Getting To Zero Energy Ready In Homebuilding

Utopia Webinar - November 11, 2021

Meet The Experts

Jay Epstein
President and Founder
Healthy Communities
Williamsburg, Va.

Bill Rectanus
Vice President of
Homebuilding Operations
Thrive Home Builders
Denver, Colo.

Chad Gillespie
Senior Manager of
Performance Construction
Mitsubishi Electric Trane HVAC
Suwanee, Ga.

David Barista
Content Director
UTOPIA
Arlington Heights, Ill.

Thanks To Utopia's Sponsor Partners

What we've learned so far

- ➔ Best Practices for Building Net Zero Homes webinar, Nov. 2020
- ➔ IBSx panel of experts, Feb. 2021
- ➔ Utopia's ongoing editorial series on DOE Housing Innovation Awards winners

“Pick your target”

Dave Everson, Owner and CEO, Mandalay Homes, Arizona

Tip

Run your existing homes through energy modeling, and then “have your rater experiment with you” to see how you might achieve your desired energy efficiency” and HERS score.

“Stage your shift to zero”

Sam Rashkin, Former Chief Architect, DOE Building Technologies Office, Founder, Housing 2.0

Tip

Start by optimizing efficiency, which covers the building envelope, equipment, and the appliances and lighting. Step two is minimizing risk through indoor air quality, comfort, and water protection.

“Do load calculations with care”

Chad Gillespie, Mitsubishi Electric Trane HVAC

Tip

Builders should consider a home’s location, approximate area, orientation, mechanical systems, and glass and roof specs when calculating a home’s heating/cooling load. Once those are done, look closely at the numbers and see if you can make any adjustments to improve the home’s energy efficiency with air sealing, window glazing, putting ductwork in conditioned spaces, or other strategies.

“Concentrate on air sealing”

Tim O’Brien, Tim O’Brien Homes, Madison and Milwaukee, Wis.

Tip

“Air sealing is the most cost-effective thing you can do to make your houses more efficient.” Tim O’Brien Homes uses high-performance wall systems with rigid foam insulation, advanced framing, spray foam insulation, R-50 insulation in the attic, R-7.5 foundation insulation, and more to create a tight building envelope.

“Reconsider your HVAC”

Todd Usher, Addison Homes, Greenville, S.C.

Tip

As part of its effort to improve the performance of its building envelope, Addison Homes moved to variable-speed heat pumps and variable-speed air handlers. “These systems also have active dehumidification, which more effectively removes humidity from the home and keeps the comfort level in the home consistent.”

“Make zero standard”

Todd Usher, Addison Homes

Tip

“It’s hard to tell a trade that ‘this house we are going to [build] to best practices’ and ‘this house we are going to do to code. We do it as best practices every time, and that way it is our standard.”

“Operating efficiencies can offset higher costs”

Tim O’Brien, Tim O’Brien Homes

Tip

Tim O’Brien Homes has been able to drive down higher initial first cost for building zero energy homes from 3% to 2-2.5% by consciously partnering with its energy rater and HVA, plumbing, and insulation trade partners to find efficiencies and develop smoother processes. “You can work together to lower your cost of doing business together.”

Jay Epstein

President and Founder
Healthy Communities
Williamsburg, Va.

Getting To Zero Energy Ready In Homebuilding

Pathways to Decarbonization for Residential Homes
The Building Blocks to Decarbonization –Simplicity of Design
"Reducing Your Carbon Footprint"

Zero Energy Ready Home- Microgrid (Virtual Net Metering) - Preserving the trees in New Residential Developments- Electric Car with Bidirectional Battery Charging- Hot Water Recirculating Pump – Electrification of New Homes

The U.S. Department of Energy (DOE) Zero Energy Ready Home (ZERH) program delivers seven complete systems to homebuyers that ensure a superior experience:

1. High-Performance Enclosure
2. High-Efficiency Components
3. Whole-House Water Protection
4. High-Performance Comfort
5. Whole-House Health Protection
6. Solar Ready Construction
7. Enhanced Quality Assurance

Takeaway

We have not changed how we build the home…

We changed how we market the home. based on consumer awareness!

ZERH Home- Pathway to Decarbonization
The first step to reducing Carbon Emissions

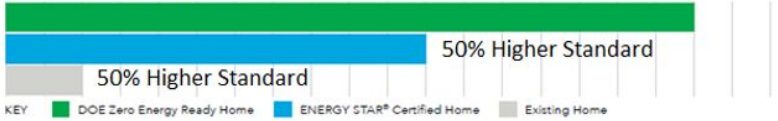
Supply chain creation of products

Distribution and Use of Products

Operations - Reducing the Carbon Emissions for the end user

Take Away:
To keep this simple for the Builder and homeowner to understand – We focus on the carbon emissions once the home is built. This is the builders first step -Let the Market define who we are and take notice-We have been building homes like this for years !!!

Live More, Worry Less Compare the Difference

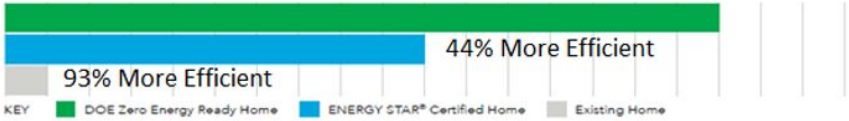


"We have lived in the home for two years now and couldn't be happier with the quality of construction, and the ease of living in, cleaning and maintaining the home."
— Homeowner

Live in Tomorrow's Home, Today Compare the Difference

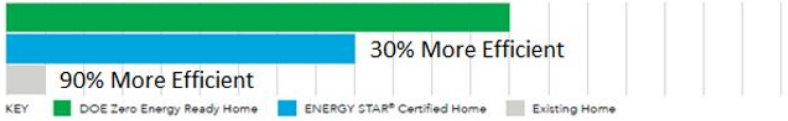
"I love this home. I never thought home ownership could be this easy. No condensation on windows, less dust, very little maintenance, affordable utilities, and it's good for the environment. It has improved our quality of life."

