necessary to attain each level are: ***Certified* = 40 - 49 points; *Silver* = 50 - 59 points; *Gold* = 60 - 79 points; *Platinum* = 80 points or more**.

LEED certification is provided by independent third parties who validate a building's compliance with LEED specifications. The certification process is administered by the Green Building Certification Institute (GBCI) through a network of professional third-party certification bodies. The GBCI also offers education and a professional credentialing program on three levels: LEED Green Associate, LEED Accredited Professional, and LEED Accredited Professional Fellow. More information on the credentialing program may be found at www.gbci.org.

Green Globes

Green Globes provides an alternate certification program to LEED. It was introduced to the United States by the Green Building Initiative (GBI) in 2004 and is patterned after a Canadian green building rating system that was first developed in the United Kingdom and known as *BREEAM, Building Research Establishment Environmental Assessment Method*. In the United States, Green Globes offers two assessment tools, one for new construction that has been available since 2005, and a recently introduced evaluation tool for Continual Improvement of Existing Buildings (CIEB). Both are intended to evaluate commercial buildings, rather than residential. The Green Building Initiative was accredited as a standards developer by the American National Standards Institute in 2005 and is in the process of seeking ANSI approval of its *Green Buildings Assessment Protocol for Commercial Buildings*.

Green Globes is touted as being more user-friendly and easier than LEED certification. It is a web-based interactive green building assessment tool that is questionnaire-driven. Users answer a series of questions with a combination of yes/no, not-applicable, multiple choice or date insertion responses. Questions become more complex as one proceeds through the assessment. Upon completing the questionnaire, the system generates a written report with suggested improvements and references to supplemental information. Online training is available on GBI's website (www.thegbi.org) or personal training may be arranged for a fee.

There is a two-stage third-party assessment process that includes review of various documents as well as an on-site walk-through of the building. The evaluations are conducted by GBI authorized and Green Globes trained assessors who typically are required to have experience in design, engineering, energy analysis/management, construction and/or facility management. The assessors review the completed questionnaire and attempt to confirm that the points awarded by the program are supported by documentary evidence, as well as a site visit to inspect and interview personnel. Scoring is based on a 1000 point maximum and a building minimally must obtain 350 points to qualify for a one green globe rating. Commercial buildings may earn a rating of one, two, three or four green globes. As with all assessment programs, there are attendant fees.

CONCLUSION

Almost any building, whether new or existing, residential or commercial, is now capable of being rated as to how energy efficient it is, and whether it is eligible for a "green built" certification. ***Questions to ask include not only what rating standards were utilized, but what version of those standards, who performed the certification, what the resulting score was and what documentation exists to verify the certification***. All of the rating programs discussed herein require compliance certification by third party verifiers, although the educational background and training of those verifiers will vary depending on what agency or group is issuing the approval. Credentialing requirements for any given program may be found on the approving body's website.

Certification under any program will entail certain fees or costs, depending on the program. All focus on a total systems approach, recognizing that each system supports and affects other systems for an integrated unified building. The most critical features of a building that impact how energy efficient it is are how well sealed it is around *all* openings (doors, windows, walls, ducts, light fixtures, exhaust vents, etc.), appropriate grade insulation *properly installed*, efficient heating and cooling systems and high performance windows. Licensees should be mindful that while energy efficiency is one of the primary goals of green building, an energy efficient building may *not* necessarily be green built. Licensees should choose their words carefully in describing the attributes of any given property. As previously stated, ***all green built structures will be energy efficient, but not all energy efficient structures may be certified as "green built."***

Licensees must understand the significance of and difference between these "terms of art" and use them correctly. ***Before*** a licensee makes any assertions (a.k.a. "representations") about a property or its features *in any forum*, the licensee should request written verification of the ENERGY STAR or green built certification from the owner. The certification should answer the above questions as to what version of whose standards were applied and who certified compliance. As with most important documentation, a prudent licensee will retain a copy of the certification in his/her transaction file, even if not technically required by the record retention rule. While new construction, whether residential or commercial, either qualifies or doesn't as energy efficient or green built, structures that have been renovated, remodeled or additions made may not be as easy to rate or describe. Having a copy of the applicable certification in the transaction file evidences reasonable discovery by a licensee and helps dispel doubt.

