DOE Zero Energy Ready Home

Zero Energy Ready Home Training

SAM RASHKIN
Chief Architect
Building Technologies Office
DOE Zero Energy Ready Home training sessions provide dynamic content on the business case and technical strategies to successfully design and build zero energy ready homes in today’s market. The training features multiple modules covering the business advantages of high performance building, marketing to consumers, advanced building specifications and systems, and gaining recognition through DOE Zero Energy Ready Home Home.
Learning Objectives

1. Understand the business case for constructing zero energy ready homes.

2. Recognize the home buyer value propositions for purchasing zero net-energy homes.

3. Understand the DOE technical specifications associated with zero energy ready performance.

4. Understand how to gain recognition for construction zero energy ready homes with the DOE Zero Energy Ready Home program.
Web Site:
www.buildings.energy.gov/zero/

e-mail Contact:
zero@newportpartnersllc.com
Agenda: Morning

• **Zero Business Solution:**
  - Zero Building Blocks
  - Zero Common Agenda
  - Zero Ready for Informed Buyers
  - Zero Value Translated

• **Zero Builders in Action**
  - Thrive Homes
  - Revive Development
Agenda: Afternoon

• Zero Specifications
  – Optimized Enclosure System
  – Water Protection Systems
  – Optimized Comfort System
  – Comprehensive IAQ System
  – Efficient Component System
  – Solar Ready System
  – Summary

• Zero Recognition
  – Zero Energy Ready Home Resources
  – Partnering with Zero Energy Ready Home
  – Meet the Raters: Local Solution
Prologue:
You Are Here
Housing is Five Experiences

**Sales**
- Message [3]
- Process [3]
- Service [3]

**Quality**
- Lean Construction [6]
- Quality Management [7]
- Proven Innovations [3]

**Design**
- Fit to Site [5]
- Natural Comfort [5]
- Right-Size/Right-Way [10]
- Architectural Integrity [3]
- Integrated Systems [10]

**Community**
- Community Spaces [3]
- Quality Features [3]
- Enduring Value [3]

**Performance**
- Building Science [4]
- Water Efficient [3]
- Efficient Components [5]
- Disaster Resistant [3]
- Indoor Air Quality [3]
Projected Impacts:*

• **~$250 Billion** Utility Bill Savings
• **~$70 Billion** Added Construction/Year
• **~100,000** Persistent New Jobs
• **~2.3 Million** Job-Years of Work
• **~2,000 MMTOE** Less Air Pollution

* Impacts based on internal DOE analysis assuming 30% Zero Energy Ready Homes thru 2035
Zero Building Blocks
Welcome to New Risk Reality

EUI (1975 = 100)

Improvement in Code (1975-2015)

Risk Zone

New Risk Reality Driver

Risk Driver: Advanced Enclosure

Six Building Blocks

+ Insulation
+ Windows
+ Air Sealing

Rigorous Codes <HERS Scores
Building Block #1: Comprehensive Water Protection

Risk Driver: Advanced Enclosure

Outcome: Colder Surfaces, Less Drying

Water Managed: Roofs, Walls/Openings, Site/Foundation, Materials

Moisture Risk: More Wetting Potential
Building Block #2: Ensured Comfort

HVAC QI: Right-Sizing/Var. Speed
Ducts in Cond. Space
Proper Installation Complete

Risk Driver: Advanced Enclosure

Outcome: Low Loads, >MRT Control
<Air Flow, >Swing Seasons

Comfort Risk: <Mixing
<RH Control
Building Block #3: Ensured Indoor Air Quality

**Comprehensive IAQ System:**
- Source Control
- Fresh Air System
- High-Capture Filtration

**Risk Driver:** Advanced Enclosure

**Outcome:** Less Air Exchange

**IAQ Risk:** More Contaminants
Building Block #4: Ensuring Future Value

Future Code Enclosure:
> Air Tightness
> Window Eff.
> Insulation

Risk Driver:
Optimized Enclosure

Outcome:
3-Year Code Cycle

Investment Risk:
Near-Term Obsolescence
Building Block #5:
Minimize Total Energy Use

ENERGY STAR Components:
- Equipment
- Lighting
- Appliances
- Fans

Risk Driver: Optimized Enclosure
Outcome: Heating/Cooling = <50% Load
Efficiency Risk: Components Energy Use
Building Block #6: Zero Energy Ready Performance

