Green Housing Essentials

3 Correspondence Continuing Education Hours

Green Housing Essentials

Orientation

The ten learning objectives of this course are as follows:

1. Summarize the principles of sustainability
2. List consumer motivations and preferences in green housing
3. Illustrate examples of greenwashing
4. Explain the home energy assessment process and procedure
5. Compare the green certifications Energy Star, LEED, NAHB Green Certified
6. Describe green construction procedures, systems, and materials
7. Support the cost/value benefits of energy efficient materials and products
8. Consider the advantages and challenges of a net zero house
9. Organize a "green team" as a business resource
10. . Apply sustainability principles in the real estate business plan

To enhance comprehension, review questions will be asked throughout the course.

A final exam will be administered after the course is completed to check for mastery of the material.

If you do not pass the final exam, you can review the course material and retake the exam at no additional cost.

If assistance is needed with this course you can contact PDH Academy at 888-564-9098 or at pdhacademy@gmail.com.

After completing the course and final exam, we ask that you take our course survey to help us continue to provide high-quality continuing education.

Course Introduction

What does “green” mean to today’s consumer? Natural? Organic? Recyclable? Energy efficient? Environmentally friendly? Renewable? Locally sourced? Sustainable? Healthy? Safe? And how do these concepts relate to their choices when buying and selling homes? In this 3 hour real estate continuing education course we will explore the principles of sustainability, consumer preferences, and green housing construction, issues and trends as they apply to the real estate practitioner in the business of servicing buyers and sellers.

Let’s start with how *you* feel about “green.” Take a moment to jot down a few words or phrases that describe what “green” means to you.

Next ….. When you think about “green” in housing, what comes to mind? Write down a few words or phrases describing green housing. Can you think of a few construction methods or materials that you consider to be “green?”

As you have surmised, “green” can mean many things to different people. In this 3 hour real estate continuing education course we will explore the principles of sustainability, consumer preferences, and green housing construction, issues and trends as they apply to the real estate practitioner in the business of servicing buyers and sellers. But first, let’s look at some recent history regarding the environmental movement in the USA.

Principles of Sustainability

Dangerous chemicals and pesticides used during WWW II became a hot topic for many during the 1950’s. Rachel Carson, one early environmentalist who was employed by the US Fish and Wildlife Service, championed against pesticides that she believed were killing birds and other nature. Her book, Silent Spring, published in 1962, led to the nationwide ban on DDT and inspired the environmental movement that some say gave rise to the creation of the Environmental Protection Agency (EPA) which was established in 1970. Also in the 1950’s the *Keep America Beautiful* anti-litter campaign was launched due to the tremendous highway litter that followed the construction of the US interstate highways. During the 1960’s the push continued, and many PSAs were created to heighten public awareness about sustaining a beautiful America. Some may remember the ad campaign that featured actor Iron Eyes Cody as a crying Indian mournfully gazing at pollution and litter. This famous PSA ad debuted on Earth Day 1971.

https://en.wikipedia.org/wiki/Keep_America_Beautiful

In 1972 the United Nations Conference on the Human Environment met in Stockholm, Sweden. They developed 26 principles known as “The Stockholm Declaration.” Some of these principles included the need to safeguard natural resources and wildlife, share but

non exhaust non-renewable resources, prevent oceanic pollution, and foster environmental research and education. This group, the ECOSOC (The Economic and Social Council of the United Nations) exists today and touts its innovative thinking and debate as well as initiatives on sustainable development.

www.un.org/ecosoc

Then, in 1983, the United Nations called for a World Commission on Environment and Development to further address worldwide sustainability. Newer issues now included global warming, deforestation, species loss, toxic wastes, and the rapid depletion of the world's natural resources, much of which was caused by construction and development. Known as the Brundtland Commission, they published their written report in 1987 and named it Our Common Future. Their definition of and still popular quote about sustainable development is: "Development that meets the needs of the present without compromising the ability of future generations to meet their own needs."
"People, Planet, Prosperity" was coined in the 1990's and is known as The Triple Bottom Line of Sustainability. (TBL or 3BL) This approach to sustainability speaks to the importance of balance in all three areas. If one area dominates, the others suffer. For example, when people consume too many resources, the planet and overall prosperity will suffer. And that means real estate will suffer. Each of us has the responsibility to insure that our communities and our lives are in balance so that future generations will survive and flourish.

So how do we actually measure sustainability? There are worldwide sustainability indices regularly published, but in simple terms for this course let's list some basics we can note and study in our own communities:

1. Traffic
2. Congestion
3. Public transportation
4. Carpooling efforts
5. Walkability
6. Air quality
7. Water quality & supply
8. Waste Management
9. Recycling and re-use
10. Ample parks and recreation area
11. Responsible development
12. Updated building codes and sustainable policies
13. Food production locally grown and harvested
14. Population
15. Economic levels

How does *your* community measure up? Where you list and sell real estate, rank these 15 items. Make a list of items that are doing fine and a separate list of items that you think need improvement.

How do *Consumers* measure up?

Another way to think about measuring environmental sustainability is by surveying the people in your marketplace. We've already covered how *you* think about "green." How do your customers and clients think about this? Studies show that more and more homebuyers and homeowners are linking "green" to energy efficiency which equates to lowering their monthly carrying cost and enhancing resale value. If this is important to the consumer, then the real estate professional needs to be aware of and address the energy efficiency of available properties. Whether you're the source or the resource of the information, the topic of energy efficiency needs to be included. This will be covered in more detail later in the course.

Another consumer emphasis focuses on the benefits of improving health and quality of life. Good health and protecting our loved ones is at the heart of humanity. Parents wrangle with increasing numbers of asthma and other indoor and outdoor air quality illnesses. So they not only wisely choose their foods and activities, but they prefer housing and neighborhoods that measure up.

And what about the group that is motivated by social responsibility? Thankfully there are many who wish to save the planet! So they conserve water, they recycle, they compost, they buy local and organic, and they choose to do the right things to focus on the Triple Bottom Line of People, Planet and Prosperity.

A smaller portion of consumers buy into sustainability simply because they wish to be in the trendy "Eco-Chic" lane.

But, no matter why your local consumers are thinking green and no matter if they are the early adopters, the mainstream or the laggards, attitudes about environmental sustainability seem to be shifting toward a positive future. Homebuyers and homeowners are researching green building products and materials when they build or renovate so they can save home operating costs and insure better resale value. Informed, popular choices include energy efficient HVAC systems, plumbing, siding, windows, doors, and appliances. From quartz countertops to rain barrel catchment systems, consumers are barraged with ads and drip marketing that appeals to their environmentally conscious mindset. And in their day-to-day lives consumers in general are comparing labels on food and personal products in order to make the right choice. But with so many products touting "environmentally friendly," "organic," or "green" in their labeling and marketing, consumers often are confused and even bewildered. Hence, the green overload is causing green fatigue!

The following 6 questions will be a review of the content from this section.

These questions will **NOT** be graded.

These questions are provided to help gain insight into the course material.

Review Questions

1. To some the word “green” suggests
    a) Healthy
    b) Safe
    c) Energy efficient
    d) All of the above

2. Rachel Carson’s 1962 book Silent Spring led to the ban on
    a) LSD
    b) DDT
    c) EPA
    d) MSG

3. In 1970 which federal agency was established for research, monitoring, standard-setting and enforcement to ensure environmental protection?
    a) EPL
    b) DEC
    c) FHA
    d) EPA
4. The Keep America Beautiful campaign was launched in the 1950’s to deter
    a) Deforestation
    b) Development
    c) Littering
    d) Toxic Waste

5. “Development that meets the needs of the present without compromising the needs of future generations” paraphrases the essence of the UN 1987 report called
    a) The TBL
    b) The Stockholm Declaration
    c) Our Common Future
    d) The World is Flat

6. The Triple Bottom Line of Sustainability refers to a balance of
    a) Pesticides, Planet and Profit
    b) People, Planet and Prosperity
    c) People, Profit and Plants
    d) Planet, Postures and Payback

Greenwashing

Greenwashing is a term that describes deceptive marketing, false labels, misleading claims and/or irrelevant claims. Imagine a cleaning product touting itself as "green" simply because the bottle itself is made from recycled glass. Or an ad for bamboo floor material that ships all the way from China. (Surely the carbon footprint of the distance it ships far outweighs the renewal resource itself. Maybe wiser to buy bamboo grown in the US!) Or a pesticide product that claims 'no DDT' when in fact DDT was banned over 50 years ago. These are just a few of the hundreds of greenwashed product claims that are causing confusion and overload. So who's helping the consumer sort through this?

The Federal Trade Commission (FTC) together with the Environmental Protection Agency (EPA) created the "Green Guides" in the 1990's and continues to update its information.

On Sept 14, 2015, the following appeared on the FTC.gov site:

"It is often difficult for consumers to tell whether a product has the environmental attributes it touts. For example, consumers cannot reasonably confirm claims that a product is made from recycled materials, when those materials look and perform the same as new materials. Environmental certification seals help address this problem by assuring consumers that they are actually getting the environmental benefit they want to buy.

However, these seals and certifications can inadvertently deceive consumers by conveying more than a marketer intends. To help marketers avoid this problem, the Commission issued advice in its Guides for the Use of Environmental Marketing Guides (commonly known as the Green Guides) . That guidance explains that unqualified general environmental benefit claims such as "green" and "eco-friendly" convey a broad range of attributes, and that almost no product could have them all. The Green Guides go on to explain that green claims should be properly qualified and provide examples of how to create a seal or certificate that avoids deceiving consumers.

https://www.ftc.gov/enforcement/rules/rulemaking-regulatory-reform-proceedings/guides-use-environmental-marketing-claims

The FTC's new business blog post, Performing Seals, can help marketers understand how certification seals can comply with the Green Guides. It includes two sample certification seals to illustrate dos and don'ts businesses should keep in mind."

https://www.ftc.gov/news-events/blogs/business-blog/2015/09/performing-seals

Source:
(www.ftc.gov/news-events/press-releases/2015/09/ftc-sends-warning-letters-about-green-certification-seals)

Does greenwashing and green fatigue apply to real estate? YES! Let's examine how buyers, sellers and agents can be guilty of overusing the word "green."

