“Green Homes are Built Better for People, Pocketbook, and Planet”
11-10-13
by Beth Johnson
REALTOR®, Keller Williams Realty
Principal, Smart Green Now Consulting
LEED Accredited Professional
EcoBroker Certified™
Certified Green Professional
NAR GREEN
Beth Johnson:
“Connecting and respecting the buyer, seller, builder, community, Earth”

- First green-credentialed “Quadruple Crown” Realtor: LEED AP, EcoBroker Certified, Certified Green Professional, NAR GREEN
- First Texas Realtor to earn either LEED AP or EcoBroker
- Specialty is greenbuilding: new construction and resale
- First North Texas Realtor specializing in greenbuilding
- 29 yrs. as professional with environmental advocacy organizations
- Founding Member, former Director of GBT
- Courses: USGBC, NAHB, EEBA, RESNET, ACI, Building Science Corp., Austin GBP, EEGBI, RLI, EcoBroker, NAR
- Planning our own green home
Why is Home Performance Important?

• The Problem – buildings:
  - waste energy and natural resources
  - are major contributors to air pollution and global warming/climate change
  - 53% of U.S. population lives near coast

Sea Level +6M

Beaumont
New Orleans

www.BethJohnson.com
Why is Home Performance Important?

• U.S. is world’s second largest emitter of greenhouse gases
Why is Home Performance Important?

U.S. Energy Consumption by Sector

- Buildings 48.7% (47.8 QBTu)
- Transportation 28.1% (27.5 QBTu)
- Industry 23.2% (22.7 QBTu)

Source: ©2011 2030, Inc. / Architecture 2030, All Rights Reserved.
Why is Home Performance Important?

• Heating, cooling, powering homes primarily from burning fossil fuels.

• Greenhouse gas emissions from U.S. homes:
  - 22% of annual U.S. emissions
  - Homes use energy 24/7
  - Average home pollutes 2X average car annually
  - Homes pollute much longer than cars

• Home energy use:
  - 7% from construction
  - 93% heating, cooling, water heating, lights, appliances.
Why is Home Performance Important?

• The Solution – better buildings:
  - “2030 Challenge” –
    • Net zero fossil-fuel use by 2030.
    • Build new homes/buildings to use half as much energy as existing homes.
    • Retrofit as many homes as we build each year.
    • Off-the-shelf design and construction knowledge:
      - Incremental, achievable targets
      - About 13% more efficient every 5 years
  - Three-quarters of all homes/buildings will be new or renovated in next 30 years.
2030 Challenge adopted by:

- 839 U.S. cities signed Mayors Climate Protection Agreement
- 9 states, dozens of others developing climate action plans
- 3 regional greenhouse gas initiatives
- Federal govt.:
  - All new/renovated federal bldgs. must meet 2030 Challenge targets, per 2007 Energy Independence and Security Act
  - DOE: “By 2030, new home buyers will have the option to buy a cost-effective Net-Zero Energy Home (NZEH) anywhere in the United States.”
- Office-holders:
  - US Conference of Mayors (USCM)
  - National Association of Counties (NACo)
  - National Governors Association
  - numerous counties, cities
- Organizations:
  - American Institute of Architects (AIA)
  - 52% of individual architectural design firms (1,000+)
  - U.S. Green Building Council (USGBC)
  - American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)
  - numerous universities
2030 Challenge

U.S. Building Sector CO2 Emissions

Source: Malina Inc., 2005 (Assumes a 15% embodied energy reduction in the construction of new buildings)

business as usual
climate action plan
1990 levels
-60% -40 -20 0 +20 +40 +60 +80 +100 +120%
1990 2000 2010 2020 2030 2040 2050
target
Architecture 2030 Special Bulletin, 5-7-13:

• Building Sector energy consumption and projections:
  - trending down dramatically
  - have declined annually since 2005
  - “enormous strides in efficiency” over 6 years
  - “This is huge.”
  - “monumental shift in efficiency”
  - tracking ahead of 2030 Challenge targets
    “with unstoppable momentum”
U.S. Building Sector Operations Energy Consumption

2030 Challenge Targets and EIA 2005 – 2013 Energy Consumption Data

Source: Architecture 2030, U.S. Energy Information Administration, Annual Energy Outlook (EIA AEO)
What is Green Building?