Solar Ready: Structural Calcs
Conduit for Wiring
BOS Space
Extra Circuit Breakers

Risk Driver: Optimized Enclosure
Outcome: Ultra-Low HVAC Eff. Components
Solar Ready Risk: Zero Ready
## ZERH = Six Building Blocks

**Six Complete Risk Management Systems**

<table>
<thead>
<tr>
<th>Optimized Enclosure System</th>
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Zero Common Agenda
Zero Progress

States with ZERH

Time for a Common Agenda
Zero:  
- Name  
- Threshold  
- Definition  
- Strategy
**Zero Name**

**‘Net’**

Out:
- Protect Valuable Real Estate
- Ensure Simplicity

**‘Ready’**

In:
- Protect Core Customer Liability
- Inclusive vs. Exclusive
## Zero Threshold

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**Zero Threshold**

![Image of a house with various systems highlighted](image)
High-performance home, so energy efficient, all or most annual energy consumption can be offset by renewable energy.
Zero Clear Strategy

Efficiency and Performance First!

Annual Energy Use

- Minimum Code Home
- Zero Energy Ready Home
- Zero Energy Home

Optimized Efficiency:
- Enclosure
- Components
- Solar Ready

Do No Harm:
- Moisture Protection
- Assured Comfort
- Comprehensive IAQ

Optional Renewable Energy:
- On-Site
- Offsets

Efficiency and Performance First!
Zero Ready for Informed Buyers
Informed Buyer Movement

Information Asymmetry: Caveat Emptor

Information Parity: Caveat Venditor
More Informed Homebuyers

SOURCE: National Association of Realtors® - Profile of Home Buyers and sellers 2010
What Car Buyers Know

- Design
- Performance
- Cost
- Durability
- Value

- Appearance
- Size
- Function
- Energy Efficiency (MPG)
- Acceleration/Handling
- Safety/Crash Test Ratings
- Invoice Price
- ‘Great/Good/Fair’ Price
- Resale Value
- Maintenance Cost
- Repair Record
- Recalls
- Warranty
- Awards/Special Recognition
- Professional Reviews
- Owner Reviews
What Home Buyers Will Know

• Design
• Performance
• Cost
• Durability
• Value

- Appearance
- Size
- Function

- Energy Efficiency (HERS)
- Comfort
- Health

- Sticker Price
- Ownership Cost (PITI + E)
- Resale Value
- Maintenance Cost

- Repair Record
- Disaster Resistance
- Warranty

- Awards/Special Recognition
- Professional Reviews
- Owner Reviews
Cheap IR Cameras
Mobile IR Cameras

Essess

Cambridge
Drone IR Cameras
Airborne IR Cameras

Energy made visible.
Make changes at home today that will have a global impact tomorrow.

SELECT YOUR CITY  LEARN MORE
Un-heated vacant housing

Poorly insulated housing with varying degrees of heat loss

Well insulated occupied housing with heat loss visible through the chimney flues
Citywide IR Programs

Home > Green Vancouver > How you can go green > Programs to help reduce your footprint > At home > Thermal Imaging program

Green Vancouver

- Greenest City Action Plan
- Renewable City Strategy: our future to 2050
- Zero Waste Vancouver
- Climate Change Adaptation Strategy
- Neighbourhood Energy Strategy
- How you can go green
  - Programs to help reduce your footprint
    - Smart Thermostat Pilot Program
    - Thermal Imaging program
- At work

Thermal Imaging program

We launched a thermal imaging pilot program in January to help homeowners identify energy loss in single family homes and to share information on energy saving incentives that are available. We’ve identified five neighbourhoods (220 KB) to participate in the pilot. The images will be taken throughout the month of January and staff will follow-up with homeowners later this spring.

What is a thermal image?

A thermal image is a picture of the heat that comes off of an object. Often in a thermal image, when something is hot, the image is bright yellow; if something is cold, it shows up as dark blue.

Thermal imaging is becoming an increasingly popular tool around the world to quickly identify opportunities for energy efficiency upgrades to a home that will also improve comfort and may improve health.

Discover your home’s energy efficiency potential

In Vancouver, 55% of all greenhouse gas (GHG) emissions come from buildings, and detached homes account for 31% of all GHG emissions from buildings.