1. Home buyers may ask for a “green” home, so it’s important to ask them what they mean. Ask what’s important to them and why. Are they looking for a few features or a fully net-zero home?
2. Home sellers may be over zealous in describing their homes as “green” when they have one or two energy efficient features such as Energy Star appliances and some new replacement windows. Did they have an energy assessment by an independent professional? Do they have any established certifications?
3. Real estate agents need to qualify statements made by their customers and clients to avoid misrepresenting properties as well as failing to meet consumers’ needs.

The key for all parties is education. Real estate professionals who study this topic and observe sustainability trends can better guide customers and clients while enriching their own lives and careers.

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Review Questions

1. Green fatigue refers to the
   a) Uniform worn by EPA staff
   b) Seal on products that contain no fluorocarbons
   c) Overload of confusing marketing claims
   d) Carbon footprint of new construction

2. Greenwashing is a term that describes deceptive marketing, false labels, misleading and/or irrelevant claims on products.
   a)True
   b) False

3. To help consumers sort through the plethora of green claims on products and services, the EPA joined forces with which other federal agency to create “Green Guides?”
   a) IRS
   b) DEC
   c) FTC
   d) INS

4. In real estate sales when sellers say they have an Energy Star home, the listing agent should ask for proof of certifications.
   a)True
   b) False

Energy Surveys & Assessments

Although the term "energy audit" is still widely used, the more socially acceptable terms tend to be "energy survey" or "energy assessment." But whatever term you use, the point is that it just makes sense for homeowners to know the carbon footprint and energy consumed by their homes.

One simple way to check and enhance the energy efficiency of a home is to go to the ENERGY STAR website (www.energystar.gov) and click on the icon for "Save Energy @ Home." Recommend this solution to customers and clients! The direct link is:

www.energystar.gov/index.cfm?fuseaction=popuptool.atHome.

Here you will see a house showing various rooms. When you click on any room you'll see tips and solutions for specific areas and items in the rooms.

Homeowners can save hundreds of dollars a year by performing self-help tasks mentioned in these guides. As stated on the video provided, "The energy used in the average home can be responsible for more than twice the greenhouse gas emissions of the average car. By using less energy at home you reduce greenhouse gas emissions and help protect the environment for the risks of global warming." See the video here:

www.energystar.gov/index.cfm?c=products.pr_podcast_athome

Savvy agents become familiar with these tips and solutions so they can engage in energy discussions with their buyers and sellers.

For a more complete "Do-It-Yourself Audit" go to:

www.energystar.gov/index.cfm?fuseaction=HOME_ENERGY_YARDSTICK.showGetStarted

Homeowners will need the last 12 months of utility bills and some basic information about their home (such as zip code, age, square footage, and number of occupants). The Energy Star Home Energy Yardstick computes and compares your home's energy efficiency to similar homes across the country and gives recommendations for energy-saving home improvements from ENERGY STAR.

Another valuable resource is the website www.energy.gov which is the U.S. Department of Energy's (DOE) consumer resource on saving energy and using renewable energy technologies at home. There homeowners can find tips on a "Do-It-Yourself Home Energy Audit" as well as info on hiring a professional.

(http://energy.gov/energysaver/professional-home-energy-audits)

Hire a Professional

If your customers and clients are interested in getting specific recommendations for improving the efficiency of their home, they should consider contacting a professional Home Energy Auditor. A professional auditor uses a variety of techniques and equipment to determine the energy efficiency of a home. Thorough audits often include a blower door test, a duct leakage test, a combustion analyzer and infrared cameras which reveal hard-to-detect areas of air infiltration and missing insulation.

Since all real estate markets are different, find out if your local utility company offers free or discounted energy audits to their customers. If not, then the homeowner can hire a home energy professional, such as a certified Home Energy Rater, to evaluate the home's energy efficiency.

To find a Home Energy Rater, visit the ENERGY STAR for Homes Partner Locator at:

www.energystar.gov/index.cfm?fuseaction=new_homes_partners.locator

The home rater will determine the HERS score using a Home Energy Rating System. These tests will determine:

1. The amount and location of air leaks in the building envelope
2. The amount of leakage from HVAC distribution ducts
3. The effectiveness of insulation inside walls and ceilings
4. Any existing or potential combustion safety issues

Other variables that are taken into account include:

- Floors over unconditioned spaces (like garages or cellars)
- Attics, foundations and crawlspaces
- Windows and doors, vents and ductwork
- Water heating system and thermostats

Once the tests have been completed, a computerized simulation analysis utilizing RESNET Accredited Rating Software will be used to calculate a rating score on the HERS Index.

The national training and certification standards for HERS Raters were created by RESNET (The Residential Energy Services Network) and are recognized by federal government agencies such as the Environmental Protection Agency (EPA), the U.S. Department of Energy (DOE), over 150 building code jurisdictions and the U.S. mortgage industry. The Residential Energy Services Network (RESNET) was founded in 1995 as an independent,

non-profit organization committed to helping homeowners reduce the cost of their utility bills by making their homes more energy efficient.

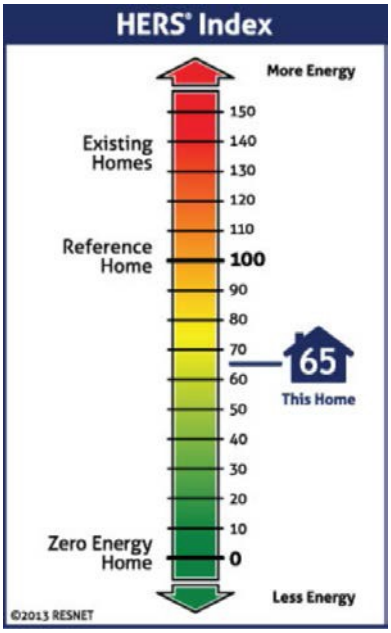
So what is HERS Index?

The Home Energy Rating System (HERS) Index is the industry standard by which a home's energy efficiency is measured. It's also the nationally recognized system for inspecting and calculating a home's energy performance, like how efficiently it's operating and where the homeowner can make modifications for greater energy savings.

A certified RESNET Home Energy Rater assesses the energy efficiency of a home, assigning it a relative performance score (the HERS Index Score). The lower the number, the more energy efficient the home. A score of 100 is a reference; a net-zero home is 0. A one-percent increase in efficiency drops the rating one point. This rating is considered in the ENERGY STAR Certification.

- A home with a HERS Index Score of 70 is 30% more energy efficient than the RESNET Reference Home.
- A home with a HERS Index Score of 130 is 30% less energy efficient than the RESNET Reference Home.

To calculate a home's HERS Index Score, a certified RESNET HERS Rater does an energy rating on the home and compares the data against a 'reference home'– a designed-model home of the same size and shape as the actual home, so the score is always relative to the size, shape and type of the subject property.



Source: www.hersindex.com/energy-efficiency-hers-index-score

When you're talking to sellers about listing their home, remind them that a low HERS Index Score may command a higher resale price. And when you're working with buyers, the HERS Index Score can help them anticipate the costs of energy bills and efficiency upgrades.

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Review Questions

1. To learn how much energy is being consumed by your home
   a) You may hire a certified Home Energy Rater
   b) You must apply to your local EPA Office for permission
   c) You must be willing to vacate the home for 24 hours
   d) All of the above

2. The Energy Star Home Energy Yardstick is
   a) A tool used by professional HERS Raters
   b) Required by the EPA for energy credit
   c) A method for a "Do-It-Yourself Audit"
   d) Free to lower income families

3. A more socially accepted term for "energy audit" tends to be
   a) Energy Certification
   b) Energy Solution Program
   c) Energy Assessment
   d) Energy Carbon Footprint

4. By using less energy at home you help reduce greenhouse gas emissions.
   a) True
   b) False

5. The acronym HERS stands for
   a) Home Environmental Research Society
   b) Home Energy Research System
   c) Home Energy Reliable Search
   d) Home Energy Rating System

6. A HERS Rater must be certified through
   a)The Residential Energy Services Network – RESNET
   b) The Environmental Protection Agency – EPA
   c) The Department of Energy – DOE
   d) The Federal Trade Commission - FTC

Certifications

There are three prestigious ‘green housing’ certifications real estate agents should be aware of:

1. Energy Star
2. LEED
3. NAHB GREEN

For builders/homeowners to receive any of these certifications they must meet stringent criteria set by the specific group. Points are earned for meeting various green principles and standards. Points also may be subtracted for compromising sustainability. The more points, the higher the certification level. Energy Star is the baseline standard to even begin to qualify for LEED and NAHB GREEN.