- Green homes strive to be built better for people, pocketbook, and planet
  - energy efficient, lower utility bills
  - healthier, safer, indoor air quality
  - lower maintenance, more durable
  - comfortable (good climate control) and quiet
  - water efficient
  - resource efficient
  - less air pollution
  - improved first-sale and resale value
Green Building Is:

• Peace of mind
• Lower ownership costs
• Better performance
• Wise investment
• Cost-effective, functional, and practical
• Quality building, good building
• Smart, sensible, logical
• Thoughtful, informed choices
• Weighing options, trade-offs
  – not rigid “must-do’s”
Green Building Is:

- a systems-based, whole-house approach, based on building science, to constructing energy-efficient, higher-performance, lower-impact homes.
- first about reducing the NEED for supplemental heating and cooling, regardless of fuel SOURCE.
- Durability co-equal to energy efficiency
- any architectural style, size, price range.
Green Building is **NOT**: 

- a “regular” house with “green” thrown on as an afterthought.
- **primarily about:**
  - fuel choices (wind, solar PV, solar hot water)
  - off-grid/net-metering/on-grid
  - “zero energy” (today)
  - different/exotic wall or roof systems
  - R-value (in this climate)
  - exotic/expensive HVAC such as geothermal heat pump
  - underground houses, recycled blue jeans as insulation, concrete countertops, salvaged wood.
- about paying extra for bragging rights.
Home Energy Rating System (HERS) Index: a common language
Home Energy Rating System (HERS) raters:

- help assure quality construction
- independent, third-party, certified
- overseen and random audited by accredited HERS Providers
- HERS Index – government-overseen program that’s like mpg rating for houses
Reference URLs:

- ENERGY STAR for Homes Version 3 Guidelines
- Green Built Texas
  - www.greenbuilttexas.org/
- LEED for Homes 2008
  - http://www.usgbc.org/leed/rating-systems/homes
ENERGY STAR FOR HOMES
U.S. Environmental Protection Agency
ENERGY STAR FOR HOMES:

• HERS Index 70-75
• Size Adjustment Factor
• Inspection Checklists:
  - Thermal Enclosure
  - HVAC System Quality Installation (contractor)
  - HVAC System Quality Installation (rater)
  - Water Management System (builder)
Complete thermal envelope =
air barrier + effective insulation (good)

Gap in thermal barrier = thermal bypass (bad)
Missing air barrier to hot attic

Proper air barrier

Slide 22

www.BethJohnson.com
Air barrier missing at wall adjoining porch

Thermal barrier gap, per infrared camera
Air barriers correctly installed
Missing or ineffective air barrier between unconditioned and conditioned space
Effective blocking and air sealing
Air sealing
Thermal bypass at attic access hatch
Insulated attic hatch seal
Effective and Continuous Insulation, Properly Installed:
Excessive wood use and corner with no place for insulation
Materials:

Advanced framing techniques: 2-stud or “California” corners
Wind-washing from soffit vent has removed ceiling insulation.
Soffit baffles to prevent wind-washing of attic floor insulation

Slide 35

www.BethJohnson.com
Dropped ceiling/soffit’s vertical portion has no insulation.
Misalignment of insulation and future drywall air barrier due to compression of insulation
Insulation not in contact with surface to be insulated
Third-party inspected, tested, certified:

Blower-door test assures low infiltration of air through the envelope.
Spray foam insulation
Insulated concrete forms
High Performance Windows:

- Multiple panes
- Low-E coating
- Gas fill
- Warm edge spacers
- Improved frame materials

.30 or lower SHGC
World's Best Window Co.