> **CAUTION:** Understand that merely because a property has ENERGY STAR rated appliances, lighting or HVAC systems does **NOT** mean the property has been certified as ENERGY STAR Qualified. Further, while some builders, developers, or owners may advertise that a structure has been "built to ENERGY STAR standards" or "built to LEED specifications" or "built to NGBS standards," ***this does not mean that the property has been* certified *as qualifying for the applicable designation***. In other words, "built to ENERGY STAR standards" does **not** mean that the structure has been certified as ENERGY STAR Qualified and a consumer who then applies for the utility credit for being ENERGY STAR Qualified will be very disappointed to learn they are not eligible for the credit, because the property is not in fact ENERGY STAR Qualified. **Always look for the ENERGY STAR label or obtain other written evidence that the desired designation has actually been awarded.**

As more consumers become interested in purchasing energy efficient products or buildings that have been certified as green-built, licensees who are more educated as to the characteristics of each and the costs/benefits over the life cycle of the building will have an advantage. The websites below are excellent resources from which to gain information regarding various tax incentives, rebates and special loan programs for energy efficient homes and products, as well as cost comparisons to build or renovate a building to be energy efficient. A list of all LEED certified projects, as well as registered projects (i.e., pending certification), in the United States or any specific state may be found at www.usgbc.org/LEED/Project/CertifiedProjectList.aspx for those who are curious as to what buildings in their area might be LEED certified.

One example of a LEED certified building of which some licensees may be aware is the National Association of REALTORS® building in Washington DC. Additionally, appended hereto is a description of some of the sustainability features incorporated into the North Carolina American Institute of Architects' Center for Architecture and Design located in Raleigh, NC (www.cfadnc.org) that has applied for a platinum LEED certification, as well as features incorporated into the Wells Fargo Duke Energy Center building in Charlotte, which has a platinum LEED certification.

Lastly, licensees (or at least REALTOR members) should be aware that some MLS organizations have incorporated a "Green Fields" category within TEMPO. It is believed that the Triangle, Triad and Charlotte MLS systems have this field available. Reprinted is the cover page from Green Fields. Explanations of the "Green Building Features," "Green Building Certifications," and "Green Building HERS Rating" are further explained within the TEMPO program, but are not reprinted herein. NAR also offers various green certification programs and initiatives, such as "Greening the MLS" to its members.

Recommended Websites

www.energystar.gov National ENERGY STAR program
www.ncenergystar.org North Carolina Energy Efficiency Alliance based at ASU*
www.epa.gov/greenbuilding U.S. Environmental Protection Agency
www.doe.gov U.S. Dept of Energy
www.usgbc.org U.S. Green Building Council (LEED)
www.resnet.us Residential Energy Services Network (certifies HERS raters)
www.nahbgreen.org NAHB Resource Center: National Green Building Stds & Certifications
www.thegbi.org Green Building Initiative: Green Globe standards
www.greenmadesimple.tv Videos, incentive programs, and energy saving tips
www.advancedenergy.com Advanced Energy - international corporation
www.dsireusa.org Database of State incentives for renewable energy & energy efficiency
www.ncsc.ncsu.edu NC Solar Center at NCSU
www.irecusa.org Interstate Renewable Energy Council

* This organization was formed approximately 2 years ago with a federal grant that has now expired; whether the organization will continue to exist is unknown, but there is a wealth of information, training videos and other resources on this website.

Green Fields in Some MLS Systems

The green movement is growing. More buyers are interested in acquiring a property with green features. Sellers who have invested in green features want prospective buyers to be aware of these benefits. Some MLSs have added data fields to their MLS system so agents may accurately describe and advertise the green attributes of a property. These attributes generally fall into the following categories: Green Building Features, Green Building Certifications, and Green Building HERS Rating.

MLS data fields are generally searchable so agents working with buyers are able to easily find homes with green features and/or certifications. This also permits appraisers to consider green features when determining the value of a home.

When selecting any of the "green" options in an MLS listing to describe or find a property, it is important to understand the meaning of each option. Below is a list of the green fields available in one N.C. MLS system.