Through the Greenest City Action Plan, we are aiming to reduce emissions from existing buildings by 20% by 2020. This would eliminate 180,000 tonnes of GHGs per year - the equivalent of removing 40,000 cars from the road.
Buyers Will Know Thermal Defects
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Aqua in Chicago
Buyers Will Know Thermal Defects

Aqua in Chicago
Builders Compete Thermal Defects

Benefits of the GreenLean construction process

Based on the government’s Energy Star program, Haskell Homes has developed an exclusive new GreenLean construction process (patent pending) that enables our homes to reach higher levels of energy efficiency and green building than even the EPA suggests.

Thermal imaging can detect where homes are losing energy. In this picture of one of our major competition homes, the light areas represent heat loss during the winter. As you can see, heat is escaping from every board in the framing. This is due to the way the home was built, how it is insulated, and several other factors. Haskell Homes built using the GreenLean construction method loses much less heat than what is being shown here. Because of GreenLean, every Haskell Home is able to save you as much as 50% on your utility costs. This translates to more money in your pocket each and every month you live in your home.

This is a thermal image of a Haskell Home. As you can see, there is no heat loss from the framing inside the walls as there is in the picture of our competitor’s house above. This is due to the GreenLean construction process which includes staggered 2 x 6 framing vs. standard 2 x 4 framing. It is also due to the better insulation used as well as many other unique construction techniques and attention to detail that make every Haskell Home have an HERS energy efficiency rating of 65 or less vs. a rating of 80 or above for many of our competitor’s homes. Call us today at 801-298-4881 to learn more!

Home Designs
Choose from 16 beautifully designed homes

Locations
Build on your lot or ours across the Wasatch Front

Competitor’s Home

Our Home
because it minimizes the risk of Thermal Defects
Buyers Will Know Poor Windows
Buyers Will Know Poor Windows
Buyers Will Know Good Windows
Zero Ready for Informed Buyers…

...because it integrates

Advanced Windows
Buyers Will Know Moisture Problems
Buyers Will Know Moisture Problems
Zero Ready for Informed Buyers…

...because it minimizes the risk of Moisture Defects
Diagnostic System:

- **Six Sensors**
  - 3 Thermal
  - 2 Voltage
  - 1 Current

- **<15 Minutes Install**

- **$50 Hardware**
Diagnostic Capability:

- **Charge** [Low]
- **Capacitor** [Failed Start or Run]
- **Flow** [Condenser or Evaporator]
- **Operation** [Normal/Abnormal]
- **Performance** [COP]
Buyers Will Know HVAC Quality
Buyers Will Know HVAC Quality
Zero Ready for Informed Buyers…

…because it helps ensure Quality HVAC
Indoor vs. Outdoor Air Pollutants:

On average **2-5 times greater**

Up to **100 times greater**

While Americans Spend

**90% of time indoors**

Source: EPA
“If your child doesn’t use an inhaler, consider yourself a lucky parent because, 1 in 10 children in the U.S. suffers from asthma.”

Source: Remarks for Administrator McCarthy, Announcement of Clean Power Plan, Washington, DC, June 2, 2014
Buyers Will Know Indoor Air Quality

- Push here for immediate detection
- Sensor Name: Can modify it from Setting
- Analysis & Advising info
- More advising info
- Latest Detection Time & Sensor Power Status
- Unhealthy for Sensitive Group: The responsible pollutant is Volatile Organic...
Buyers Will Know Indoor Air Quality

Air Mentor

PM2.5 Good
<5

Current status:
The last hour average value is 5 ug/m3.

Recommendation Actions:

African Violet

African Violet will bloom throughout the year, and it has strong ability to reduce carbon dioxide and hold dust. It reduces carbon dioxide concentrations i...
...because it helps minimizes the risk of Health Problems
Buyers Know Lack of Efficiency

71% think it’s important

35% satisfied with current home

36% Satisfaction Gap

“very energy efficient with low monthly utility costs.”

Source: The Housing Satisfaction Gap: What People Want but Don’t Have, Demand Institute, 2014
Buyers Will Know Operational Score

![Image of two charts showing energy usage comparison]

**Last Summer Comparison**

- **You** used 32% more electricity than your neighbors.
- **Your usage last summer:** May '10 - Sep '10

- **Efficient Neighbors:** 1,679 kWh
- **All Neighbors:** 1,750 kWh
- **YOU:** 2,302 kWh

*1 kWh: A 100-Watt bulb burning for 10 hours uses 1 kilowatt-hour.