Take Advantage of Innovative Technology Compare the Difference



"We were attracted to…a complete high-performance package, high energy efficiency, high water efficiency, and air filtration for indoor air quality."
— Homeowner

Take Control of Your Utility Bills Compare the Difference

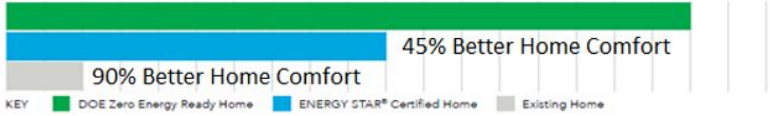


"Our energy bills are less than half of our previous home with 20% more square footage."
— Homeowner

Live Better with a Healthier Home Compare the Difference

"We have always suffered from allergies… I can come back home and my odorless, fresh space speaks for itself. No mold, no breathing problems, no fumes and no itchy eyes. We are definitely happy."
— Homeowner

Experience Comfort at a Whole New Level Compare the Difference



"As soon as you walk into this house you can tell its sound, it's airtight. You feel like you're wrapped in 100 wool blankets."
— Homeowner

Emissions and Energy Summary

Emissions Summary

TopBuild Home Services
ENVIRONMENTS FOR Living

Property
1178 HITCHENS LN
WILLIAMSBURG, VA 23188
Model: ADAMS CONCRL BD3 SOL S
Community: WALNUT FARMS

1178 HITCHENS LN LOT 64
909HECVA ADAMS CONCRL BD3

Organization
TopBuild Home Services, I
Charles Bond

Builder
HEALTH E
COMMUNITIES

Inspection Status
2021-10-25
Rater ID (RTIN): 0091852
RESNET Registered
(Confirmed)

Emissions by End-Use

Carbon Dioxide (CO_2) [tons/yr]	
Heating	1.6
Cooling	0.5
Water Heating	0.5
Lights & Appliances	2.8
Photovoltaics	-4.3
TOTAL	1.2

Sulfur Dioxide (SO_2) [lbs/yr]	
Heating	4.4
Cooling	1.5
Water Heating	1.4
Lights & Appliances	7.8
Photovoltaics	-11.8
TOTAL	3.3

Nitrogen Oxide (NO_x) [lbs/yr]	
Heating	2.5
Cooling	0.8
Water Heating	0.8
Lights & Appliances	4.4
Photovoltaics	-6.6
TOTAL	1.8

Energy Use Intensity (EUI) [kBtu/ft²]	
Site EUI	4.7

Home Energy Rating Certificate

Final Report

Rating Date: 2021-10-25
Registry ID: 139283318
Ekotrope ID: 5dYq98Ad

TopBuild Home Services
ENVIRONMENTS FOR Living

HERS® Index Score: 5
Your home's HERS score is a relative performance score. The lower the number, the more energy efficient the home. To learn more, visit www.hersindex.com

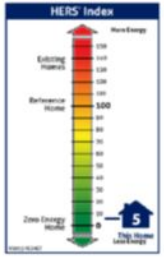
Annual Savings $2,320
*Relative to an average U.S. home

Home:
1178 HITCHENS LN
WILLIAMSBURG, VA 23188

Builder:
HEALTH E COMMUNITIES

Your Home's Estimated Energy Use:

	Use [MBtu]	Annual Cost
Heating	9.4	$317
Cooling	3.1	$104
Hot Water	2.9	$99
Lights/Appliances	16.7	$564
Service Charges		$129
Generation (e.g. Solar)	25.2	-$847
Total:	**32.2**	**$366**



Home Feature Summary:

Home Type:	Single-family detached
Model:	ADAMS CONCRL BD3 SOL SPL RR
Community:	WALNUT FARMS
Conditioned Floor Area:	1,504 ft²
Number of Bedrooms:	3
Primary Heating System:	Air Source Heat Pump • Electric • 10 HSPF
Primary Cooling System:	Air Source Heat Pump • Electric • 19.8 SEER
Primary Water Heating:	Residential Water Heater • Electric • 3.42 Energy Factor
House Tightness:	691 CFM50 (3.57 ACH50)
Ventilation:	96 CFM • 46 Watts
Duct Leakage to Outside:	11 CFM @ 25Pa (0.73 / 100 ft²)
Above Grade Walls:	R-24
Ceiling:	Attic, R-49
Window Type:	U-Value: 0.28, SHGC: 0.22
Foundation Walls:	R-10

This home meets or exceeds the criteria of the following:

ENERGY STAR v3.1
ENERGY STAR v3
2018 International Energy Conservation Code
2015 International Energy Conservation Code
2012 International Energy Conservation Code
2009 International Energy Conservation Code
2006 International Energy Conservation Code

Rating Completed by:

Energy Rater: Charles Bond
RESNET ID: 0091852

Rating Company: TopBuild Home Services, Inc.
475 N Williamson Blvd., Daytona Beach, FL 32114
8669127233

Rating Provider: TopBuild Home Services, Inc.
475 N Williamson Blvd., Daytona Beach, FL 32114
8669127233

Charles Bond
Charles Bond, Certified Energy Rater
Digitally signed: 10/29/21 at 1:33 PM

ekotrope

Ekotrope RATER - Version 4.0.0.2770
The Energy Rating Disclosure for this home is available from the Approved Rating Provider.
This report does not constitute any warranty or guarantee.

Tip - ZERH's Works- Just realize how special a product we have - So adaptable to today's changing Marketplace - Not a one off design hard to duplicate

THE SIMPLICITY OF THE BUILD

Jay Epstein has coined the term *The Simplicity of the Build,* an innovative methodology that allows builders, subcontractors, superintendents, sales staff and the homebuyer to understand the building concept of a Zero Energy Ready Home and build homes of the future today. Building Zero Energy Ready Homes is not inherently more complicated to construct than a conventional homes but requires a coordinated effort on behalf of everyone involved to insure all parts and pieces come together in the end.

Tip : Hot Water D'MAND system recirculating pump saves up to 8000 gallons of water a year. A Reduced carbon footprint and saves you money the first day you move in

Tip: Energy Heal and raised storage cradle built into the truss system allows room for R49 attic insulation.

Tip: Third Party Manuel J for proper sizing of your mechanical system for higher efficiency in sizing unit

Tip: The important components - thermal blanket- flash and batt insulation- high performance window - ERV - multistage compressor with variable speed air handler and a good rater to test your component selection is the ticket to success

I created an acronym called DARST.
It stands for Dreams and Reality Sometimes Touch.
Rest assured a ZERH - Dreams and Reality Do Touch

FEEL

Have you ever experienced a July day that your home would never cool down? Or that cold February evening you could not get warm?

Epstein says "the temperature throughout Zero Energy Ready Homes does not change. Even on the hottest days we stay cool and on the coldest winter nights we stay warm. The system runs longer and more energy efficient without the startups and stops of a typical unit."

Hear

Did you every wish that your loud compressor was not in your backyard?