ENERGY STAR

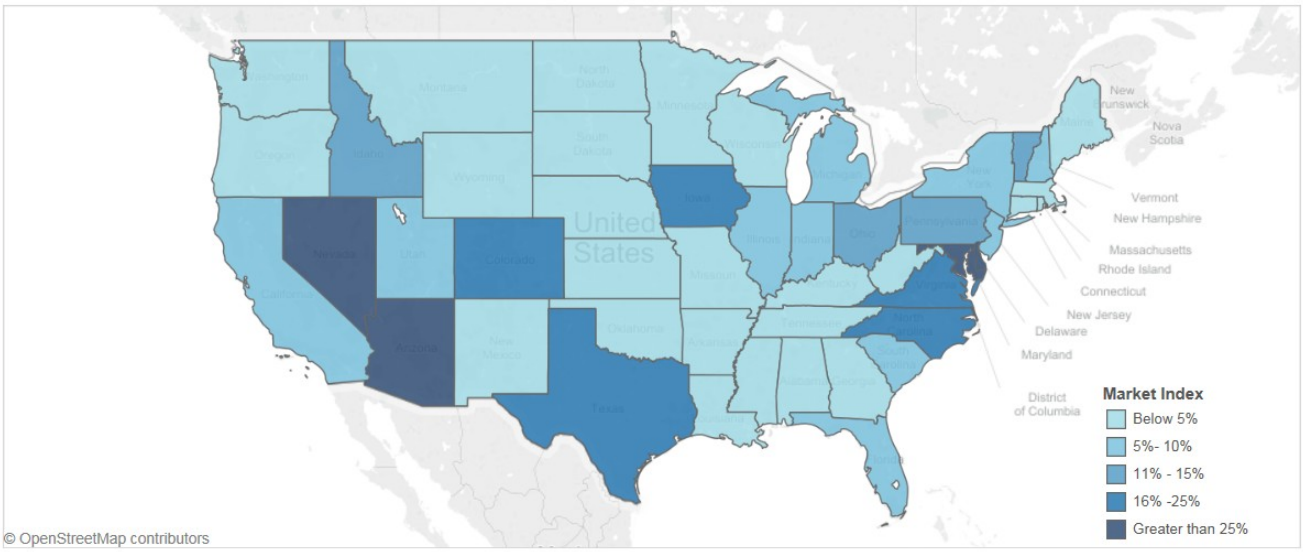
Since 1992 more than 1.5 million new homes and more than 22,000 facilities proudly carry EPA’s ENERGY STAR certification, use dramatically less energy, and are responsible for substantially less greenhouse gas emissions than their peers.
To move energy efficiency into the future, EPA continues to increase the stringency of ENERGY STAR performance specifications across all products, homes, buildings and plants. Today, an ENERGY STAR clothes washer uses about 70 percent less energy and 75 percent less water than a standard washer used 20 years ago. So it’s not a surprise that even the energy star rated appliances (and homes) of several years ago may not qualify per current standards!

In 2012, EPA completed the transition to new, more rigorous requirements for homes to earn the ENERGY STAR label. Homes certified under the new requirements are at least 15% more efficient than those built to the 2009 International Energy Conservation Code (IECC), and include additional energy–saving features to deliver a performance advantage of up to 30% compared to typical new homes.

2014 ENERGY STAR Certified New Homes Market Share

The map and tables below provide a state-level breakdown of the market share for ENERGY STAR certified new homes. The map compares the number of site-built, single-family ENERGY STAR certified new homes to the number of new, privately-owned, one unit homes permitted in each state and the District of Columbia, adjusted for housing completions. Each state's market share is a measurement of ENERGY STAR's presence in the site-built, single-family new homes market for that state and does not measure any other energy efficiency efforts within the state. ENERGY STAR, in partnership with stakeholders, achieved a national market share in the new homes sector of 12 percent in 2014.

2014 ENERGY STAR Market Share State Map



Zoom out to view Alaska and Hawaii.

Click on map to filter values below.

Total ENERGY STAR Homes (Single Family)*	Total Home Completions (1 Unit)**	ENERGY STAR Market Share
74,102	627,696	11.81%

Source: www.energystar.gov/index.cfm?fuseaction=qhmi.showHomesMarketIndex

Since both homes and appliances may be ENERGY STAR rated, real estate agents need to be aware that typical homeowners may refer to their home as an "ENERGY STAR" home simply because they purchased some ENERGY STAR rated appliances. Be aware that a home that has received the ENERGY STAR certification will have a label affixed to the breaker box. The following is a capture of the ENERGY STAR label agents need to look for when confirming the certification. The label shows the date the home was approved, and it must be updated annually in order to maintain its ENERGY STAR certification. See sample:

ENERGY STAR is the baseline for the other two certifications we will discuss.

LEED

The US Green Building Council (USGBC) was founded in 1993 to promote sustainability in the building and construction industry. In March 2000, they unveiled LEED (Leadership in Energy & Environmental Design) as a green building certification program that recognizes best-in-class building strategies and practices. To receive LEED certification, building projects satisfy prerequisites and earn points to achieve four different levels of certification: Certified, Silver, Gold or Platinum. Currently the USGBC is touting their fourth version (LEEDv4), but applications for the LEED 2009 version and criteria are anticipated to continue being accepted well into 2016.

LEED certified projects are found all around the world. The Parisian Macao, a new integrated resort in China expected to be completed in 2016 with LEED Silver certification, includes over 3,000 rooms and a 50% scale of the Eiffel Tower. In fact, according to the USGBC, "There are LEED projects in more than 150 countries and territories, representing every continent except for Antarctica. LEED is being used in highly industrialized nations and newly developing ones, and LEED is helping to demonstrate the enormous power and potential of the emerging green economy." For more info about the top ten countries utilizing LEED, see:

www.usgbc.org/2015top10countries

And the USA real estate community can be proud of the Washington, DC headquarters of the National Association of Realtors® which was the first privately-owned project to earn LEED certification in DC and is located blocks from the US Capitol on a narrow, former brownfield site. The building has been an effective tool for NAR to educate the local

community, lawmakers, and over 1 million Realtors nationwide about sustainability. NAR conducts weekly building tours since it earned LEED New Construction Silver certification in 2004 and demonstrates sustainable technologies that are now commonplace such as daylight harvesting, low-emitting finishes, water-free urinals and rainwater catchment for landscape irrigation. See:

www.greenshape.com/national-association-of-realtors-washington-dc/

While there are various categories for LEED, the LEED for HOMES program would be the most likely category that residential real estate agents might encounter.
The LEED for HOMES program offers the four levels of certification per these points:

Certified	40 - 49 points
Silver	50 - 59 points
Gold	60 - 79 points
Platinum	80 + points

Source: www.usgbc.org/leed

NAHB GREEN

According to the National Association of Home Builders (NAHB www.nahbgreen.org), the National Green Building Standard™ certification goes well beyond saying a home is energy efficient; it provides independent, third-party verification that a home, apartment building, or land development is designed and built to achieve high performance in six key areas: Site Design, Resource Efficiency, Water Efficiency, Energy Efficiency, Indoor Environmental Quality, and Building Operation & Maintenance. - See more at:

http://www.homeinnovation.com/green#sthash.WA3lLZ2k.dpuf

The ICC 700 National Green Building Standard (NGBS) provides practices for the design, construction, and certification of new green single-family homes. This category includes single-family homes, townhouses and duplexes A new green home can be awarded a Bronze, Silver, Gold, or Emerald certification level, depending on the number of green practices successfully incorporated in its design and construction. Existing single-family homes can also attain one of the four levels of certification when remodeled according to the requirements of the NGBS. - See more at:

http://www.homeinnovation.com/services/certification/green_homes/single-family_certification#sthash.D08DRbub.dpuf

In addition to single family homes, the certification is awarded to multifamily, land development and remodeling as well to various products that are eligible for points toward certification of those projects. Products that carry the Home Innovation NGBS Green Certified mark (formerly the NAHB Research Center Green Approved Product mark) have been submitted by their manufacturers for evaluation and approval of point-worthiness for specific criteria within the National Green Building Standard. - See more at:

http://www.homeinnovation.com/green#sthash.WA3lLZ2k.dpuf

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Review Questions

1. The LEED certification stands for
   a) Leadership in Energy & Ecological Design
   b) Leaders Engaging Energy Designs
   c)Leadership in Energy & Environmental Design
   d) Leaders Engaging Environmental Design

2. The Energy Star Certified home meets performance standard set by which US government agency?
   a) DEC
   b) DOT
   c) DOE
   d) EPA

3. To determine if a home actually has an Energy Star Certification, look for the label that is affixed to the
   a) Hot water heater
   b) Breaker Box
   c) Mailbox
   d) Furnace

4. To remain current, the Energy Star Certification must be updated by a verified third party
   a) Every 3 years
   b) Whenever the local building codes change
   c) Annually
   d) Twice a year

Green Construction and Remodeling

Site Selection

Each of us can think of a lot or subdivision where a developer came in, totally bulldozed the site of every living thing, skimmed off the topsoil to sell, cut driveways or roads, and then stick built or dropped in the desired homes. That's because the traditional builder would often design a home and then build it or drop it on the cleared site. But before the shovel hits the ground or any construction begins, today's green builder studies the existing site to assess challenges as well as opportunities to best utilize and/or integrate various environmental features. Climate, wind and sunlight patterns, water runoff and

accumulation, ecosystems and wildlife, topography, hills, trees, and even walkability play a role in the big picture. Climate, for example, would affect choices regarding design, materials, HVAC systems, and house placement. Orientation to the best sunlight maximizes passive and active solar techniques and technologies. In colder climates, homes are designed to best capture the sunlight while the warm-to-hot climates require a delicate balance to avoid inviting excess heat. Existing trees and landscape help maintain the integrity of the original site as well as play a role in offering shade and blocking wind. Preserving the natural environment also allows for limited use of fertilizers and pesticides. Certainly even the green builder may bring in additional landscaping to the site, but the choices would be consistent with local, native species to enhance the overall balance of nature.