Millennium 2000+
Vinyl-Clad Wood Frame
Double Glazing • Argon Fill • Low E
Product Type: **Vertical Slider**

<table>
<thead>
<tr>
<th>ENERGY PERFORMANCE RATINGS</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>U-Factor (U.S./I-P)</td>
<td>0.30</td>
</tr>
<tr>
<td>Solar Heat Gain Coefficient</td>
<td>0.30</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ADDITIONAL PERFORMANCE RATINGS</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Visible Transmittance</td>
<td>0.51</td>
</tr>
<tr>
<td>Air Leakage (U.S./I-P)</td>
<td>0.2</td>
</tr>
</tbody>
</table>

Manufacturer stipulates that these ratings conform to applicable NFRC procedures for determining whole product performance. NFRC ratings are determined for a fixed set of environmental conditions and a specific product size. NFRC does not recommend any product and does not warrant the suitability of any product for any specific use. Consult manufacturer’s literature for other product performance information. www.nfrc.org
Efficient Heating and Cooling Equipment:

- ≥14.5 SEER ENERGY STAR certified AC
- ≥ 80 AFUE furnace
HVAC System Quality Installation:

- Correctly calculated heating and cooling loads, and equipment sized correctly – NOT OVERSIZED!!!!

- Bedrooms pressure-balanced by return duct, jump duct, or transfer grill
HVAC System Quality Installation:

- Ducts sized, designed, installed correctly
- Refrigerant test
- Air flow test
- Air balancing
Third-party inspected, tested, certified:

Duct-blaster test assures minimal duct leakage.
Duct joint is severed – severe leak.
Unnecessary duct length
Insulation has come off the duct.
HVAC System Quality Installation:

- Mechanical ventilation per ASHRAE 62.2
- Ventilation intake not near contamination sources
HVAC System Quality Installation:

• Minimum MERV 6 filter for AC return
• Filter panel gasketed, accessible
HVAC System Quality Installation:

• Local mechanical exhaust
  - to outdoors
  - correctly sized

• Combustion appliances
  - mechanically drafted or direct vented or
  - safety tested if naturally drafted
Efficient Lighting and Appliances:

- Example:
  - 40 CFL fixtures = 75% less energy, last up to 10 times longer
  - $500 extra cost for new house = $31 added annual mortgage cost
  - $649 annual electricity and bulb savings = $617 net annual savings = $4,901 net savings over 9-year bulb life
Fluorescent light fixtures:
Water Management System Checklist:
Water Management System Checklist:

- Gutters and downspouts 5’ away from house
Water Management System Checklist:

Continuous drainage plane on exterior walls behind cladding material
Water Management System Checklist:

Weep holes
No drainage plane behind cladding
Water Management System Checklist:

Proper flashing at windows and doors
Improper/missing flashing at window
Green Built Texas
Dallas Builders Association
www.GreenBuiltTexas.org
Energy Efficiency:

- ENERGY STAR, OR

- HERS 75 or below, and comply with ENERGY STAR Thermal Enclosure Checklist
Water Efficiency:

• Obtain EPA WaterSense Certification, OR
  implement the following (excerpted):
• Toilets $\leq 1.3$ GPF
• ENERGY STAR dishwasher
Water Efficiency:

- Rain and freeze sensors or weather-forecast based (ET) irrigation controller
- Landscape and turf must survive Stage 3 drought restrictions.

Courtesy: TXSmartscape.com
Water Efficiency:

Hot water on-demand, heater within 30 ft. of fixtures, or PEX home-run
Water Efficiency:

• Some additional possible strategies:
  – High performance fixtures:
    • Lavatory faucets ≤ 1.5 GPM
    • Kitchen and utility faucets ≤ 2.2 GPM
    • Showerheads ≤ 2.0 GPM
  – Irrigation zoned separately for turf vs. bedding
  – Non-spray irrigation system or no system
Indoor Air Quality:

• Equipment to maintain Relative Humidity $\leq 60\%$
LEED for Homes
(Leadership in Energy and Environmental Design)
U.S. Green Building Council
www.usgbc.org
Rewards homes with less than average size conditioned space:
Energy and Atmosphere:

- Performance of ENERGY STAR
Durability Planning & Mgt.:

Keep poorly-insulated plumbing out of outside walls.
Durability Planning & Mgt.:

One solution: Double the wall thickness where needed.
Sustainable Sites:

Tree preservation plan
Sustainable Sites:

• No invasive plants

• Limit turf

• Non-toxic pest control
Materials and Resources:
Framing efficiencies such as...
Tax-Credit Home Examples
(50% less H/C energy)

Nevada Court -- Denton

Courtesy: DallasGreenzine.com
Nevada Court – Denton

- Ducts in conditioned space
  - (fur-down)
- Radiant barrier decking
- Damp-blown cellulose in walls
- 2X4 24” OC stud spacing
- California corners, ladder T’s
- Overhangs
- Minimized east-west glazing
- $135,000 structure and land
• **Qualifying for the New Home Tax Credit**

  - Examples in 9 U.S. Cities

  Philip Fairey
Conclusions of FSEC:

• Qualification not difficult in very mild climates
• Window selection is important, with changes in SHGC making a significant difference, even in northern climates
• Efficient lighting and appliances provide significant benefit in cooling dominated climates
• Relatively “standard” envelope features can make the goal with only “moderate” increases in HVAC efficiencies if ducts are good
• Tight ducts located in conditioned space provide significant benefit for both heating and cooling.
Further info on tax incentives including retrofits:

- [www.dsireusa.org](http://www.dsireusa.org)
- [www.resnet.us](http://www.resnet.us)
- [www.energytaxincentives.org](http://www.energytaxincentives.org)
- [http://www.resnet.us/taxcredits/faq-raters.htm](http://www.resnet.us/taxcredits/faq-raters.htm)
How Much Does Green **Cost**?

- Green as a primary design goal:
  - Less expensive than green as an afterthought
  - Some elements SAVE upfront money
  - Some elements SAVE operating, maintenance, repair costs and time
How Much Does Green Cost?

- Cost to own = cost to purchase + cost to operate.
- Energy efficiency is most cost-effective portion of green.
- Home price is NO indicator of construction quality or home performance.
- “Extra” energy efficiency measures often save more in monthly utility bills than their additional mortgage cost.
- Custom process has more cost impact than “green” choices.
- Finish-out choices have more impact than “green” choices.
- Estimates of “green cost premium” relative to standard
  - Same net upfront cost
  - 2%-10%
  - $5,000-$7,500 on $135K house (3.7-5.5%)
How Much Does Green Pay?

Return on investment:
- Energy efficient construction and features produce returns in utility bill savings that are
  - guaranteed
  - consistent
  - far greater than average stock market return
  - tax-free
  - equivalent to yield on a sizeable nest egg
- Example: $1,000 annual utility savings = 4% tax-free yield on a $25,000 Certificate of Deposit
Avoided Costs and Risks:

- Money in homebuyer’s pocket for college savings or family entertainment instead of in utility’s pocket
- What’s the money, time and CLUE value of a more durable, low-maintenance home with fewer repairs and insurance claims?
- Avoided builder call-backs and lawsuits
- Resale risk in 10 years if NOT built green today
- “Green-collar” jobs – in America
- What’s a healthy family worth?
- What’s the value of a healthy planet? Can we afford a sick one?
- What’s the cost of dramatic climate change?
Energy Savings Possible through Conservation (without site-generated power):

- Building envelope: 20%
- Mechanicals: 25%
- Lights/appliances/plug load: 10%

**TOTAL SAVINGS:** 55%

(Source: U.S. Dept. of Energy)
Neutral Cost Point:

Utility Bills Reduced 58% with No Net Increase in Homeowner Costs

- **Mortgage + Utilities ($/yr)**
- **Energy Star**
- **Neutral Cost**
- **IECC**
  
  (2000 ft\(^2\), 2-story, 16\% window to floor area ratio, unconditioned basement)
Example: Neutral Cost Package