Who are your Neighbors?

- **All Neighbors:** Approximately 100 occupied, nearby homes that are similar in size to yours (avg. 1,382 sq ft).
- **Efficient Neighbors:** The most efficient 20% from the All Neighbors group.

**Last Month Neighborhood Comparison**

- **You** used 15% less electricity than your efficient neighbors.
- **YOUR EFFICIENCY STANDING:**
  - Great 😊😊
  - Good 😊
  - Below Average

- **YOU:** 504 kWh
- **Efficient Neighbors:** 596 kWh
- **All Neighbors:** 1,092 kWh

*1 kWh: A 100-Watt bulb burning for 10 hours uses 1 kilowatt-hour.*
Buyers Will Know Asset Score

The Home Energy Score is a national rating system developed by the U.S. Department of Energy. The Score reflects the energy efficiency of a home based on the home's structure and heating, cooling, and hot water systems. The Home Facts provide details about the current structure and systems. Recommendations show how to improve the energy efficiency of the home to achieve a higher score and save money.
Buyers Will Know Efficiency

![Energy Efficiency Rating](chart.png)

Current: 37
Potential: 73

- **A** (90-100) Very energy efficient - lower running costs
- **B** (81-90) Efficiency
- **C** (66-80) Usual
- **D** (55-65) Average
- **E** (39-54) Poorly insulated
- **F** (21-38) Not energy efficient - higher running costs
Zero Ready for Informed Buyers…

…because it optimizes

Energy Efficiency
Buyers Know Solar Prices Falling

Buyers Can See Solar
Zero Ready for Informed Buyers…

…because it optimizes Solar Readiness
Buyers Know Planet is Hurting
Zero Ready Informed Buyers…

…because it minimizes Environmental Impact
Buyers Know Homes Are Aging

Median Age of Owner-Occupied Housing

Source: 2013 AHS, U.S. Census Bureau
Buyers Know Homes Are Aging

Median Age of Housing Stock

Source: American Community Survey, 2012
Buyers Know Aging Home Liabilities

- High Utility Bills
- Poor Comfort
- Health Risks
- Moisture Problem Risks
- Excessive Bugs/Pests
- Durability Issues
- Obsolete Technology

Meet 85% of Your Competition
Zero Ready for Informed Buyers…

...because it eliminates liabilities with Older Homes
Buyers Know Trusted Performance

HERS® Index

Existing Homes

Standard New Home

Zero Energy Home

This Home 65

More Energy

Less Energy

Energy Star

Energy Ready Home

U.S. Department of Energy

Passive House Institute US

NAHB Research Center

Green Approved

WaterSense

Meets EPA Criteria

EPA Indoor AirPLUS

Qualified Homes

Fortified

...for safer living.

78 | INNOVATION & INTEGRATION: Transforming the Energy Efficiency Market
Zero Ready for Informed Buyers…

...because it delivers

Trusted Performance
Buyers Will Know Reviews

Gary Lanthrum reviewed Estes Builders

March 22 at 1:56pm

This is the third house I've had built. Working with Estes was by far the best experience of all these construction projects. All new home construction projects will experience unexpected problems and challenges along the way. What really set Estes apart was the efficient and equitable way they help us work through those inevitable problems as they arose. Add to that the craftsmanship of the subs they used and we're all smiles with our new home.

Estes apart was the efficient and equitable way they help us work through those inevitable problems as they arose. Add to that the craftsmanship of the subs they used and we're all smiles with our new home.

Home Builders - DO NOT BUILD WITH THIS COMPANY!!!

If you are thinking about building with this company, I beg you not to. We signed a contract a year ago and were told that we would have a home in January. Well, January has come and gone and we just now have a completed home as of last week... Except when you walk inside you see missing trim, broken windows, the vinyl siding is warped, the porch steps are about to split apart, the paint looks... Read more

Was this review helpful? 6 | 1

Home Builders - Horrible Experience

First off I can't even describe how frustrating this was for me and my family. This company is just full of excuses. A 4 month home build turned into a year and a half. This company uses the bottom of the barrel subcontractors. I can write a book about how crazy the builder and the company is. They string you along the whole time thinking your an ***. The regional manager ... Read more

Was this review helpful? 7 | 0
Coming to a housing industry near you…

2016 Customer Satisfaction Survey Results:

OVERALL AVERAGE RATING:

4.8 out of 5 stars
Zero Ready for Informed Buyers…

...because it optimizes the Home Living Experience
1. If it can be done, it _will_ be done.