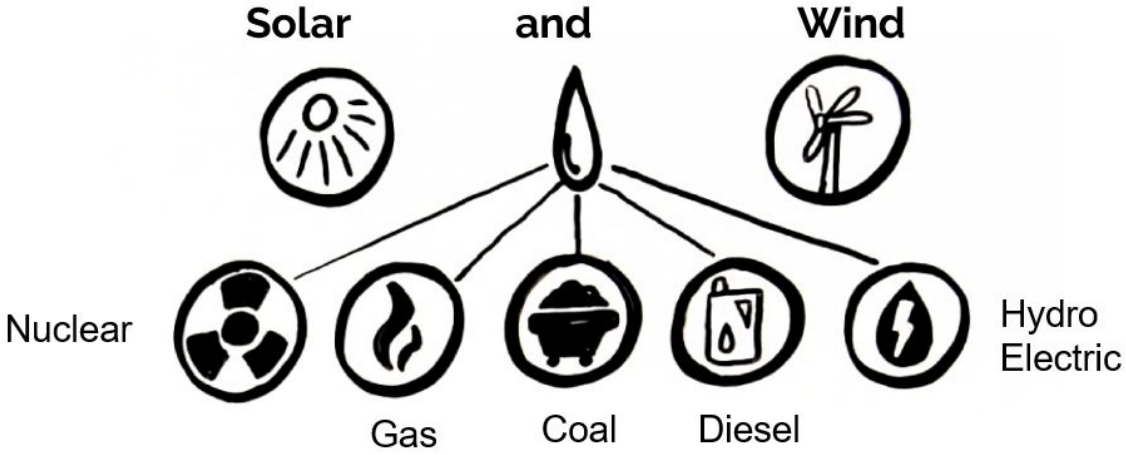
Epstein says "the Zero Energy Ready Home truly is quiet as the air moves throughout the home. The air handler is located in a conditioned part of the home, in a closet by design in our Zero Energy Ready Home. Once the door is closed the air handler cannot be heard. The compressor outside is quiet too. As we carry on a conversation by the multi stage compressor, I noticed that it does not impair our conversation. Seeing is believing."

Touch

Have you ever wanted to control the environment inside your home?

Blown fiberglass packs the wall cavities, which are first air sealed with an inch-thick coating of open-cell spray foam.

We use a lot of Water creating Power for our homes with two exceptions:



Darrell McMaster- SAVING THE WORLD ONE HOUSE AT A TIME

Take away:
Two ways for your customer to see instant savings on their utility bill and reduced carbon emissions: Your high performance ZERH home with Solar and Hot Water D'MAND System utilizing structured plumbing

The Post Covid ZERH Buyer

Sight

Clarity of the Air - Have you ever noticed the haze of light thru your window created from the particles in the air on a bright sunny day?

Epstein says “As you walk through The Zero Energy Ready home you will notice the brightness of the room. No lights are on, but only the sunlight entering the room. The room is crisp and clear as the system has filtered the particles from the air”.

Epstein says “Once you are inside the home take a moment and just breathe. The air is crisp and clean. Truly a breath of fresh air. You may notice after a while your sneezing and allergies were left outside.”

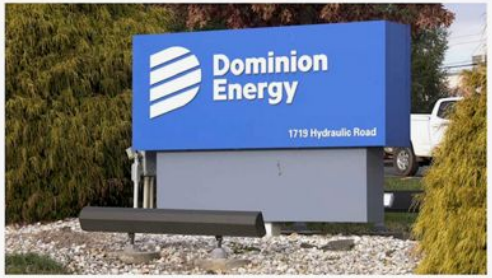
Take Away:

The Baby Boomer watched the blue skies disappear. The Gen X and the Millennium are just now post Covid seeing the blue skies. Three groups of buyers interested in Healthy Energy Efficient Homes that reduce the carbon footprint define the ZERH buyer.

nbc12.com

12 Watch Live News

Dominion expects bills to rise to pay for renewable mandates



Dominion Energy office on Hydraulic Road in Charlottesville (WVIR)

Updated: May. 4, 2020 at 4:39 PM EDT

RICHMOND, Va. (AP) — Customers of Dominion Energy Virginia can expect their bills to increase by an average of about 3% annually over the next 10 years as the company changes its generation mix to comply with new renewable energy mandates, Dominion recently told regulators and lawmakers.

Stimulating Winter Sales

ZERH Home- Pathway to Decarbonization
High Performance Energy Savings
Electrification of New Homes

Take Away:

The media and government awareness (free advertising) of future high utilities bill in gas and oil predicts a cold winter with high utilities bills. The ZERH electric high performance home is the answer

Take Away:

Net metering credits your excess electricity generated in the spring and fall and is credited back at the same cost you pay for electricity during the summer and winter. A balancing act that protects you from higher utilities bills.

LIVING WITH CLIMATE CHANGE

Here's the first U.S. city to cut gas and oil for all-electric, on the path to zero carbon emissions

By Rachel Koning Beals
November 4, 2021, 6:21 pm EDT

Ithaca, N.Y., is turning to the private sector to fund the upfront outlays of its building decarbonization effort

What's Next: Virtual Net Metering

How to Build Solar Homes Without Losing Trees

The homes are designed to reduce the carbon footprint. A typical home releases 17,000 lbs. of carbon every year. The homes at Solara Woods will release less than 2000 lbs. of carbon a year.

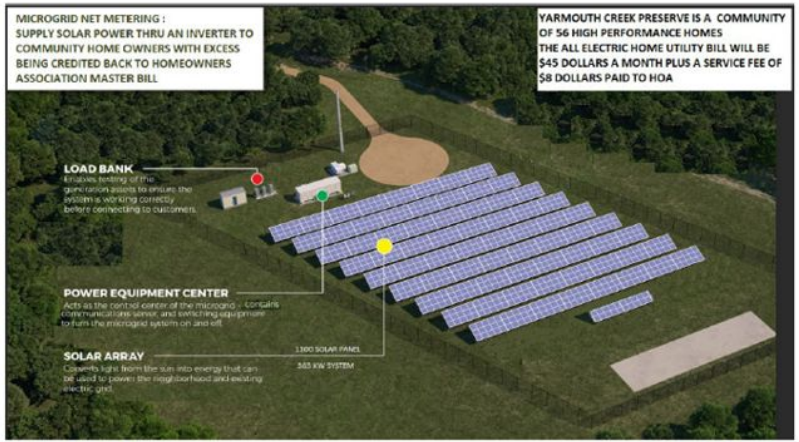
SECTION 1: LIFE | BALANCE

SOLARA WOORDS is about balance. Just as there exists balance in nature, there is life balance for residents at Solara Woods. Balance is achieved through design…a design that has presented opportunities for renewal, growth and a healthy lifestyle…BALANCE.

SOLARA WOODS

Each home is designed to exceed building efficiency energy standards and high performance metrics resulting in a zero energy ready home. Cost savings on energy consumption is one clear and monetary benefit of this type of design and construction. But Solara Woods' homes are designed beyond the numbers. They are designed and built using a comprehensive approach to ensure that the home supports a healthy and balanced lifestyle. This is accomplished through the following three things.