- R22 wall assembly (2x6 + R-19 batts+ foam sheathing)
- R50 ceiling assembly
- R10 basement
- .0001 SLA (2 ACH\textsubscript{50})
- Low e/low SHGC glazing, Argon Fill (0.28 U-value, 0.37 SHGC)
- 80% CFL Lighting
- SEER 18 AC
- AFUE 90+ furnace
- Gas tankless hot water, EF 0.8+
- Tight ducts (Mastic, 5% Leakage), in conditioned space
- Energy Star Appliances
- 1.5 kW\textsubscript{DC} PV System
- BA QA (moisture control, ...)

Estimated cost increase relative to standard home\textsuperscript{2,3}: +$10.00-$13.00/ft\textsuperscript{2}

Notes:
1. Equivalent packages may be substituted, based on specific builder preferences
2. Does not include costs associated with builder/contractor training and changes in business practices.
3. Incremental costs evaluated relative to minimum IECC
<table>
<thead>
<tr>
<th>Estimated Incremental First Cost Relative to Standard Practice&lt;sup&gt;1,2&lt;/sup&gt;</th>
<th>$25,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Amortized Cost 7%, 30 Year mortgage&lt;sup&gt;3&lt;/sup&gt;</td>
<td>$1386</td>
</tr>
<tr>
<td>Annual Utility Bill Savings</td>
<td>$1386</td>
</tr>
<tr>
<td><strong>Net Annual Savings</strong></td>
<td><strong>$0</strong></td>
</tr>
</tbody>
</table>

(2000 ft<sup>2</sup>, 2-story, 16% window to floor area ratio), unconditioned basement

<sup>1</sup>Evaluated relative to minimum IECC  
<sup>2</supQualifies for federal new home tax credit  
<sup>3</sup>Assumes 28% marginal tax bracket and includes present value of future replacements of equipment over 30 year life of mortgage.
Marketability:

- Green certified North Texas home sales in 2012 (MLS):
  - 41% of new homes
  - 20% of pre-owned homes ≤ 10 years old were green certified or had significant green features

- Will you have trouble selling the home if it’s NOT energy efficient? Are you buying a white elephant?
  - (longer time on market and/or lower price)
Marketability:

- California, 2007-2012, 1.6 million sales
  - 9% higher appraised value for green-certified homes
    - Greater than the cost of the features
    - Greater than resulting utility savings
Marketability:

- Portland, OR, 2011
  - Fourth year for “notable price premium” for certified new homes over non-certified
    - 8% price premium in metro area
    - 30% price premium for certified existing homes over non-certified
Marketability:

- Frisco & McKinney, TX, 2012, *Journal of Real Estate Research*
  - 2.07% - 2.43% price premium for voluntary green certification or features
  - 3.03% - 4.69% price premium in mandatory green building programs
  - “…non-green becomes a form of functional obsolescence in a market that recognizes green development as the new market standard.”
Marketability:

- “Very desirable” features (Realtor.com 2013)
  - 86% - energy-efficient AC
  - 85% - energy-efficient appliances
  - 79% - energy-efficient lighting
  - 76% - water-conserving appliances
Marketability:

- 5 of top 11 “essential/must have” or “desirable” features wanted by ≥85% of respondents are energy/indoor air quality related (NAHB “What Home Buyers Really Want”, 2013)
  - ENERGY STAR® -rated appliances (94%)
    - “essential” to 36%
  - ENERGY STAR® rating for whole home (91%)
    - “essential” to 28%
  - Exhaust fan in bathroom (90%)
    - “essential” to 53%
  - ENERGY STAR® -rated windows (89%)
    - “essential” to 35%
  - Ceiling fan (88%)
    - “essential” to 48%
Marketability:

• 9 of 10 buyers would choose a highly energy efficient home with lower utility bills over one costing 2-3% less without those features. (NAHB “What Home Buyers Really Want,” 2013)