Green Building Features

- □ Adv. Framing/Concrete Const.
- □ ENERGY STAR Light Fixtures
- □ ENERGY STAR Appliance(s)
- □ Engineered Wood Products
- □ EPA WaterSense Plumb. Fixt.
- □ Fresh Air Ventilation
- □ Geo Ther. Heat Sys. (Clsd Loop)
- □ Infill Lot
- □ No-Low VOC/Paints, Sealants, Varn
- □ Photovoltaics-Solar Power
- □ Radiant Heated Floors
- □ Rainwater Collection
- □ Recyled Const/Household Waste
- □ Sealed Combustion Firepl/Woodst
- □ Sealed Crawl Space
- □ Solar Hot Water
- □ Spray Foam Insulation
- □ Tankless Water Heater
- □ Xeriscaping-Drought Resist. Plnts

Green Building Certifications

- □ NAHB Certified Home
- □ ENERGY STAR Homes
- □ GHBT Green Certified Home
- □ LEED-H Certified
- □ NC Healthy Built Home Certified

Green Building HERS Rating

- □ 85-80
- □ 79-75
- □ Below 74

Statistics for the AIA NC Center for Architecture & Design, Raleigh, NC See www.cfadnc.org for info & photos

The Ten Stations of Sustainability

1. 12 ft Roof Overhang- The roof overhang is 12 feet deep. It provides shade for the upper floors of the building, especially during the summer months when the sun angle is primarily overhead. It's designed to allow the sun to warm the 1st and 2nd floors in the winter months.

2. Down Spout- Every drop of rain that falls on the building's roof is collected by a gutter system that includes a 12-inch-diameter steel pipe cut in half and attached along the entire roof. The gutter collects the water and directs it to the downspout, which spills into collection pool, then dumps into the bio-retention cell.

3. Wood Siding- The use of wood for this project became a major element in the final design. Wood siding helps cut down on solar gain, insulates the building, and is relatively low maintenance. The cypress is local to North Carolina; reclaimed from the Great Dismal Swamp in Gates County as a result of being felled by hurricanes; milled locally; sent to Greensboro for finishing; and finally delivered to the building for installation.

4. Rock Wall- The stone wall is a major design element in this project. The stones used are local to North Carolina and provide an inside-outside connection for the building and landscape. The wall running north/south creates a division between the parking garden and the planted garden, while the east/west wall serves to retain the earth on the southern portion of the site, which allows the building to have a ground level connection to the street at the corner of Peace and Wilmington Streets.

5. Bio Retention Cell- The bio-retention garden is a key water management system for the building and site. Planted with magnolia trees and ground cover, it collects water run-off from the roof of the building and the parking garden and filters it through layers of soil, gravel, and sand. Water not fully absorbed into the cell to support the plant life is released into the city's storm water system in a much cleaner state.

6. Geothermal Wells- This building is completely heated and cooled by the earth through a geothermal system. Geothermal systems take advantage of the earth's constant temperature with a series of pipes that move water from underground to the building. The water transfers the warmth or chill from the ground to a series of 10 heat pumps that condition the air in the building. There is a system of 20 wells, each dug to 350 feet beneath the parking lot. By heating and cooling the building this way, there is an approximate 64% reduction in energy usage.

7. Porous Paver Parker- Rather than paving with asphalt, the parking garden is comprised of porous pavers that are installed over 3 feet of gravel and engineered fill. This system slows the flow of water and allows it to percolate into the ground acting as a filter before it is drained into the city's storm water system.

8. Ventilation- Every floor has been designed with a passive system for free flowing air. Doors and windows have been strategically placed across from each other to create cross-ventilation. On days with good weather, heating and cooling systems are not needed at all.

9. Green Screen- Shading for a south-facing building is an important design consideration. A vegetated screen, or "green screen," is a unique solution utilized on the south window wall of the multi-purpose room to shield the space from the day-long heat and glare of the direct southern sun.

10. Location- Located on the north side of downtown Raleigh, this site required the installation of 34 parking spaces. To accommodate this mandate, the building was positioned on the northern-most edge on the lot, leaving ample room for parking as well as a beautiful landscape on the southern side. The building form is also long and thin, allowing for cross ventilation and access to light on two to three sides in all spaces. The building has two distinct sides. One side is park-like and looks toward the Government Complex and Capitol building. This is the front door of AIA North Carolina. The side that faces Peace Street is much more urban with zinc siding and individual windows. This is a contribution to Raleigh's growing urban environment, which is developing around the Center.