Natural drainage away from the projected home is another important consideration in the site selection and/or assessment process. Catchment systems, rain barrels, rain gardens and bioswales as well as limited use of impervious asphalt and concrete paving all assist in responsible drainage and seepage to replenish groundwater. Note that today the green builder uses pervious asphalt and concrete and pervious or permeable pavers since they absorb water instead of causing run-off into local streets or, worse yet, into nearby bodies of water. In municipal sewer areas, particularly in the cities, the issue of preventing or minimizing combined sewer overflow (CSOs) is a serious threat to the environment inasmuch as an excess of rainwater or heavy snow melt causes the municipal sewer system (which generally treats the water) to overflow and discharge untreated human waste, toxic materials and debris into streams, rivers and other bodies of water. The EPA published a CSO Control Policy in 1994 to "provide guidance on how communities with combined sewer systems can meet Clean Water Act goals in as flexible and cost-effective a manner as possible." With clean water being scarcer throughout the world, the topic of water pollution is crucial to human and environmental health. For more info, see:

http://water.epa.gov/polwaste/npdes/cso/index.cfm

The Building Envelope

The building envelope provides shelter and protection from the outdoors and includes below grade areas, exterior walls, insulation, fenestration systems (windows & doors) and roofing. Let's examine these areas in more detail.
Below grade may include foundations, slabs, basements and crawl spaces. These are selected by personal choice or by the specific site and its location, topography and restrictions. Exterior walls vary in construction from stick built to prefab, modular and panelized methods. More and more, green builders are focusing on foundations and framing methods that employ super insulating benefits. That's because insulation is critical in reducing the energy that buildings lose. Proper insulation = energy conservation! Insulation is rated by R-value which indicates how well the material resists heat transference. Insulation components include the type, the thickness and the density. The higher the R-value, the greater the effect. And the effect is also dependent upon proper installation. Here are some construction choices for the high performance home:

ICFs

An increasingly popular choice for foundations and exterior walls are Insulated Concrete Forms (ICFs) which are forms or molds that have built-in insulation for accepting reinforced concrete. The first patent application for an ICF was registered in the late 1960's, but more recently ICFs have become a mainstream preferred building product throughout the world. These large, hollow blocks (almost like giant Legos!) are filled with reinforcing bars (rebars) and concrete to create a high-performing wall that is structurally sound, insulated, strapped, has a vapor barrier, and they're ready to accept final exterior and interior finishes. There are no CFCs (chlorofluorocarbons), HCFCs (hydrochlorofluorocarbons) or formaldehydes and no wood to rot and mold. ICFs may well be a health solution for allergy and asthma sufferers. Additionally, ICFs have an excellent fire rating and are termite and pest resistant. Homes built with ICF exterior walls require an estimated 44% less energy to heat and 32% less energy to cool than comparable frame houses.

Photos courtesy of Murphy Brothers Contracting

www.murphybrothers.com

Although there are many brands of ICFs, Murphy Brothers Contracting is a Certified Fox Blocks® Installer and touts the benefits of this brand of ICFs. Per Michael Murphy, "Fox Blocks Insulating Concrete Form Wall Systems provide an extremely energy efficient building envelope offering superior strength, sound, air quality, and well insulated walls. Three things you should know about building your home with insulated concrete forms:

1. 50%+ by weight recycled content, ICF's make environmentally friendly buildings, resistant to mold and other water maintenance issues.
2. For comfort & peace, there's no equal...ICF buildings offer constant room temperatures meaning no more drafts or hot/cold spots and there are less sound issues when located in high traffic areas.
3. The strength of reinforced concrete walls which provide up to a 4-hour fire resistance rating will give your family a real feeling of safety and security."

SIPs

Another popular framing choice which replaces onsite framing is the use of SIPs - structural insulated panels. SIPs consist of an insulated foam core sandwiched between two structural facings, typically oriented strand board (OSB). SIPs are manufactured under factory controlled conditions and can be fabricated to fit nearly any building design. SIPs do not contain any VOCs or other harmful chemicals that can affect occupant health. The components used to make SIPs (foam, oriented strand board, and adhesive) meet some of the most stringent standards for indoor air quality. Using SIPs instead of traditional onsite framing tends to shorten construction time as well as reduce onsite waste. For more information about SIPs, refer to the Structural Insulated Panel Association (SIPA) which is a non-profit trade association.

www.sips.org

Denim Insulation

Other than using already insulated building products like ICFs and SIPs, green builders also are utilizing recycled materials such as denim. Denim Insulation, actually processed from old bluejeans, is believed to rival fiberglass in its ability to serve as a barrier to both heat and sound. Environmentally safe, denim insulation batting is produced mostly from recycled cotton jeans, and cotton is a rapidly renewable resource! This processed material does not contain any chemicals or irritants or pose any VOC (volatile organic compounds) or off-gassing concerns. Easy to handle, average homeowners can work with this product without gloves and masks or fear of itch, skin irritation or other repercussions from fiberglass. It comes in many R-values and can be used for interior and exterior walls as well as many ceiling applications.
Another environmentally sound reason to produce denim insulation is to reduce our landfills. Every year billions of pounds of clothing, including jeans, are dumped into landfills.

Denim insulation samples - Photo courtesy of Roseann Farrow

Cellulose Insulation

Cellulose insulation is made from 80% recycled newspaper fibers and 20% non-toxic fire retardants to make a foam-like material that can be added in walls without existing insulation, or it can be used under floors. It also is typically blown into attics, either as the first layer of insulation or as additional layers. Acting as a heat block, it keeps warm air inside during the winter and outside during the summer. Many builders like using cellulose insulation because it can be blown into small spaces and hard-to-reach gaps, it has better thermal qualities than fiberglass, and it may be more cost effective in some instances. Compared to polyurethane foams that contain fossil fuels and are toxic during installation, cellulose is a safer bet. An added benefit is that, unlike fiberglass, the leftover scrap can be recycled.

Spray Foam Insulation

Icynene insulation is another popular and safe product that also provides an air barrier and a vapor retarder. This spray foam insulation is made using the oil from environmentally friendly and renewable castor oil plants. Production of the castor plant has low energy dependence and requires no pesticides, fungicides or man-made irrigation. Icynene is used throughout the home - in walls, floors, roof, and window and door frames. While many spray foam products use HFCs (hydrofluorocarbons) as blowing agents and contain PBDEs (polybrominated diphenylethers) for fire resistance, all Icynene spray foam insulation products are PBDE-free, and several are also HFC-free.

Photo of Icynene insulation in attic ceiling courtesy of Roseann Farrow

Some types of insulation using urea-formaldehyde foam or vermiculite contaminated with asbestos, popular for 30+ years are now banned. For information see:

http://www2.epa.gov/asbestos/protect-your-family-asbestos-contaminated-vermiculite-insulation.

Real estate agents need to be aware that the buyer's home inspector will note these products, and removal can be costly for the seller.

Siding

There are many traditional choices for the exterior siding on residential homes …. wood, vinyl, stone, brick, or stucco. While any of these may be employed in green housing, a popular green choice today is siding or shingles made of fiber cement. Fiber cement is a composite material made of sand, cement and cellulose fibers It's the only siding that combines the performance of masonry, has minimal upkeep, is rot, fire and termite-proof, is unaffected by wind or cold, and it has the look of painted wood clapboards, shingles, stone or brick. There are various manufacturers, but the market leader is James Hardie, and the products are named HardiePlanks, HardieShingles, HardieTrim, etc. Over 5.5 million US homes boast Hardie siding. The painted version offers a 15 year warranty against cracking, peeling and chipping. Green Builder Magazine awarded James Hardie the 2015 Reader's Choice Survey for "greenest siding product." For more info see www.jameshardie.com

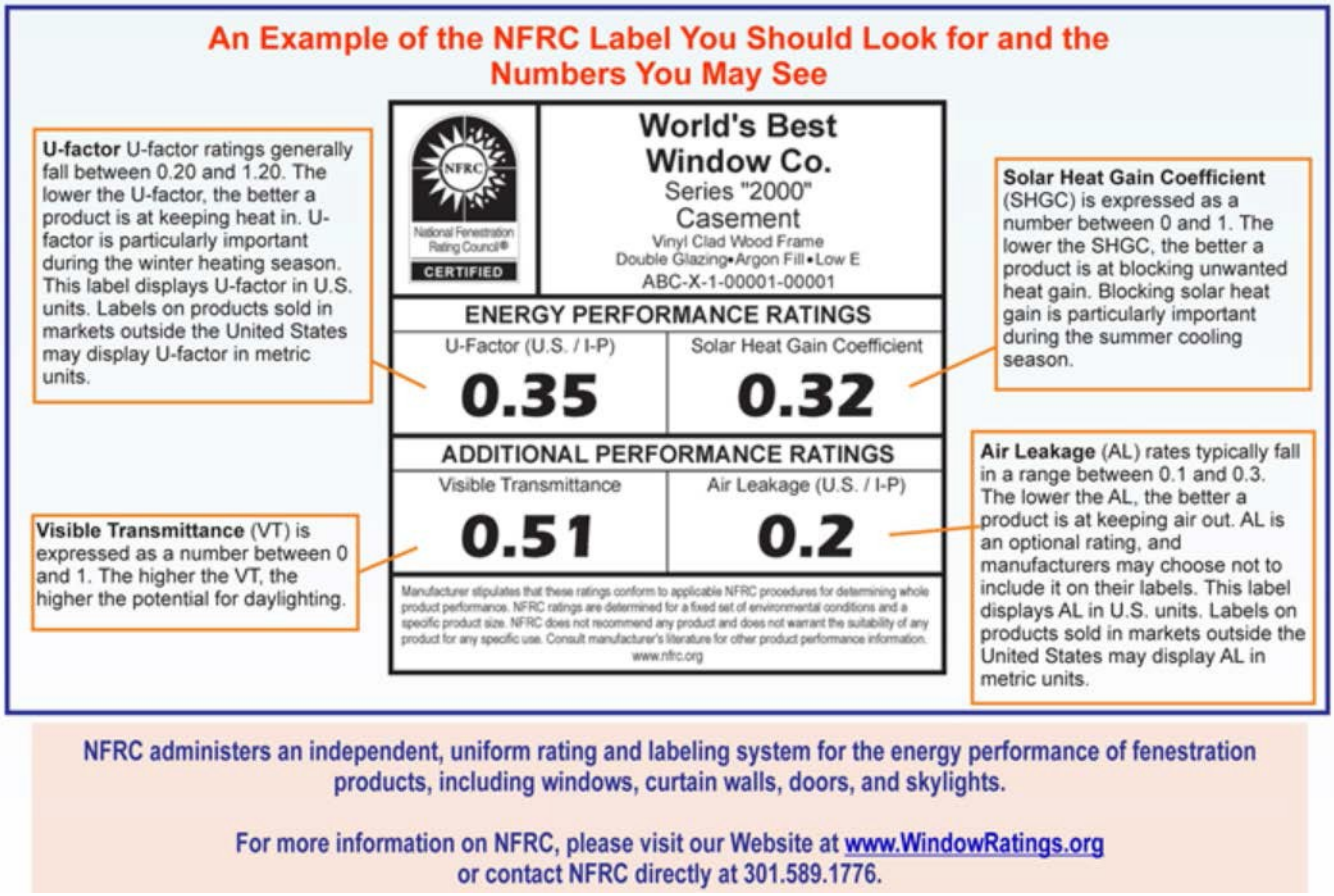
Fenestration Systems (Windows and Doors)

Since the thermal efficiency of the building envelope is critical in high performance buildings, windows and doors are major players.