• Agree/agree strongly (NAHB “What Home Buyers Really Want,” 2013):
  - 77% - knowing projected utility costs is important
  - 73% - projected utility costs would influence purchase decision
  - 71% - prefer to buy from a builder that provides home energy ratings
Energy Star (EPA)
(approximate HERS 70-75 in North Texas, or better)

- Nationwide (launched 1995)
  - 3,360 builder partners
  - 1.4+ million homes to date
  - 101,000 in 2012
  - 25% market penetration
  - 87% consumer awareness
  - 70% of those say it’s significant factor in purchase decision
  - 75% who purchased would recommend
• Texas is #1 Energy Star state in number of homes
  - 309 builder partners, 24 of whom are 100% partners
  - 404,984 homes built to date
  - 21,000+ homes in 2012
  - Same as next 5 states combined
  - 27% market share in TX

• North Texas
  - 91 builder partners, 8 of whom are 100% partners
  - 131,299 built to date
  - 5,789 homes in 2012
Green Built Texas (HBA)
(HERS 75 or below)

- Launched in ‘06
- 90 builders, including large volume builders
- 14,337 homes completed to date
Federal tax credits (U.S. IRS)

• Homes certified to require 50% less energy to heat and cool than built-to-code homes
• 91,000 built 2006-2009 (latest figures)
• Market share grew dramatically:
  • 0.8% in 2006
  • 3.1% in 2007
  • 4.5% in 2008
  • 10% in 2009
LEED for Homes (USGBC)

• Pilot Fall ‘05
• Chartered Jan. ’08
• Nationwide
  • 45,000 certified (as of Oct. 2013)
• Texas
  • 6,780 certified (as of Oct. 2013)
    • 231 are Ft. Hood military homes
    • 340 are Dallas Habitat for Humanity homes
• First major production homebuilder to commit to LEED is Texas-based MHI:  Plantation, Coventry, Carmel
  • 1,000 LEED-certified single-family homes
  • More than any other production builder
Local Green Home Examples

Habitat for Humanity

421+ D/FW Energy Star homes (340 LEED)
Centex/Pulte – 12,957 DFW Energy Star homes
Frisco

(Energy Star + Frisco Green Building Program)
Nevada Court, Denton
(first affordable all-green subdivision)
Energy Star, GBT, tax credit, 2030 Challenge
HERS 65 - 70

Courtesy: DallasGreenzine.com
Rockwall custom

Energy Star, GBT, 2030 Challenge
HERS 64
First LEED Home in the nation
Ideal Homes-- Oklahoma City
“Bannister House”
Energy Star, GBT, LEED Platinum, Building America, 2030 Challenge
HERS 55
Net Zero Energy Home (first in North Texas)
The Woodson Place
First developer to win Lone Star Land Steward Award
5-star (highest recognition) in Austin GBP
Resale Homes
N. TX MLS green update—Nov. 2008

• Energy Efficiency (replaces “Energy Features”)
  - Tankless Water Heater
  - Smart Electric Meter
  - 13-15 SEER AC
  - 16+ SEER AC
  - Programmable Thermostat
  - 12"+ Attic Insulation
  - Double Pane Windows
  - Variable Speed HVAC
  - Energy Star Appliances
  - Radiant Barrier
  - Low E Windows
  - Dehumidifier
  - 90% Efficient Furnace
  - High Efficiency Water Heater
  - Foam Insulation
  - Storm Windows
  - Storm Doors
  - Ceiling Fans
N. TX MLS green update—Dec. 2008

• Green Certification
  - HERS Rated
  - HERS 0 – 85
  - HERS 86 – 100
  - HERS 101+
  - Energy Star Certified
  - LEED Certified
  - LEED Silver
  - LEED Gold
  - LEED Platinum
  - Green Built N. Texas
  - NGBP - National Green
N. TX MLS green update—Dec. 2008