According to the U.S. Department of Agriculture, one acre of forest absorbs six tons of carbon dioxide and puts out four tons of oxygen. This is enough to meet the annual needs of 18 people.



At Solara Woods, we wish to preserve the trees and views through out the community. The electrification of this solar community with high-performance homes while preserving the trees and views of the land is accomplished by establishing a residential microgrid of 1100 panels @330 watts each. The micro grid would be 363KW in size located on three acres of land within the community. The microgrid will be owned by the Homeowners Association and be used for the sole benefit of the Solara Woods residents. This is how new residential communities should be built in the near future.

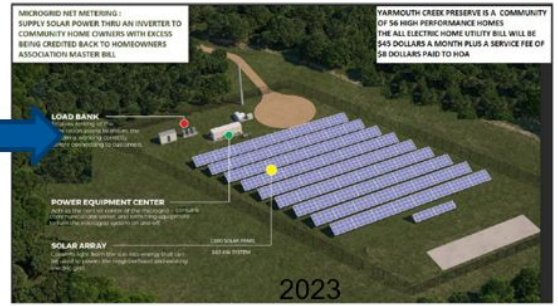
Take Away: So many opportunities for higher value of solar events for Community solar verses Rooftop

***Besides producing power, you get more control, frequency control, you can mitigate transmission wide constraints, so you don't have to upgrade transmission lines.**

***The community solar the air is cooler behind the panels verses roof top so it operates at 6 to 8% more efficient levels and produces more kilowatt hours.**

***Maintained better and operates better- panels are cleaned, less dusty.**

Zero Net Carbon Footprint- Follow the trail



ZERH Sales at Healthy Communities Up 355%

Take Away
Emerging Market Trends

Be a Part of the ZERH Movement
Where Dreams and Reality Do touch

Contact Information

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Healthy Communities
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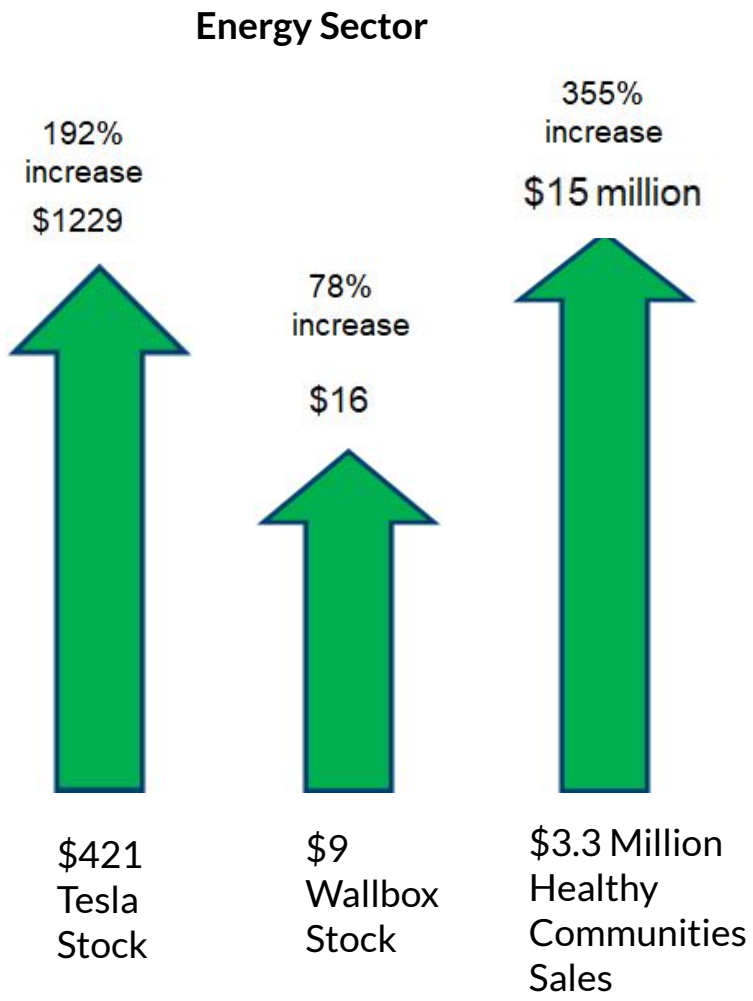
Email: Jay@HEC-VA.COM