Windows

Besides the obvious benefit of providing fresh air, windows offer daylight and views. South facing windows provide the best opportunities for daylighting as well as passive solar heat gain, so placement is a definite consideration in the high performance building. According to The Efficient Windows Collaborative, "The design of a window and choice of glazing can dramatically affect the quantity and quality of daylight in a space and how it is experienced. Low-solar-gain low-E glazing systems can dramatically reduce the amount of heat without reducing the light entering your home. This type of low transmission glazing technology can reject up to ¾ of the heat while allowing more than ½ the light." (www.efficientwindows.org)

Performance of a window is measured by several types of ratings which are noted on the window label. These standards are set by The National Fenestration Rating Council (NFRC). The most commonly used rating when selecting a window purchase is the "U-factor" which is the rate of heat loss. The lower the number, the better. See example of a window label below.



In green construction and remodeling, builders who want even lower u-values also look for windows that have multiple panes filled with gas and/or with low-e coatings on the glass itself. Instead of using air, the common choices for fill between the panes is argon and krypton which occur naturally in the atmosphere and maintain long-term thermal performance. When cost is a factor the more common choice is argon.
Low emissivity (low-e or low thermal emissivity) refers to a surface condition that emits low levels of radiant thermal (heat) energy. The window coatings are made of metal oxide thin coatings that reduce infrared radiation from a warm pane of glass to a cool pane, so fading of interior furniture and carpeting is reduced. Reducing heat gain and glare also lowers the u-value.

High-performance windows can reduce utility bills, and they also reduce peak heating and cooling loads.

Daylighting refers to the placement and use of windows, skylights, solartubes or other vehicles to bring natural light into the home. Simply remembering to open the drapes or blinds during the day is an example of a daylighting technique.

Exterior Doors

Exterior doors are made from wood, fiberglass, steel and combinations of various materials and can cost several hundred dollars to over ten thousand dollars.

One popular choice is MDF (Medium Density Fiberboard) made of post-industrial recycled content such as wood chips and shavings. These achieve green building objectives without compromising quality, style or design flexibility.

A fiberglass door with a polyurethane insulation core (similar to SIPS mentioned earlier) is another high performance product because the polyurethane core boosts R-value, contains no formaldehyde, helps avoid mold and vermin intrusion, and reduces outside noise.

Wood doors are still considered to be a premier choice when selecting sustainable building products. A naturally renewable resource, no other commonly used building material requires as little energy to produce as wood. It's resistant to heat, frost, corrosion and pollution and is an efficient insulator because its cellular structure contains air pockets that limit its ability to conduct heat. One caveat, though, when green builders are looking for green certification points, is that they choose wood that is FSC certified (The Forest Stewardship Council). The FSC seal below is recognized worldwide and assures that the wood for lumber as well as doors comes from well-managed, sustainable forests.

FSC

According to the FSC, "Deforestation and forest destruction is the second leading cause of carbon pollution, causing 20% of total greenhouse gas emissions." Today the FSC sets standards for responsible forest management in over 80 countries. In September 2015, the US Environmental Protection Agency issued "Recommendations of Specifications, Standards and Ecolabels" to guide federal procurement. For lumber and wood, FSC is now the only EPA recommended standard. See:

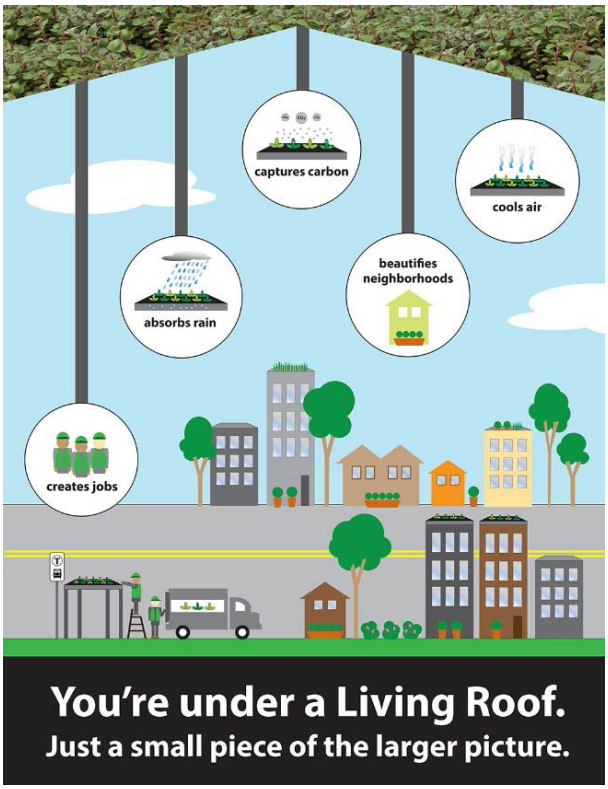
https://us.fsc.org/index.htm

Roofing Choices

Roofing choices include the traditional shingle roofing products as well as the green or live roof, the blue roof, the cool roof and the increasingly popular solar pv roof.

The Green or Live Roof

The EPA recommends green roofs as a way to help control nonpoint pollution from stormwater runoff. A properly installed green roof will extend the life expectancy of the underlying roofing materials by protecting them from heat, harmful UV rays, and weather events. Green roofs also lower energy costs by providing thermal insulation which helps to keep buildings cooler in the summer and warmer in the winter. They also help to reduce the heat island effect that occurs in cities during the summer months. Additional benefits of green roofs include aesthetic enhancement, habitat for wildlife, and reduction of interior noise levels. See EPA poster touting the benefits of the Living Roof.



http://www2.epa.gov/sites/production/files/2015-08/sur-green-roof-poster.jpg

Live roof systems are increasingly popular in commercial applications where space is a constraint for sufficient runoff solutions. According to Michael Murphy of Murphy Brothers Contracting, "Green roofs are the hallmarks of green buildings – highly visible commitments to sustainability which improves employee, resident and/or customer perception. They retain stormwater, improving local waterways and reduce stormwater utilities. They can also reduce energy costs required for air conditioning as they cool roofs. They reduce exposure and temperature fluctuations on roofing membranes, allowing for extended roof life (2-3 times the life of most exposed membranes). Planted rooftops recreate habitat displaced by construction. They are beautiful, and views of green roofs can improve social and mental health, employee retention rates, patient recovery rates, and they can increase desirability of space that is leased or sold."

Hybrid modular system by LiveRoof® Photo courtesy of Murphy Brothers Contracting

The Blue Roof

Blue roofs have controls that help regulate stormwater runoff. Some systems allow for rainwater to be temporarily stored on the roof itself and then discharged to infiltration systems and other rain harvesting systems. Blue roofs are best suited for commercial buildings that have a flat roof and wide gutters.

The Cool Roof

Just like wearing a white shirt on a hot day keeps you cooler than wearing a black shirt, a white or light colored roof keeps the home cooler than a dark colored roof. A cool roof is not only light in color, though. It's treated with a specialized coating material that has high solar reflectivity and high infrared emissivity. Another benefit of a cool roof is its longevity. When a traditional roof fluctuates in temperature, the rooftop expands and contracts, resulting in the breakdown of its surface. A cool roof expands and contracts less which helps the roof last longer. Cool roofs have been used in commercial construction for many years, but only recently have builders employed this type of roof to residential projects.

The Solar Roof

PV Panels

Solar technologies generate electricity from the sun's energy. Photo Voltaic (PV) Solar Panels are popularly used throught the world to heat hot water and/or power some or all of the electric throughout the home. Homeowners may purchase or lease this product. Real estate agents muct be sure to inquire and confirm if the solar panels on the subject property are owned or leased. *If leased, the continuing lease fees are a lien on the property and therefore transfer to the new buyer*.

Here are some photos of PV panels that have been added to the south side of homes:

Photos courtesy of 2K Solar www.2KSolar.com

Per Chris DeBernardo, owner of 2K Solar in NY, "Most PV modules deliver direct current (DC) electricity at between 25 & 35 volts, whereas most common household appliances run off alternating current (AC) at 110-240 V. An inverter is used to convert the low voltage DC to higher voltage AC. Other components in a typical grid-connected PV system are the array mounting structures and the various cables and switches needed to ensure that the PV generator can be isolated both from the building and from the main service panel. Finally, a special net meter will be required to ensure that the system owner can be credited for any PV power fed into the main supply." See diagram below:

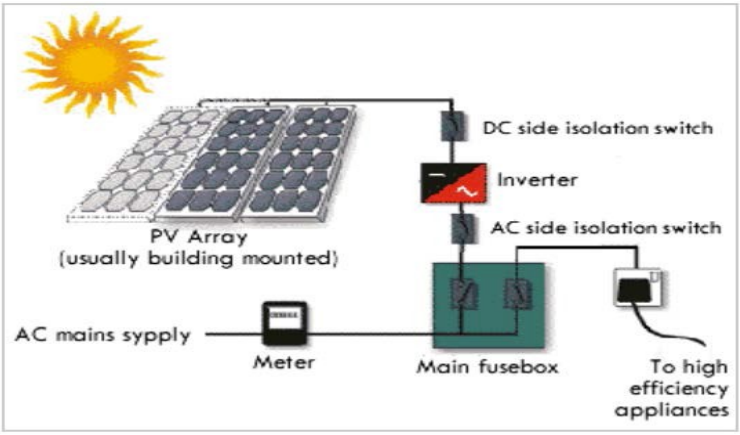


Diagram courtesy of 2K Solar www.2KSolar.com

Solar Shingles

Instead of solar panels that attached to the roof, more recently developed are solar shingles. According Michael Murphy of Murphy Brothers Contracting, "Solar Shingles differ from conventional solar panel systems in that they aren't on the roof. They actually ***are*** the roof. Solar Shingles provide the same protection, durability and flexibility as asphalt, cedar or slate shingles. Visually appealing, they are designed to blend with standard roofs and normal home construction. This is an excellent option for folks who want to take advantage of the environmental opportunity offered by sun's clean abundant energy plus the financially attractive government sponsored tax incentives, but are turned off by the unsightly look of conventional solar panel systems." DOW POWERHOUSE™ Solar Shingles are shown below:

Photos courtesy of Murphy Brothers Contracting www.murphybrothers.com

As a quick review, we studied the components of the building envelope throughout the last ten pages or so. The building envelope provides shelter and protection from the outdoors and includes below grade areas, exterior walls, insulation, fenestration systems (windows & doors) and roofing. Now that the building envelope is complete, let's take a brief look at HVAC (Heating, Ventilation & Air Conditioning) and plumbing/water management systems found in the high performance home.