2. If you don’t do it, _someone else_ will.

* Daniel Burrus, “*Flash Foresight*”
Someone Else Doing It Graveyard…

- Kodak
- Polaroid
- Motorola
- Palm
- Circuit City (and a host of other retailers)
- American Car Manufacturers
- TWA and other Legacy Airlines
- Converse Sneakers
- and the list goes on…
Informed Buyers Willing to Pay…

…for Transformational Experiences:

Personal Transportation

<1X
Informed Buyers Willing to Pay…

…for Transformational Experiences:

Personal Transportation  Daily Break

<1X  2-3X
Informed Buyers Willing to Pay…

…for Transformational Experiences:

Personal Transportation  Daily Break  Healthy Food

<1X  2-3X  2-3X
Informed Buyers Willing to Pay…

…for Transformational Experiences:

<table>
<thead>
<tr>
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<th>Daily Break</th>
<th>Healthy Food</th>
<th>Tech + Design</th>
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<td>&lt;1X</td>
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Informed Buyers Willing to Pay…

...for Transformational Experiences:

<table>
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<td>10X</td>
</tr>
<tr>
<td>Healthy Water</td>
<td>∞X</td>
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</table>
Zero Value Translated
How do consumers decide?
Communication Strategy

- Simple Core Message
- Better Experience Showcase
- Clarity with Contrast
Are you ready for a home that lives, works, and lasts better? The home of the future — a better home — is available today. Take a virtual tour of homes that are so energy efficient a renewable energy system can offset all or most of their annual energy consumption. These award-winning homes are independently certified to meet DOE Zero Energy Ready Home guidelines and constructed by a select group of top builders. Zero Energy Ready Home is part of the U.S. Department of Energy’s Better Buildings initiative. Better Buildings aims to make commercial, industrial, public, and residential buildings 20 percent more energy efficient over the next decade.

Click on a climate zone to see homes in that region.

<table>
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<tr>
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<th>LOCATION</th>
<th>NIA WINNER</th>
<th>CLIMATE ZONE</th>
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<tr>
<td>Cobbler Lane</td>
<td>Addison Homes</td>
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<td>ZED 2</td>
<td>Boulder ZED Design Build</td>
<td>Boulder, CO</td>
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Zero Energy Ready Home: The Experts’ Choice
Making the Largest Purchase of a Lifetime Just Got Easier
Simple Core Message

Zero Energy Ready Home: For More Information:
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DOE Tour of Zero

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Experience Showcase

Click any climate zone to see homes in that region.

Search: [Search] [Reset]

Showing 1 to 25 of 77 entries

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Showcase: Tour of Zero

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<td>C. B. Blakeslee</td>
<td>BPC Green Builders</td>
<td>Merike, CT</td>
<td>2008</td>
<td>COLD/VERY COLD</td>
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<td>BPC Green Builders</td>
<td>Merike, CT</td>
<td>2005</td>
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</tbody>
</table>
Showcase: Tour of Zero

"ZER0" ENERGY READY HOME
U.S. DEPARTMENT OF ENERGY

KEY FEATURES
- High-performance ventilation system for enhanced safety and comfort
- Comprehensive air protection
- Energy-efficient heating and cooling systems
- High-efficiency water heating system
- High-efficiency appliances and advanced lighting technology for energy and water savings

"...homes that are energy-efficient but also attainable."

Garbett Homes
Net Zero at Rosecrest
Garbett Homes

"We incorporated solar and home automation with tested, proven technology to build homes that are energy-efficient but also affordable."

"DOE TOUR OF ZERO: GARBETT'S NET ZERO-ENERGY HOME AT ROSECrest BY GARBETT HOMES."

Buildings.Energy.gov
Showcase: Tour of Zero

DOE TOUR OF ZERO: GARBETT’S NET ZERO-ENERGY HOME AT ROSECREST BY GARBETT HOMES
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"... homes that are energy-efficient but also attainable."

Garbett Homes
Net Zero at Rosecrest
Salt Lake City, UT
garbetthomes.com

"We’ve incorporated solar and home automation with Garbett Homes’ ability to build homes that are energy-efficient but also attainable."