• Green Features
  - Solar Electric System
  - Solar Hot Water
  - Geo-Thermal HVAC
  - Drought Tolerant Plants
  - Low Flow Commode
  - Low Flow Fixtures
  - Recirculating Hot Water
  - Rain/Freeze Sensors
  - Wind Power
  - EF Irrigation Control
  - Rain Water Catchment
  - Energy Recovery Ventilator
  - Mechanical Fresh Air
  - Enhanced Air Filtration
Austin’s Energy Conservation and Disclosure (ECAD) Ordinance:

- 2009
- Single-family site-built homes 10 years old or older
- Sellers required to have an ECAD audit
- Provide copy to prospective purchasers & Austin Energy
- Air sealing in plumbing areas & weatherstripping
- Attic insulation
- Duct performance
- HVAC efficiency
- Windows: shading, low-E glass, solar screens
ECAD Ordinance (cont.):

- Rebates & incentives
- Exempted if participated in
  - Home Performance with ENERGY STAR® or
  - Equivalent Austin Energy program
  - Within last 10 years and
  - Show at least 3 energy efficiency improvements
- Variance if binding agreement to remodel within 6 months & get an audit
- 41% of sellers felt ECAD helped sell the home
Retrofitting:

- **Home Performance with ENERGY STAR**
  - national program from U.S. EPA and U.S. DOE
  - 50 localities in 21 states
  - Austin and North Texas participate
  - 1,900 approved contractors
  - More than 250,000 homes improved
  - 75,000 whole-house retrofits in 2012 alone
  - comprehensive, whole-house approach
  - improves energy efficiency and comfort
  - protects the environment

- **Participating Contractors**
  - specially trained
  - evaluate your home using state-of-the-art equipment
  - recommend comprehensive improvements for best results
  - help you cost-effectively improve energy efficiency
## Retrofit Costs

### Converting your home to a David Weekley Green Home

<table>
<thead>
<tr>
<th>WHAT?</th>
<th>WHY?</th>
<th>Estimated Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>14 SEER with Variable Speed Fan</td>
<td>Remember, this is for each system. If you have more than one system – double or triple the cost.</td>
<td>$7,198</td>
</tr>
<tr>
<td>Jump Ducts and Air Pressure Balancing</td>
<td>Retro-fit existing duct system, replace with insulated ductwork and seal to 5% or less leakage (note: 5% probably can’t be achieved, but a substantial reduction in leakage is possible).</td>
<td>$4,776</td>
</tr>
<tr>
<td>Vinyl Windows and Low E Glass</td>
<td>Tear out existing windows and replace with Low E vinyl windows.</td>
<td>$9,894</td>
</tr>
<tr>
<td>R-Value Ceiling Insulation</td>
<td>Add enough blown-in insulation to increase ceiling insulation from R-20 to R-38.</td>
<td>$622</td>
</tr>
<tr>
<td>Radiant Barrier Decking</td>
<td>Spray radiant barrier to underside of existing decking.</td>
<td>$2,125</td>
</tr>
<tr>
<td>Mold Resistant Shower and Tub Walls</td>
<td>Remove existing tile and add Cement Hardiebacker™ Board with anti-fracture coatings to all baths.</td>
<td>$2,500</td>
</tr>
<tr>
<td>Fresh Air System</td>
<td>Add mechanical system to HVAC system and re-duct at primary return air (if possible).</td>
<td>$550</td>
</tr>
<tr>
<td>Draft Elimination</td>
<td>Would require tearing off exterior of home.</td>
<td>Not Feasible</td>
</tr>
<tr>
<td>DOW House Wrap</td>
<td>Would require removing all exterior cladding.</td>
<td>Not Feasible</td>
</tr>
<tr>
<td>Paper Free Wall Insulation</td>
<td>Would require tearing off interior drywall on all exterior walls.</td>
<td>Not Feasible</td>
</tr>
<tr>
<td>Quality Control/Inspections</td>
<td>Performance of existing home can be done but fixing existing issues is not feasible.</td>
<td>Not Feasible</td>
</tr>
</tbody>
</table>

**Total Estimated Cost to Retro Your Existing Home**

$27,665
Contact info for Beth Johnson:

Beth Johnson
REALTOR®, Keller Williams Realty
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