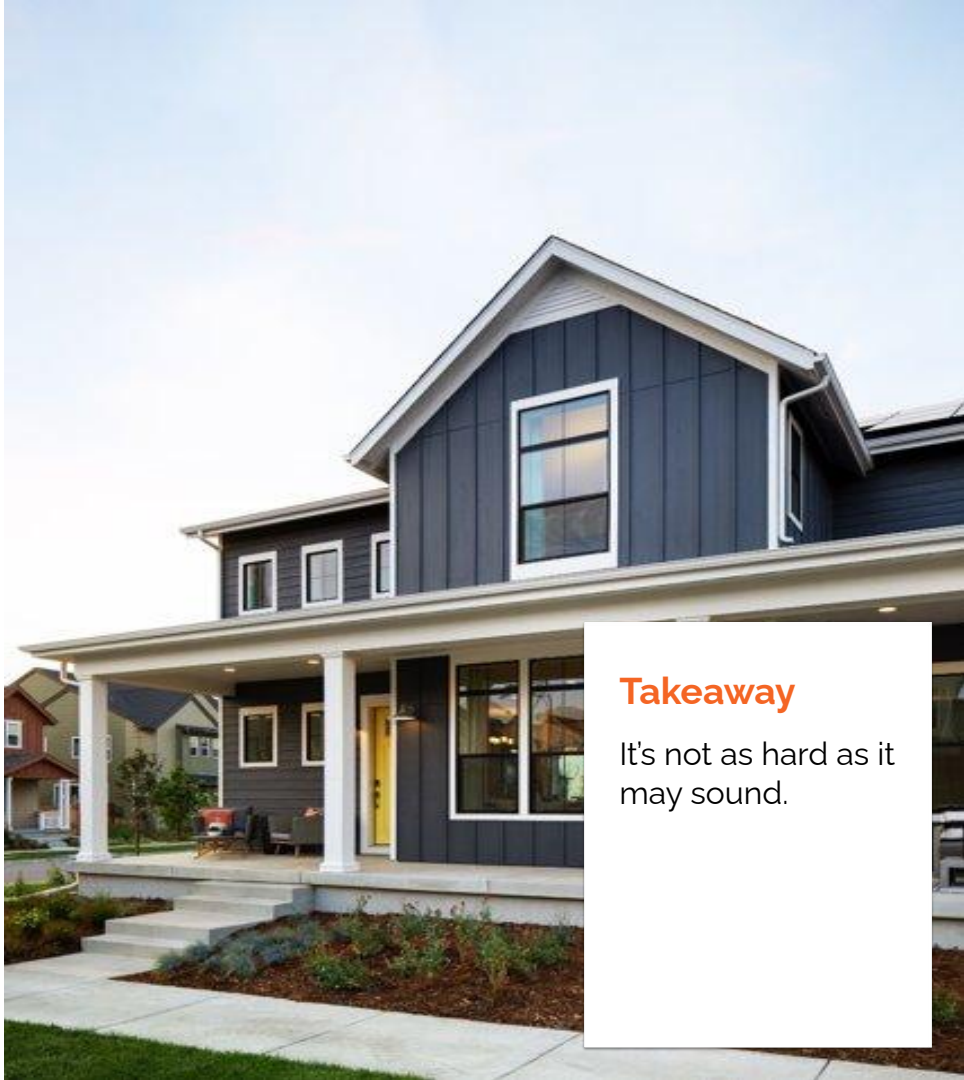


Bill Rectanus

Vice President of Homebuilding Operations
Thrive Home Builders
Denver, Colo.

Getting To Zero Energy Ready In Homebuilding

1. Frequently Asked Questions
    a. Why?
    b. Does it cost more?
2. The Basics
    a. Energy Star
    b. Envelope
    c. Duct System
    d. Water Efficiency
    e. Lighting and Appliances
    f. Indoor Air Quality
    g. Renewable Ready
3. DOE ZERH to Zero Energy
4. What's Next?

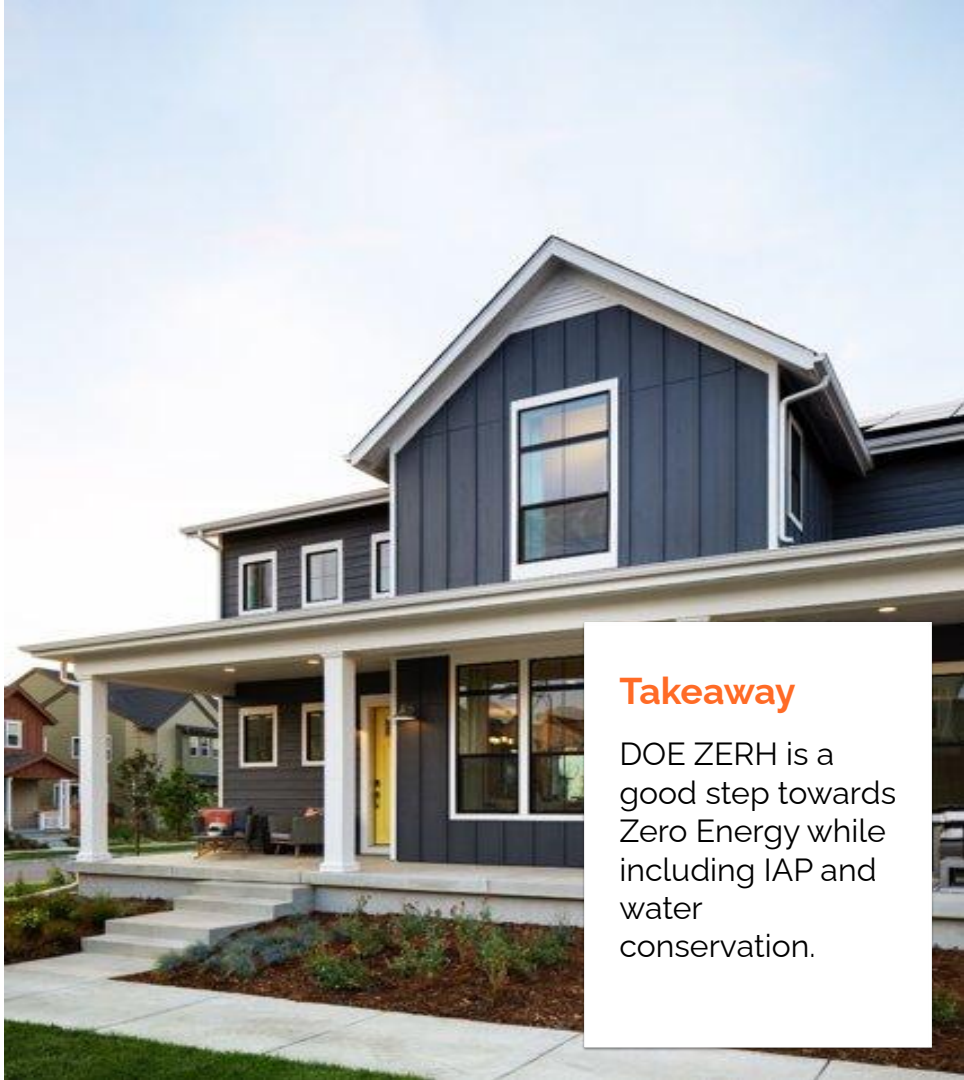


Takeaway

It's not as hard as it may sound.

Frequently Asked Questions

Why DOE ZERH or Zero Energy?