Bryson Garbett, president, Garbett Homes

Watch the video

Meet the Builder

Consumer Experience

Key Stats

$6 Average monthly energy bill

$152,258 saved over 30-yr mortgage

HERS -1

0 = a net zero energy home
100 = typical new code home
130 = average existing home

4,111 ft²

3 bedrm, 2.5 bath
2 floors + bsmt
cold climate

Energy Efficiency & Renewable Energy

J.S. DEPARTMENT OF ENERGY

Buildings.Energy.gov
Showcase: Tour of Zero

Garbett Homes

Net Zero at Rosecrest
Salt Lake City, UT
garbetthomes.com

“We’ve incorporated solar and home automation with Garbett Homes’ ability to build homes that are energy-efficient but also attainable.”

— Bryson Garbett, president, Garbett Homes

KEY FEATURES

- High-performance insulation systems enhanced quiet and comfort
- Comprehensive draft protection
- Fresh air system for cleaner, healthier indoor air
- High-efficiency comfort system
- High-efficiency appliances and advanced lighting technology for water savings

Details

Watch the demonstration video — in English or Spanish.

Garbett Homes
Salt Lake City, UT
Bryson Garbett, President
Brian Harner, Energy Director
brian@garbetthomes.com
www.garbetthomes.com

FEATURED HOME/DEVELOPMENT:

Tour of Zero ENERGY READY Home Case Study
Garbett Homes
Herriman, UT

Complied in July 2013, the 4,111 sf net-zero-energy home in Herriman, Utah (just outside Salt Lake City), is a winning example for the first U.S. Department of Energy (DOE) Zero Energy Ready Home produced and certified in Utah and the first net-zero-energy production home built in Utah. The home also meets the requirements of ENERGY STAR Version 3 and the U.S. Environmental Protection Agency’s (EPA) Indoor AirPLUS certification.

“Our motivation was to build a high-quality, affordable, net zero-energy home, and the DOE Zero Energy Ready Home program is the logical next step after ENERGY STAR on this path,” said Dennis Mors, an in-house energy coordinator for Garbett Homes.

The DOE Zero Energy Ready Home, which was designed by KYO Group Architecture & Planning, is located in the master-planned community of Rosecrest where comparable homes built to code have an average utility bill of $380 to $400 a month. This home has a Home Energy Rating System (HERS) score of -1, meaning its utility bills are zero.

“We took it one step at a time, building on the knowledge we gained from ENERGY STAR,” said Mors. “The challenge we faced was building this home affordably at zero energy in Climate Zone 3. We ramp between 10°F and 20°F during the winter and can drop below 0°F. Our summer temperatures typically range from 85°F to 95°F and can reach over 100°F. We are at over 5,000 feet in elevation here.”

With the net zero-energy and affordable goal in mind, the Garbett Homes’ team planned, modeled energy options, evaluated, and modeled again, repeating the evaluation and building processes multiple times, until they finally decided...
Showcase: Tour of Zero

Garbett Homes

1st Floor

Bedroom
Living Room
Closet
Bath
Covered Porch
Garage

2nd Floor

[Open to Below]
Bedroom
Bedroom
Laundry
Bath
Bedroom

2nd Floor with Optional 4th Bedroom and Bath

Opt. Bedroom
Opt. Bedroom
Storage
Basement

[Open to Below]

Küche

3-Car Extended Garage

3-Car & Extended Garage Options

Küche

Garage

Extended Covered Patio Option

3-Car Extended Garage
Showcase: Tour of Zero

DOE Zero Energy Ready Home: Partner Profile
Garbett Construction Inc

Partner ID: 554
Organization Type: Builder
Main Contact: Damian Moore
Address: 273 N. EAST CAPITOL ST.
       SALT LAKE CITY, UT 84103
Primary Phone Number: (801) 456-2429

Certified DOE Zero Energy Ready Home (2012 - Present):
Certified Builders Challenge Homes (2008 - 2012):
Website: www.garbetthomes.com
HIA Winner:
2013, 2016

"We've incorporated solar and home automation with Garbett Homes' ability to build homes that are energy-efficient but also attainable."

– Bryson Garbett, president, Garbett Homes

All Places of Business:

Commitments

Click
Goal:
Inspire consumers
to visit the home of the future…
available today…
DOE Zero Energy Ready Homes.

Innovation Partners:
• Manufacturers
• Associations
• Utilities
• Lenders
Clarity with Contrast
Clarity with Contrast

Clarity depends on contrast.