The following 6 questions will be a review of the content from this section.

These questions will **NOT** be graded.

These questions are provided to help gain insight into the course material.

Review Questions

1. To best utilize the site, the green builder
    a) Clears the existing lot to allow for construction vehicles and equipment
    b) Checks that the land taxes are affordable for the buyer
    c) Assesses climate, wind and sunlight patterns
    d) All of the above

2. Preserving the natural environment of the site allows for
    a) Tax credits from the Audubon Society
    b) Limited use of fertilizers and pesticides
    c) Combined sewer overflow
    d) A reduction in greenhouse gasses

3. To minimize stormwater runoff, builders and homeowners are choosing
    a) Pervious or permeable pavers
    b) Impervious or impermeable pavers
    c) USGBC certified pavers
    d) Grass lined pavers

4. Which is not included in the building envelope?
    a) Roof
    b) Windows
    c) Framing
    d) HVAC

5. Fenestration systems refer to
    a) HVAC
    b)Windows and doors
    c) Plumbing
    d) Water catchment and cisterns

6. Builders focus on foundations and framing that have super insulating benefits.
    a) True.
    b) False

Systems

HVAC (Heating, Ventilation & Air Conditioning)

Heating and cooling systems all require three components:

1. Source of heat, such as wood, coal, oil, gas, electricity, or the sun
2. Transportation system via air, water or steam
3. Delivery system, such as radiant, forced air, heat pump, solar, geothermal, or high-efficiency furnaces.

Rightsizing means matching the HVAC system to the home's size and layout, climate zone, and humidity levels. This is a major consideration for the green builder who is looking for energy comfort combined with efficiency. In the past, traditional builders may have increased the size of the HVAC system to allow for leakage in the building envelope as well as in the ducts. But today's green builder aims for a tight building envelope and an HVAC system that is correctly sized. This also adds life expectancy to the system since it doesn't need to turn on and off as much.

Forced air uses a furnace and ductwork to force warm air into each living space through vents in the floors, walls or ceilings. One advantage of this system is that the same ductwork can be used for central air conditioning, so cost is favorably impacted. That's why forced air systems are an extremely popular choice.

Solar (active or passive) provides the best combination of savings and comfort compared to gas or electricity. But building codes and most lenders require installation of a backup system.

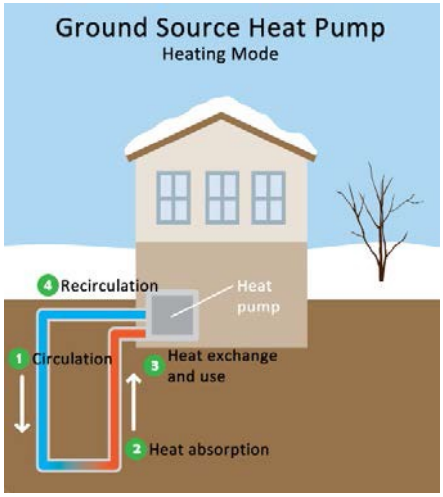
Active solar heating systems use either liquid or air to capture and release or store the solar energy. The heat is then distributed by electric fans or water pumps.

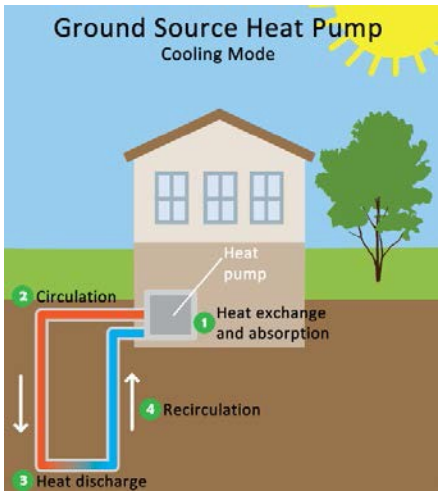
Passive solar doesn't use major mechanicals. Many high performance homes acquire certification points by simply employing passive solar. There is an aperture (maybe a window) where sunlight enters. Then an absorber or thermal mass absorbs and naturally releases the warmth it collected from the sun. Sometimes fans or blowers are used to further move the heat throughout the home. A simple example of passive solar we all can relate to is the feeling of warmth when we sit on a stone or other hard, darkened floor surface that has collected sunlight.

Radiant takes advantage of a high-efficiency hot water or electric heater to heat both space and water, using a system of tubing under the floors or in ceilings to conduct the heat to rooms while also heating water feeding into sinks and showers. One advantage is fewer allergens are spread with this system. If solar is employed to heat the water and power the electric, this is an excellent choice for the green home.

Ventilation is critical to allow a house to breathe and help maintain good air quality. Systems such as soffit, gable, roof or ridge vents, forced ventilation, air exchangers and attic fans all help to improve air quality. In the high performance home, the air exchange system must be highly controlled.

Geothermal heat pump systems are self-contained units that heat and cool homes by utilizing the sun's renewable energy which naturally is stored below ground. (Almost everywhere on earth the ambient temperature 10 feet below ground is 50-60 degrees Fahrenheit or 10-15 degrees Celsius. The deeper you go, the hotter it is.) The process is accomplished by an open, closed or pond loop system which circulates the home's air through the loop that is filled with a non-toxic, biodegradable ethanol, which has better thermal properties than water. In the winter, the home's cold air is recirculated out of the home and returned as warm air. In the summer, the process is reversed. A bonus is that when heat is removed, it also can be used to produce free hot water. Geothermal systems save energy, cut fossil fuel use, reduce carbon emissions and can be used in any climate. *Geothermal* comes from the Greek words *geo* (Earth) and *therme* (heat). According to the EPA, "Geothermal technology harnesses the Earth's heat. The steps below describe how a heat pump works in "heating mode"—taking heat from the ground and delivering it to a building—and "cooling mode," which removes heat from the building and transfers it to the ground."





Source: EPA.gov www2.epa.gov/rhc/geothermal-heating-and-cooling-technologies

Cost is often what prohibits geothermal as choice when building or replacing an old heating and cooling system. If there is a water source (pond or existing well not being used anymore for the home's water supply), this method may be cost effective. But of a new well needs to be drilled, costs rise. Payback, including tax credits and other rebates, can be in as little as 3 years. But the initial investment, sometimes up to $40,000, can be a hurdle.

Water Management

With over 30 US states facing water shortage issues, the topic of water conservation and smart practices is critical for all of us. Less water going down the drain means more water available in the lakes, rivers and streams that we use for recreation and that wildlife uses to survive.

Considering site orientation and climate, the high performance home utilizes the exterior of the home to minimize icemelt and stormwater runoff and even collect and use the water for landscape irrigation and specific bathroom facilities such as flushing. Earlier, in the section on Site Selection, we mentioned the use of catchment systems, rain barrels, rain gardens, bioswales as well as the use of permeable pavers and pervious asphalt and concrete paving to assist in responsible drainage and seepage to replenish groundwater. Another green choice is the use of local, drought resistant native plants. This type of landscaping that conserves water and protects the environment is called **xeriscaping**. When talking to home sellers, ask if they have employed xeriscaping or other water management techniques. These features may well be appreciated by the green buyer. Inside the home, a popular water management method is to reuse water for certain functions. This reused water is known as greywater.

Greywater refers to the water that comes from showers, baths, washing machines, bathroom sinks, and dehumidifiers. It is not water from dishwashers, toilets or diaper wash water. Reusing greywater conserves freshwater and reduces the volume of water sent to sewage systems. Most often greywater is safely used for toilet flushing. Regulations are on a state-to-state basis and can be superseded by local guidelines.

Toilets are by far the main source of water use in the home. According to the EPA, "Toilets account for nearly 30 percent of an average home's indoor water consumption. Older, inefficient toilets that use as much as 6 gallons per flush also happen to be a major source of wasted water in many homes. Recent advancements have allowed toilets to use 1.28 gallons per flush or less while still providing equal or superior performance. The current federal standard is 1.6 gallons per flush. The WaterSense label is used on toilets that are independently certified to meet rigorous criteria for both performance and efficiency." Only water–saving toilets that complete the certification process can earn the WaterSense label shown below. Note this label can be found on water efficient faucets and aerators as well.

Source: EPA.gov www3.epa.gov/watersense/products/toilets.html

The dual flush toilet is another great choice for the green home. It has two choices when flushing, one for liquid waste, and the other for solid waste. The first uses 0.8 gallons, and the second uses 1.6 gallons – certainly more efficient than the old-time toilets that required up to 6 gallons to flush! First introduced in the 1980's and widely used in many countries, it was redesigned in the 1990's and has now become more popular in the US. The WaterSense label can be found on many brands. See photo below for flush choice buttons on top of tank. Some models offer flush buttons on the wall behind the tank.

Photo courtesy of Roseann Farrow

Tankless water heaters produce hot water on demand instead of storing heated water in a tank for later use. This is a very popular choice in the high performance home, especially for remote bathrooms or as a backup for a solar water heating system.

Appliances

The high performance home would not be in sync without including high performance appliances. The Environmental Protection Agency endorses appliances and many other products with the famous ENERGY STAR Label shown below.