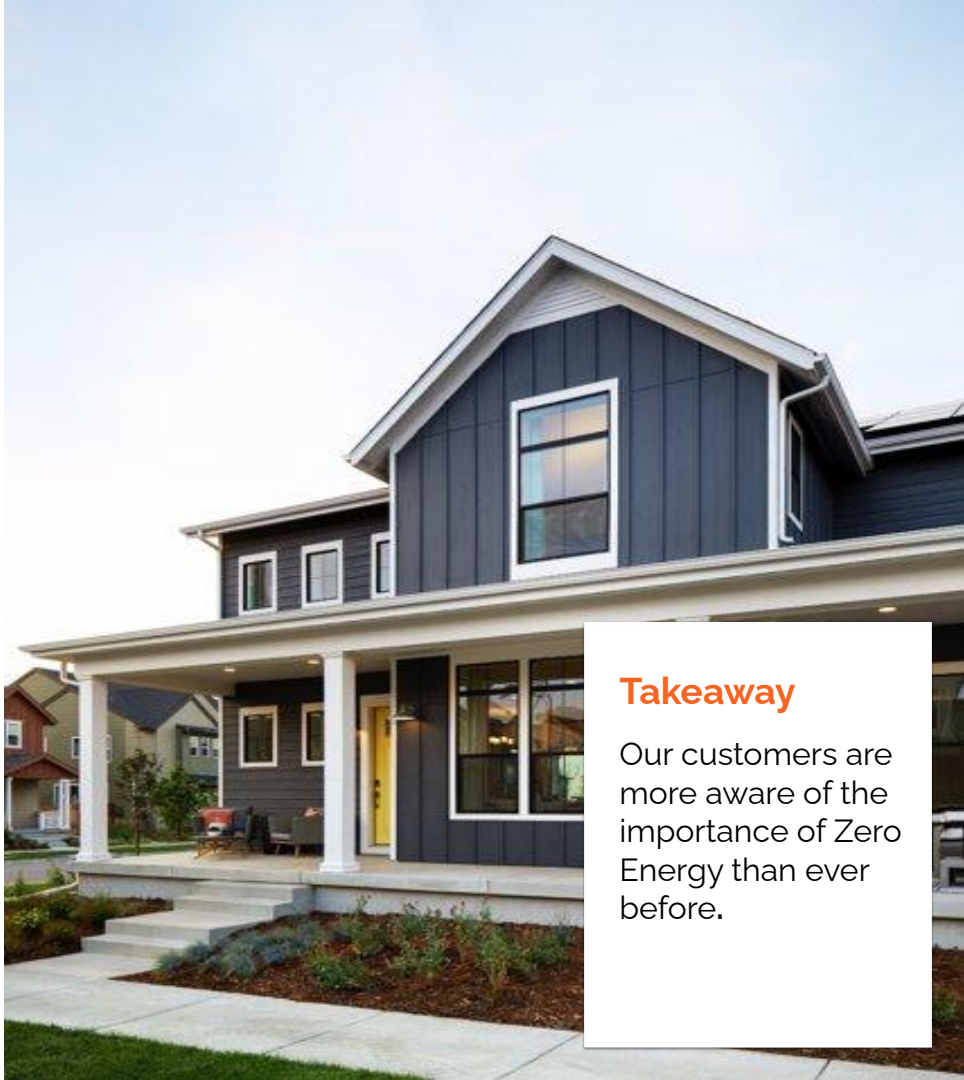
Takeaway

DOE ZERH is a good step towards Zero Energy while including IAP and water conservation.

Frequently Asked Questions

A Personal Story

Denver tops list of most polluted cities in the world.
IQAir said particulate matter levels were 11 times the World Health Organization's exposure recommendation.
Author: **Nate Lynn**
Published: **6:02 PM (MDT)**
August 7, 2021

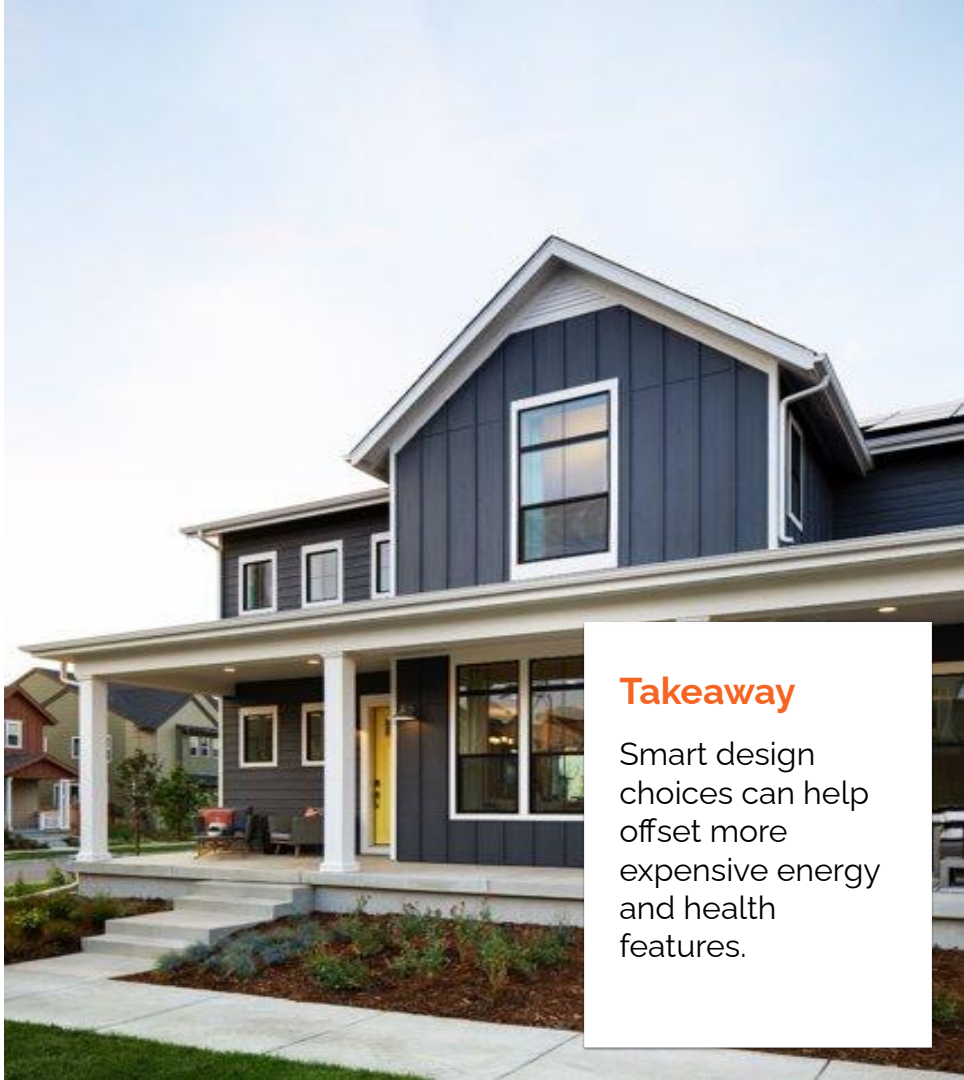


Takeaway

Our customers are more aware of the importance of Zero Energy than ever before.

Frequently Asked Questions

Does it cost more?



Takeaway

Smart design choices can help offset more expensive energy and health features.

The Basics

Energy Star for Homes – It's the Baseline

Standard Features of an ENERGY STAR Certified New Home

Your ENERGY STAR certified new home has been designed, constructed, and independently verified to meet rigorous requirements for energy efficiency set by the U.S. Environmental Protection Agency (EPA), including:

Thermal Enclosure System

A complete thermal enclosure system that includes comprehensive air sealing, quality-installed insulation and high-performing windows to deliver improved comfort and lower utility bills.

Air Infiltration Test: **1228 CFM50 (1.80 ACH50)**

Primary Insulation Levels:

Ceiling: R-50 **Floor: R-50**
Wall: R-39 **Slab: R-0**

Primary Window Efficiency:

U-Value: 0.24 **SHGC: 0.2**

Water Management System

A comprehensive water management system to protect roofs, walls, and foundations.