Additional Sustainable Features

• The building is sited to allow the majority of the site to be open, green space
• The property is strategically located near public transportation, bus routes and future light rail
• The building is oriented to catch prevailing breezes, the maximizing natural ventilation
• The building's open floor plan allows natural lighting and ventilation to reach the entire interior
• The landscaping uses soils cut from the site.
• Landscaping is irrigated through a drip system which eliminates any water waste
• All landscaping is native to North Carolina
• Zinc, on the north wall and roof, requires little energy to manufacture, is completely recyclable and averages a virtually maintenance free life span of 80-100 years
• Interior lighting is provided by an energy-efficient Lutron system (www.lutron.com)
• All bathrooms are energy and water efficient
• All interior finishes and furnishing are zero VOC

Center for Architecture and Design by the Numbers

• Total Project cost: $5.4 Million
• Construction cost: $3.2 Million
• Land cost: $800,000
• Soft cost: $1.4 Million
• Building Size: 12,000 Square Feet
• Length: 135 ft.
• Width: 30 ft.
• Floors: 3 floors + basement
• Site Size: .98 Acres
• Parking: City Mandated 34 stalls
• Project Time: 7 years from inception

• In Kind Donors: 65
• Financing/Funds:
-$3 Million Recovery Zone Facility Bond - Part of ARRA (Stimulus Act) Authorized by City of Raleigh
-$1.5 Million capital campaign -$600,000 sale of existing facility
-$800,000 In-Kind donations -$335,000 AIA additional Cash

Wells Fargo's Duke Energy Center Statistics – Charlotte NC

In order for the Duke Energy Center to qualify for LEED Platinum, Wells Fargo and its predecessor, Wachovia, which began building the tower in 2006, pledged to implement the green strategies and guidelines set forth by the USGBC throughout the entire lifespan of the building – from design, to construction, to operation.

Some highlights of the Duke Energy Center's environmental sustainability efforts include:

Water efficiency: The Duke Energy Center saves approximately 30 million gallons of water per year through a combination of rainwater collection, groundwater purification and a 46 percent reduction of domestic water used in bathrooms.

Energy efficiency: The Duke Energy Center is 22 percent more energy efficient than a traditionally built tower of comparable size, saving approximately 5 million kilowatt hours per year, equivalent to the annual energy use of about 450 homes or more than 3,500 metric tons of greenhouse gas emissions each year, through the use of daylight harvesting blinds that direct light into the building, lighting controls that respond to the amount of daylight, high performance glazing on the exterior walls, and highly efficient HVAC systems and controls, all of which reduce demands on the Duke Energy Center's lighting and cooling systems.

Other sustainable features: A Green roof is planted with native and adaptive plants, which reduces the "heat island" effect, reduces heating and cooling loads on the building, mitigates stormwater runoff, and provides an enjoyable outdoor space for tenants. Also, tenants and visitors are encouraged to use alternate transportation to get to the Duke Energy Center. The building provides secure bicycle racks, as well as showers and changing rooms for tenants who bike to work. It also provides preferred parking for low-emission vehicles, and easy access to the Charlotte Area Transit System bus and lightrail routes.

During construction of the building, Wachovia/Wells Fargo also took into consideration the impact of construction activities on both the building site itself and the surrounding city and region. As a result,
- 75,000 cubic yards of soil were remediated to cleanse and revitalize the land on this brownfield site.
- 93 percent, or 16, 500 tons, of the construction waste was diverted from landfills.
- 350,000 cubic yards of rock from the site were excavated, crushed, and reused for the construction of 4 miles of new highway.
- More than 34 percent of the materials used in construction were harvested or extracted and manufactured regionally, within a 500-mile radius of Charlotte, N.C.

- Approximately 24 percent of the materials used in construction contain recycled content. Approximately 50 percent of the wood used in construction is Forest Stewardship Council (FSC) certified, promoting and supporting sustainably managed forests.
- Materials with low VOC (Volatile Organic Compound) content are used throughout the building to create a healthier interior environment.
- Recycling areas are an integral part of the building infrastructure, facilitating the collection of paper, cardboard, metal, plastic and glass.

For more information on this building's sustainability features, see www.dukeenergycenter.info and click on Sustainability and the two links contained on that page, including an extremely educational "Case Study" filled with interesting statistics.