In order to earn the label, ENERGY STAR products must be third-party certified based on testing in EPA-recognized laboratories. The EPA touts that the label is more than a mark of energy efficiency, but it also is also a symbol of trust, quality, and responsible stewardship of our environment. Appliances that have been rated include refrigerators, freezers, washers, dryers, dishwashers, and dehumidifiers. (Products that do not have energy star ratings or labels include oven/ranges, microwave ovens, and space heaters.) Real estate agents should take note of the ENERGY STAR products and appliances when listing and selling homes since the energy efficiency of these items transfers to cost savings for the consumer.

Here are some interesting facts from the EPA website regarding refrigerators, washers, dryers and dishwashers:

“There are an estimated 170 million refrigerators and refrigerator-freezers currently in use in the United States and more than 60 million refrigerators are over 10 years old. ENERGY STAR certified refrigerators are about 9-10 percent more energy efficient than models that meet the federal minimum energy efficiency standard. If all refrigerators sold in the United States were ENERGY STAR certified, the energy cost savings would grow to more than $400 million each year.”

ENERGY STAR certified clothes washers use about 25% less energy and 40% less water than regular washers. If all clothes dryers sold in the US were ENERGY STAR certified, Americans could save $1.5 billion each year in utility costs and prevent greenhouse gas emissions equivalent to more than 2 million vehicles.

A new, ENERGY STAR certified dishwasher will save, on average, 1,600 gallons of water over its lifetime."

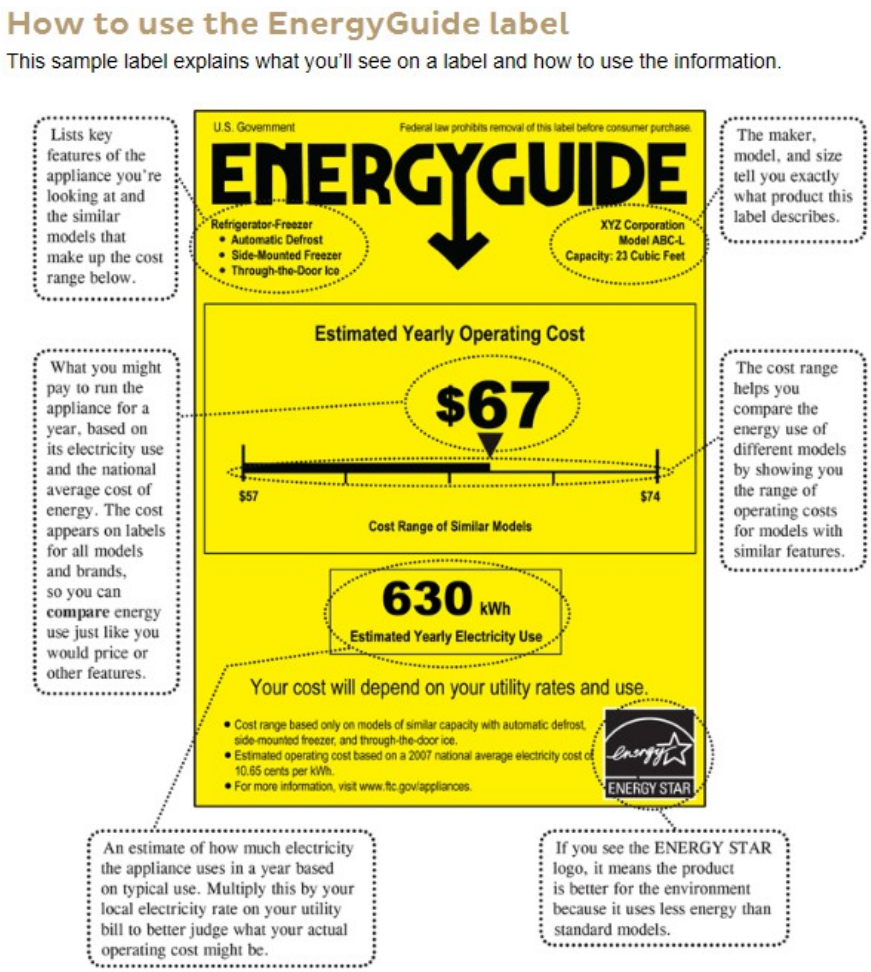
www.energystar.gov/products/certified-products

Energy Guide Label

Although not a certification like ENERGY STAR, the yellow and black Energy Guide Label is required by the Federal Trade Commission (FTC) so that consumers can compare appliances to make better, informed decisions when buying.

Clothes washers, dishwashers, refrigerators, freezers, televisions, water heaters, window air conditioners, central air conditioners, furnaces, boilers, heat pumps, and other electronic appliances are all required to have Energy Guide labels. The label must show the model number, the size, key features, and display a graph showing the annual operating cost in range with similar models, and the estimated yearly energy cost.

Below is a sample label with instructions on how to read the info. Real estate agents could benefit by understanding how to read an Energy Guide Label.



www.consumer.ftc.gov/articles/0072-shopping-home-appliances-use-energyguide-label

The following 6 questions will be a review of the content from this section.

These questions will **NOT** be graded.

These questions are provided to help gain insight into the course material.

Review Questions

1. Heating and cooling systems require which 3 components?
   a) Electricity, sunlight and delivery system
   b) Availability, transportation system and convection
   c) Source, transportation system and delivery system
   d) None of the above

2. Matching the HVAC system to the climate, humidity and home's layout is called
   a) Rightsizing
   b) Matched Pairing
   c) Cubic volume metrics
   d) Biogenic sizing

3. An aperture and an absorber are components of which type of heating method?
   a) Active Solar
   b) Inactive Solar
   c) Radiant Solar
   d) Passive Solar

4. An advantage of radiant heat is that fewer allergens are spread from this system.
   a) True
   b) False

5. Geothermal heat pump systems heat and cool homes by
   a) Circulating argon through a loop system
   b)Utilizing the sun's energy which is naturally stored below ground
   c) Transferring warm water to steam through a closed loop system
   d) Recirculating well water

6. The biggest obstacle consumers face when considering geothermal is
   a) Getting a C of O
   b) Climate
   c) Cost
   d) Maintenance fees

Interior Finishes and Green Choices

Inside the high performance home the real estate agent needs to ask the right questions to determine the type, quality and source of the interior finishes. Some items are easier to identify than others. For example, solid wood cabinets and stone, tile and wood floors are visible to the untrained eye. But for these items to qualify for the most certification points it would be important to know if they were locally sourced and if they were finished with no volatile organic compounds (VOCs). And what about paint? Today there are many manufacturers of low and no VOC paint products. The consumer who is concerned about indoor air quality (IAQ) and the health of their children would be delighted to learn that the home you're showing them has a minimal amount of VOCs. These same buyers, especially if there are allergy or asthma sufferers in the family, also would prefer no wall-to-wall carpeting in any of the rooms, especially the bedrooms. When marketing homes to the health conscious buyer, look for properties that meet their needs.

When buyers are focused on energy efficiency to save operating costs, lighting choices are an important area to be identified. Home sellers can tout the efficiency of the LED

lightbulbs they have installed throughout the home in recessed, high hat or other lighting fixtures which remain with the property. Real estate agents who are knowledgeable about light bulb comparisons can engage in conversations about the tremendous difference between LED (light emitting diode), CFL (compact fluorescent light) and the old fashioned incandescent bulb which is banned in many countries and being phased out in the US.

Here's a common misunderstanding when it comes to light (lumens) or energy being used (watts). The well-known 60-watt incandescent bulb is used here as an example. Most people think of wattage as the amount of light a bulb gives; that is, they know a 100 watt bulb is brighter than a 60 watt bulb. But, in fact, the light a bulb produces is measured in lumens, not watts. Watts measure the amount of energy required to light the bulb. So, for comparison here, let's look at a 60 watt bulb which gives 800 lumens and compare it to an LED and a CFL that also give 100 lumens.

	LED	CFL	Incandescent
Lumens:	800	800	800
Watts:	6-8	13-15	60
Life Span in Hours:	50,000	8,000	1,200
Cost per year:	$35 +/-	$77+/-	$330 +/-

Clearly the LED is the winner in energy efficiency. Some argue that the higher price outweighs the benefits, but more and more the LED bulb products are dropping in price and eventually will be more in parity to make them the right choice.

More Green Choices

Every week another "new" item hits the market, but here are some currently popular interior choices:

- Quartz, marble or granite countertops
- Paperstone countertops made from post-consumer recycled paper and petroleum-free resin
- Coco tiles for walls and furniture made from reclaimed coconut shells
- Strandwoven bamboo flooring
- Bio-Glass, post-consumer recycled glass for floors, walls and counters
- Remote control, programmable thermostats. Using an app, you can change the temperature, check energy history and get an alert if the home is too hot or cold. Currently, the "Nest" which is several hundred dollars is the top pick in most surveys.

Since all real estate is local, learn what new products are popular in your own marketplace so that you can be up to date on consumer preferences.

The Net Zero House

Simply stated, a net zero home produces as much energy as it consumes. By careful selection and use of highly efficient building materials, HVAC equipment, water efficient fixtures, appliances and other products, the green builder creates a home that generates enough renewable energy to offset its annual energy needs. (Note that the behavior of the occupants play a large role in how effectively the home operates.) Most net zero homes get half or more of their energy source from the grid but then give back energy that was created by solar or wind. This is monitored by "net metering" which refers to a home's electric meter actually spinning backward when the home is creating more energy than it needs. The excess energy feeds back to the power grid. Homeowners must complete a net metering application process with their local utility company in order to participate in this program. Companies vary as to how they handle excess power sent to the grid.

Growing in popularity in the US, the net zero house is often higher in price due to the cost of the high end energy efficient products such as solar and geothermal, but once the payback is met, the homeowner enjoys a high performance home that offers maximum comfort, costs less to operate, and helps reduce greenhouse gas emissions.