Flashing, a drainage plane, and site grading to move water from the roof to the ground and then away from the home.

Water-resistant materials on below-grade walls and underneath slabs to reduce the potential for water entering into the home.

Management of moisture levels in building materials during construction.

Heating, Cooling, and Ventilation System

A high-efficiency heating, cooling system, and ventilation system that is designed and installed for optimal performance.

Total Duct Leakage: **113 CFM @ 25Pa (Rough-In, with Air Handler)**

Duct Leakage to Outdoors: **113 CFM @ 25Pa (2.87 / 100 s.f.)**

Primary Heating (System Type • Fuel Type • Efficiency):

Air Source Heat Pump • Electric • 3.24 COP

Primary Cooling (System Type • Fuel Type • Efficiency):

Air Source Heat Pump • Electric • 17.8 SEER

Energy Efficient Lighting and Appliances

Energy efficient products to help reduce utility bills, while providing high-quality performance.

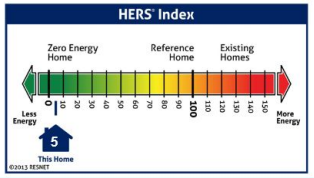
ENERGY STAR Qualified Lighting: **100%**

ENERGY STAR Qualified Appliances and Fans:

Refrigerators: 0 **Dishwashers: 0**
Ceiling Fans: 0 **Exhaust Fans: 0**

Primary Water Heater (System Type • Fuel Type • Efficiency):

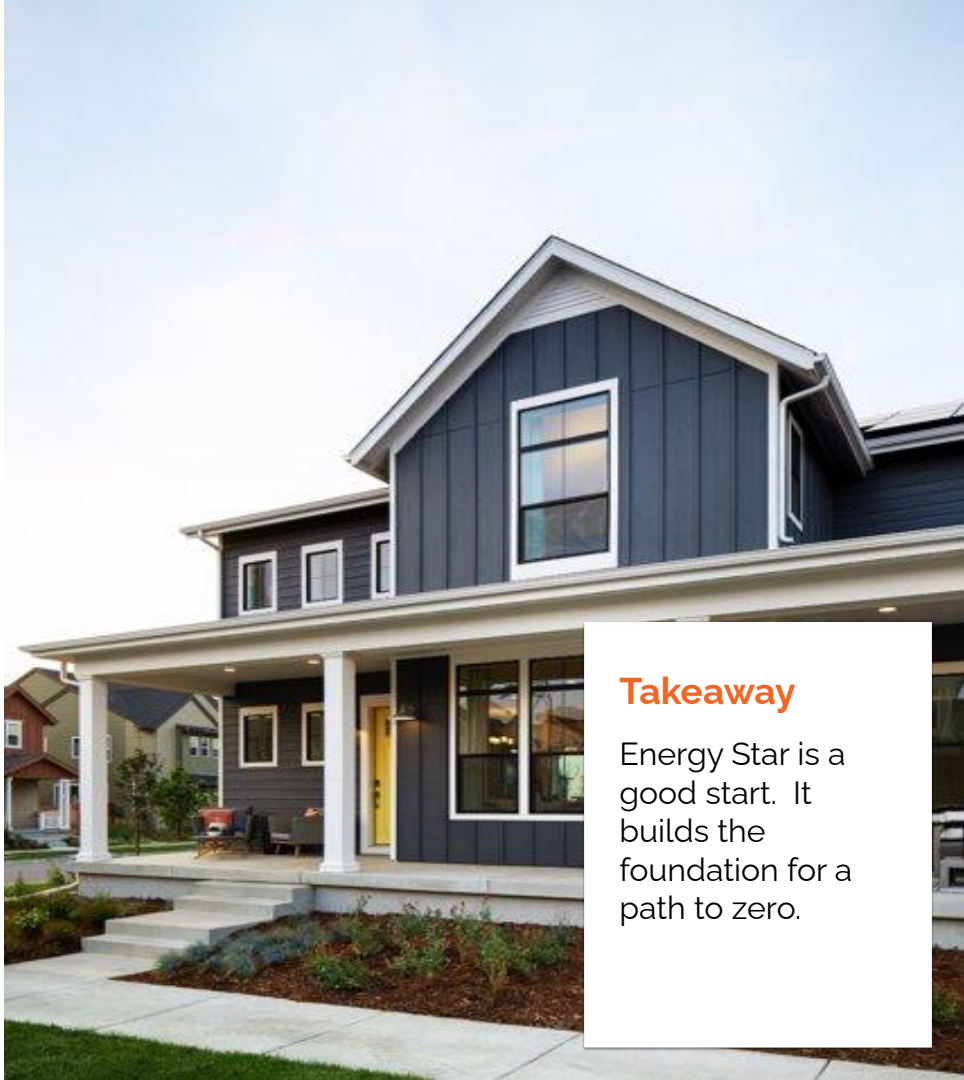
Water Heater • Electric • 3.55 UEF



This certificate provides a summary of the major energy efficiency and other construction features that contribute to this home earning the ENERGY STAR, including its Home Energy Rating System (HERS) score, as determined through independent inspection and verification performed by a trained professional. The Home Energy Rating System is a nationally-recognized uniform measurement of the energy efficiency of homes.

Note that when a home contains multiple performance levels for a particular feature (e.g., window efficiency or insulation levels), the predominant value is shown. Also, homes may be certified to earn the ENERGY STAR using a sampling protocol, whereby one home is randomly selected from a set of homes for representative inspections and testing. In such cases, the features found in each home within the set are intended to meet or exceed the values presented on this certificate. The actual values for your home may differ, but offer equivalent or better performance. This certificate was printed using Ekotrope™ (Version 3.2.3.2460).