We often understand something better when we see it in comparison with something else than when we see it in isolation.
Translating ZERH Value with Clarity

Homes to the Power of ZERO

A Symbol of Excellence
HEALTHFUL ENVIRONMENT

COMFORT PLUS

ADVANCED TECHNOLOGY

ULTRA EFFICIENT

QUALITY BUILT

DURABILITY

What is the DOE Zero Energy Ready Home™ Label?
It is a Symbol of Excellence for energy savings, comfort, health, quality, and durability met by a select group of leading builders meeting U.S. Department of Energy Guidelines.

What is a Zero Energy Ready Home?
It is a high-performance home that energy efficient, all or most, annual energy consumption can be offset with renewable energy. In other words, it is the Home of the Future.

U.S. DEPARTMENT OF ENERGY

NEW TOWN

303-201-4867
NewTown@net.com
123 Main Street, Denver, CO 34567

KEY

DOE Zero Energy Ready Home
ENERGY STAR® Certified Home
Existing Home

This graphic comparison chart demonstrates relative performance of this DOE Zero Energy Ready Home vs. existing homes (built between 1993 and 2016) and ENERGY STAR Certified Homes. Actual performance may vary.
Value Proposition Transparency

DOE Challenge Home Label Methodology

October 2012
Translating ZERH Value with Clarity

HEALTHFUL ENVIRONMENT

KEY
- DOE Zero Energy Ready Home
- ENERGY STAR Home
- Existing Home

This label indicates relative performance of this DOE Zero Energy Ready Home to existing homes (built between 1990 and 2010) and ENERGY STAR qualified homes. Actual performance may vary.
Translating ZERH Value with Clarity

**Lives Better**

**Healthful Environment**

Every DOE Zero Energy Ready Home has a comprehensive package of measures to minimize dangerous pollutants, provide continuous fresh air, and effectively filter the air you breathe.

**Comfort Plus**

Superior insulation, windows, and sealing and space conditioning systems included in every DOE Zero Energy Ready Home surround you with a comfortable, energy-efficient, and quiet setting in every room or every floor.

**Works Better**

**Advanced Technology**

Every DOE Zero Energy Ready Home begins with a detailed building science-based by ENERGY STAR for Homes, and then crosses advanced technologies and practices from DOE’s world-class research program, Building America.

**Ultra Efficient**

Compared to a typical home, an ultra-efficient Zero Energy Ready Home is in operation to own. In fact, every DOE Zero Energy Ready Home has so energy efficient, a small scale electric system can easily offset most, or all, of your annual energy consumption. We call this Zero Net-Energy Ready.

**Lasts Better**

**Quality Built**

Advanced construction practices and technologies are specified for every DOE Zero Energy Ready Home. They are enforced by independent verifiers with detailed checklists and prescribed diagnostics.

**Durability**

The advanced levels of energy savings, comfort, health, durability, quality, and future performance in every DOE Zero Energy Ready Home provide value that will stand the test of time, and invest and exceed forthcoming code requirements.

LEARN MORE AT: buildings.energy.gov/zero

---

**A Symbol of Excellence**

**Healthy Environment**

- Comfort plus
- Advanced technology
- Ultra efficient
- Quality built
- Durability

**Front Cover**

**Inside Spread**

**Flap**

**Back Cover**

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Translating ZERH Value Proposition

VIVID LIVING
HEALTHFUL ENVIRONMENT

Fresh Air
- Supply Fresh Air System
- Odor and Moisture Control Fans
- High-Capture Filtration Technology

Quiet
- Quiet Window Technology
- Quiet Wall Technology

Moisture Control
- Dry-by-Design Construction
- Moisture Control System – Whole House
- Moisture Controlled Comfort System
- Moisture Controlled Windows
- Moisture Controlled Lower Level

Pest Control
- Bug Control Barrier
- Pest Screened Home

Outdoor Contaminant Control
- Contaminant Sealed Construction
- Contaminant Sealed Comfort Delivery
- Dust and Pollen Barrier
- Radon Controlled Home

Chemical Control
- Formaldehydes Controlled Home
- VOC Controlled Home

Fume Control
- Carbon Monoxide Controlled Equipment
- Carbon Monoxide Controlled Fireplace
- Fume Controlled Garage
Translating ZERH Value with Clarity

The Future of Housing—Today

Only a select group of the top builders in the county meet the extraordinary levels of excellence and quality specified by U.S. Department of Energy guidelines.