Building a "Green Team"

Real estate agents need to have a team of experts ready and willing to offer advice and counsel to their buyers and sellers. To best shift risk it always makes sense to be the "resource" instead of the "source." Construction materials, products and techniques are changing all the time, so it's wise to shift questions to the experts. Most agents already have a working relationship with attorneys, tax advisors, home inspectors, builders, contractors and landscapers, so the next step is to learn which of these is knowledgeable about green practices. One easy way is to join your local chapter of the US Green Building Council (USGBC). "USGBC is a global movement of professionals, businesses, innovators and community leaders working to accomplish a single bold vision: healthy, efficient and equitable buildings and communities for all." Connect to a chapter here:

http://www.usgbc.org/community#chapter

You can be as little or as much involved as you wish, but by joining a local chapter you are visible to the green experts in your area, and you are demonstrating a commitment to sustainability. Chapters offer educational and social events where you can meet and mingle with the experts. Not only will you be up to date on green practices, but you will more than likely get leads. For example, green builders looking for land on which to build will need your help in locating the land and/or may ask you to list their spec homes. Or the builder's clients who want a new home may need to list their current home. Once you are "on the green team" you will be perceived as the local go-to agent of choice by the green community.

Green Education

Besides joining community groups who focus on sustainability, real estate agents have the unique opportunity to learn about this topic through the many articles, videos, webinars and courses offered by the National Association of REALTORS®. Learn more at:

http://greenresourcecouncil.org.

If you are a REALTOR® member you may choose to earn the prestigious "GREEN" designation which has been conferred upon less than 4,000 REALTORS® in the US and cooperating partners through the world.

Greening the MLS

Another vital educational area involves your local Multiple Listing System. MLS groups around the country have been adding green fields to their current database of features for many important reasons:

- Sellers can list the green features they have to substantiate value.
- Buyers (and agents) can search by these fields to find green features.
- The more inclusive the green data, the easier it will be for agents and appraisers to identify market data that can help in comparing green features as they apply to value. Using the matched pair approach, local value can be calculated for green features.
- As more data is aggregated, market trends like days-on-market and list-to-sale-price ratios can be calculated for green homes and then compared to other homes.
- The public will recognize that the real estate industry has a commitment to sustainability by identifying and verifying green features.

Your local MLS must be sure to implement policy and procedures to diminish the risk of misleading data by agents who report incorrect or false information given by the seller. For this reason many agents ask that sellers provide verification and certification documents.

Be the Green Resource

Throughout this course there have been many links to websites that offer information about green housing, materials and products. Another helpful link is to **Green and Save:**

www.greenandsave.com

Here you can join as a real estate agent in your state and be included in the search process provided to consumers. According to the GREEN and SAVE website, their strategy is "The three classic Rs of going green (Reduce, Reuse, and Recycle) are now lifted to a new level by adding Renew and Rethink. Reduce waste, Reuse materials, Recycle trash … And: explore Renewable Energy through Solar, Wind, Hydro, Geothermal, Tidal, and other sources. Rethink – All of the ways that we have done things in the past to find new opportunities for efficiency, growth and prosperity."

www.greenandsave.com/about_us.html

Studies show that, when queried, home buyers rank environmentally friendly features as important in their home buying search process. According to the *2015 Profile of Home Buyers and Sellers*, exhibit 2.5, the following areas are rated the following as being important:

- Heating and cooling costs - 84%,
- Energy efficient appliances - 67%,
- Energy efficient lighting - 67%,
- Landscaping for energy conservation - 47%.

Knowing that green features matter, the productive agents knows that becoming a resource will help consumers and add to their own profitability ….. their bottom line.

Self Evaluation / Action Steps

To assign sustainability principles in your real estate business plan, it's key that you "walk the talk." That means that you do a check-up from the neck-up! Do you understand and support sustainability? Will you make an effort to avoid greenwashing when working with buyers and sellers? Will you add green links on your website or in your drip marketing to help consumers? Will you green your home, your office, your life? Think about making a list of some action steps to help you reach your goals! Surely the journey to being a green agent is just that…….. a journey. It's an ongoing process.

The following 6 questions will be a review of the content from these sections.

These questions will **NOT** be graded.

These questions are provided to help gain insight into the course material.

Review Questions

1. When surveying by the NAR, 84% of buyers said that heating costs are important.
   a) True
   b) False

2. Consumers who are concerned about off gassing of chemicals prefer paint that has extra VOCs.
   a) True
   b) False

3. LED stands for
   a) Let Energy Decide
   b) Light Evader Demo
   c) Light Emitting Diode
   d) Light Energy Defined

4. Which is the most energy efficient light bulb?
   a) CFL
   b) LED
   c) SPF
   d) VOC

5. In lighting, lumens means
   a) The amount of energy a bulb produces
   b) The life span of the bulb
   c)The amount of light a bulb produces
   d) The annual cost compared to other models

6. Popular countertop choices include
   a) Paperstone, quartz and bio-glass
   b) Bamboo, cork and maple
   c) Crushed stone, formica and vermiculite
   d) All of the above

Green Housing Essentials

Final Exam

1. The TBL approach to sustainability maintains that the 3 areas of concern must
   a) Be in balance
   b) Compete for recognition
   c) Share federal funding
   d) Rotate each year

2. Some consumers seek out green products to
   a) Save money at the register
   b) Save the planet
   c) Qualify for lower PMI insurance
   d) All of the above

3. Deceptive marketing, false labels, misleading and/or irrelevant claims on products is known as:
   a) Green Guide
   b) Green Seal
   c)Greenwashing
   d) Green Team

4. The_____Index is the industry standard by which a home's energy efficiency is measured.
   a)HERS
   b) STAR
   c) HVAC
   d) USGBC

5. The HERS Home Rater performs tests to determine
   a) The amount and location of air leaks in the building envelope
   b) The amount of leakage from HVAC ducts
   c) The effectiveness of insulation inside walls and ceilings
   d) All of the above

6. A lower HERS Index Score means the home
   a) Qualifies for tax credits from the IRS
   b) Is more energy efficient
   c) Is less energy efficient
   d) Needs to be immediately vacated

7. A net-zero home has a HERS Index Score of
   a) 0
   b) 50
   c) 100
   d) 1000

8. A professional home energy auditor generally utilizes which of the following?
   a) Duct blaster test
   b) Infrared camera
   c) Blower door test
   d) All of the above

9. Which green housing certification(s) exceed 1.5 million in new home units?
   a) NAHB GREEN
   b) Energy Star
   c) LEED
   d) Both a and b

10. Certified, Silver Gold or Platinum are the four levels of certification for
   a) Energy Star
   b) LEED
   c) NAHB GREEN
   d) None of the above

11. . The US Green Building Council unveiled which green certification in 2000? a) LEED
   b) Energy Star
   c) NAHB GREEN
   d) USGBC GREEN

12. . Foundations and exterior walls are often built with Lego-like blocks called a) ICFs
   b) IBMs
   c) SIPs
   d) OSBs

13. . A benefit of denim insulation is that
   a) It's easy for homeowner to handle
   b) It contains no chemicals or VOCs
   c) It reduces landfill
   d) All of the above

14. . A popular choice for the green home is exterior siding made of a) Fiber cement
   b) SIPs
   c) Vinyl
   d) Fox Blocks

15. . When considering window's rate of heat loss or U-factor a) The lower the better.
   b) The higher the better
   c) The metric number must be converted to US units
   d) The transmittance is multiplied by 4.

16. . The EPA's only recommended standard for wood and lumber is
   a) Hardi-Plank
   b) SIPs that are locally sourced
   c) FSC Certified
   d) Made from rapidly renewable forest products

17. . A properly installed_____will extend the life of the underlying roof.
   a) Living Roof
   b) Solar Panel
   c) Roof Garden
   d) Wood shake shingles

18. . When photo voltaic (PV) solar panels are leased instead of purchased
   a) The seller is required to credit the buyer the remaining lease balance
   b) The lien is transferred to the buyer at closing
   c) The seller must complete a FIRPTA form for the IRS
   d) The buyer can cancel the lease and have the panels removed

19. Utilizing local, drought resistant, native plants for landscaping is known as
   a) Ecoscaping
   b) Terrascaping
   c) Bioscaping
   d) Xeriscaping

20. . The EPA estimates that these account for nearly 30% of a home's indoor water consumption.
   a)Toilets
   b) Dishwashers
   c) Washing machines
   d) Icemakers

21. . The Energy Star label is conferred by the
   a) USGBC
   b) FTC
   c) DEC
   d) EPA

22.. When sellers say their appliances are Energy Star, which of the following should the agent do?
   a)Ask for verification
   b) Ask for the seller's latest energy bill
   c) Ask the neighbor's for verification
   d) None of the above, the agent should take the seller's word

23. . In order to feed excess energy back to the grid, the net zero homeowner
   a) Applies to the IRS for tax exemption
   b)Completes a net metering application with the local utility company
   c) Files a net metering application with the local building inspector
   d) Must wait one year after installation to compare usage

24. One expedient idea to help build your 'Green Team" is to
   a) Run an ad on Craiglist
   b) Use social media to ask for help in locating green experts
   c) Join a local chapter of the US Green Building Council
   d) Enroll in a LEED AP course

25. . Which is true about the importance of greening the MLS?
   a) Sellers can substantiate value by listing the home's green features
   b) Buyer and agents will be able to search by green field choices
   c) Appraisers will have data to perform matched paired approaches in valuation
   d) All of the above

26. . When interior products are locally sourced and have no harsh, chemical finishes
   a) The items cost less
   b)The LEED certification points are higher
   c) The consumer gets tax rebates form the IRS
   d) All of the above

27. "Walking the talk" in your green business plan means
   a) Making an effort to avoid greenwashing
   b) Adding green links to your website and drip marketing
   c) Taking actions to conserve energy at home
   d) All of the above

28. . A net zero home produces
   a)As much energy as it consumes
   b) More energy than it consumes so that it nets out to zero
   c) Off gassing for the first 18 months
   d) Greenhouse gas emissions

29. . When advising clients about high performance features and
   systems a) It's better to be the resource and not the source
   b) You should learn the exact details and report the information
   c) It's better to be the source and not the resource
   d) You should remind them that you're not responsible for misinformation.

30. . The three classic "Rs of Green" are
   a) Reduce, Rebuild, Reinvent
   b) Reduce, Reuse, Recycle
   c) Reduce, Remove, Reinstate
   d) Reduce, Renew, Rethink