Lives Better

HEALTHFUL ENVIRONMENT

Every DOE Zero Energy Ready Home has a comprehensive package of measures to minimize dangerous pollutants, provide continuous fresh air, and effectively filter the air you breathe.

COMFORT PLUS

Superior insulation, windows, and sealing and space conditioning systems included in every DOE Zero Energy Ready Home surround you with even temperatures, air humidity, and quiet in every room or every floor.

KEY

- DOE Zero Energy Ready home
- ENERGY STAR Certified home
- Existing home

Works Better

ADVANCED TECHNOLOGY

Every DOE Zero Energy Ready Home begins with solid building science specified by ENERGY STAR for Homes, and then adds advanced technologies and practices from DOE’s world-class research program, Building America.

ULTRA EFFICIENT

Compared to a typical home, an ultra efficient Zero Energy Ready Home is impressive to own. In fact, every DOE Zero Energy Ready Home is so energy efficient, a small scale electric system can easily offset most, or all, of your annual energy consumption. We call this Zero Net-Energy Ready.

Qualities Built

Advanced construction practices and technologies are specified for every DOE Zero Energy Ready Home. Then they are enforced by independent verifiers with detailed checklists and prescribed diagnostics.

DURABILITY

The advanced levels of energy savings, comfort, health, durability, quality and future performance in every DOE zero Energy Ready Home provides a value that will stand the test of time and will exceed existing code requirements.

The label on this sample home performance of LSD Zero EnergyReady homes is testing homes built between 2005 and 2010 and NGS+20 Certified homes. Actual performance may vary.

LEARN MORE AT: buildings.energy.gov/zero

Call us at: 303-231-4567

ThriveHomes@net.com

Front Cover

Inside Spread

Back Cover
Contrast Matters

My power bill is $5. What’s yours?

- Heather Robbins, Garbett Homeowner

garbettHOMES.com
Now you’re living.
“Our daughter couldn’t breathe without discomfort for years. Within two months of moving into our new Cobblestone home we threw away the inhaler. That was priceless!”

Charly and Mary Jones, Cobblestone Homeowner
“You feel like you’re wrapped in a 100 wool blankets. It’s so warm, you would never know it was below zero degrees the last two weeks here.”
Contrast Matters

de young properties

YOU DON’T NEED TO
Imagine
A HOME IN THE YEAR 2020...

IT’S ALREADY HERE!
Contrast Matters
Contrast Matters

Smart vs. Dumb Cooling
Translating ZERH Value with Clarity

Smart vs. Dumb Heating
Clarity with Contrast
Lack of Clarity

<table>
<thead>
<tr>
<th>ENERGY PERFORMANCE RATINGS</th>
<th>Restorations Windows</th>
<th>World's Best Window Co.</th>
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<tr>
<td>U-Factor (U.S./I-P)</td>
<td>Solar Heat Gain Coefficient</td>
<td>Solar Heat Gain Coefficient</td>
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<td>0.22</td>
<td>0.32</td>
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<tr>
<td>ADDITIONAL PERFORMANCE RATINGS</td>
<td>ADDITIONAL PERFORMANCE RATINGS</td>
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</tr>
<tr>
<td>Visible Transmittance</td>
<td>Air Leakage (U.S./I-P)</td>
<td>Visible Transmittance</td>
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<td>0.42</td>
<td>0.1</td>
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<tr>
<td>Condensation Resistance</td>
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<td>51</td>
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</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 availability of any product for any specific use. Consult manufacturer’s literature for other product performance information. www.nfrc.org
Adding Clarity

10-Year Window

50-Year Window

Thermal Protection
Sun Protection
Natural Light
Draft Protection
Condensation Control

Restorations Windows
Vinyl Extruded, UltraCore Frame,
Triple Glazed,
Krypton90, Low-E
Product Type: Vertical Slider

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
Lack of Clarity

How do consumers decide?
Adding Clarity

2009

5-Year Enclosure

10-Year Enclosure

10-Year Enclosure

50-Year Enclosure

100-Year Enclosure

Passive House Institute US

J.S. DEPARTMENT OF ENERGY
Energy Efficiency & Renewable Energy

Buildings.Energy.gov

INNOVATION & INTEGRATION: Transforming the Energy Efficiency Market
Zero Builders in Action

- Thrive Homes
- Revive Developments