Learn more at www.energystar.gov/homefeatures



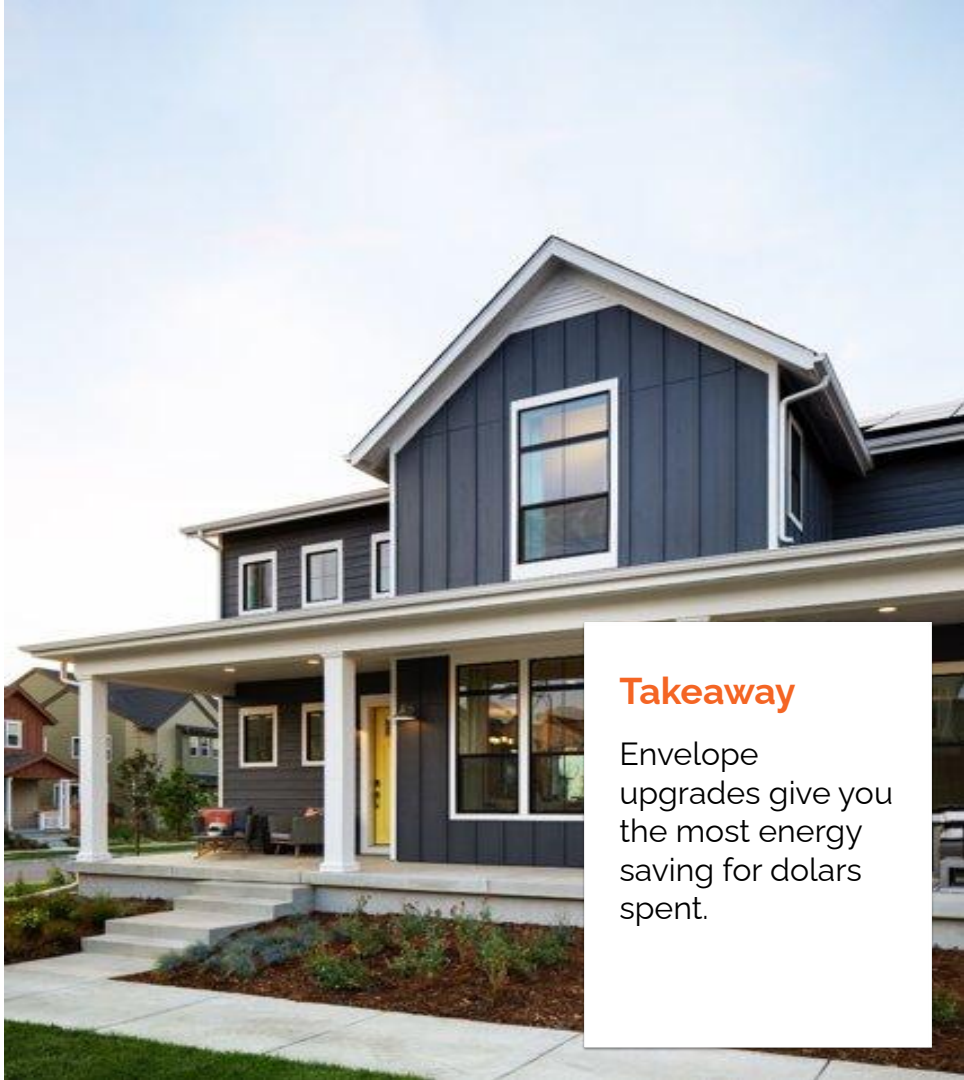
Takeaway

Energy Star is a good start. It builds the foundation for a path to zero.

The Basics

The Envelope

1. Insulation at 2015 IECC with grade 1 installation
2. Infiltration at ACH50 3.0 to 1.5 per climate zone
3. Windows at U Value 0.4 to 0.27 per climate zone



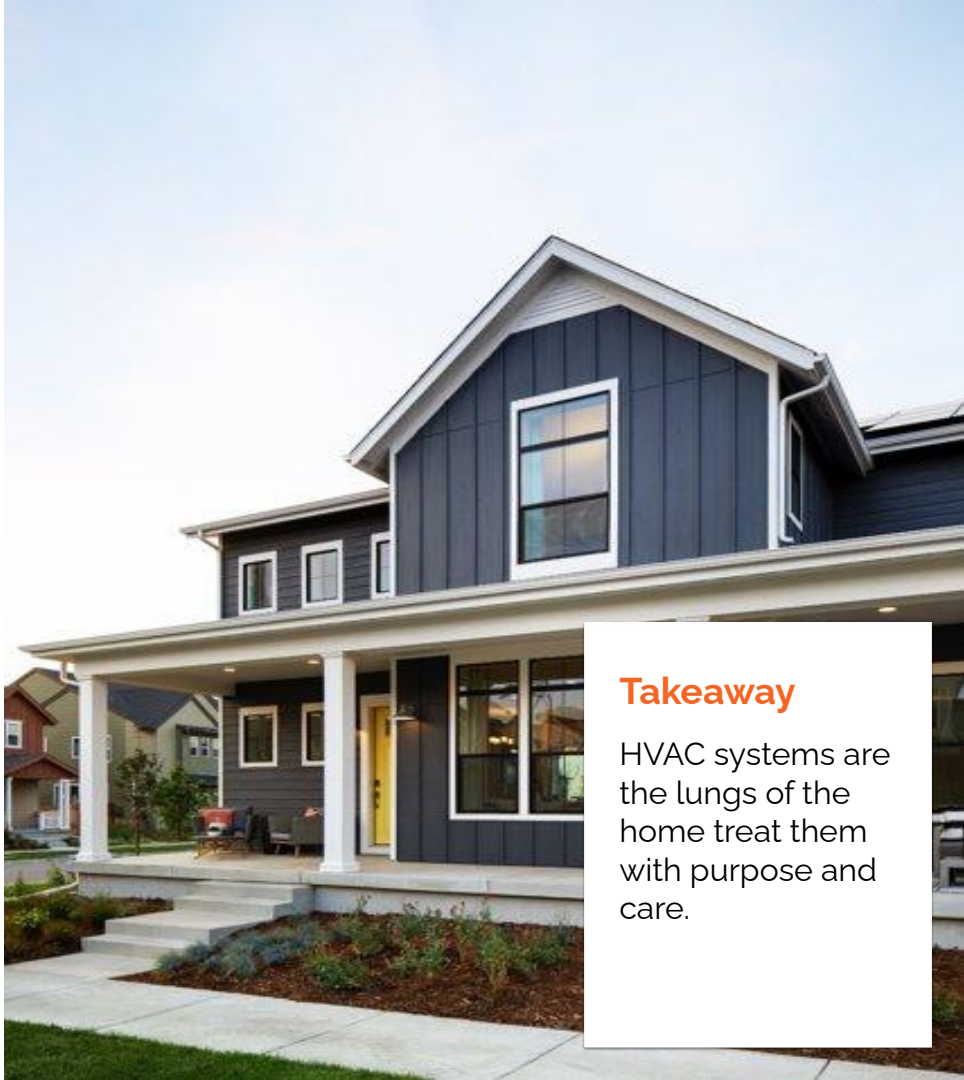
Takeaway

Envelope upgrades give you the most energy saving for dolars spent.

The Basics

HVAC and Ducts

1. Ducts located within homes thermal and air boundary
2. Equipment located within homes thermal and air boundary
3. Efficiency - 80% AFUE to 94% AFUE per comate zone
   - SEER 13 to 18 per climate zone

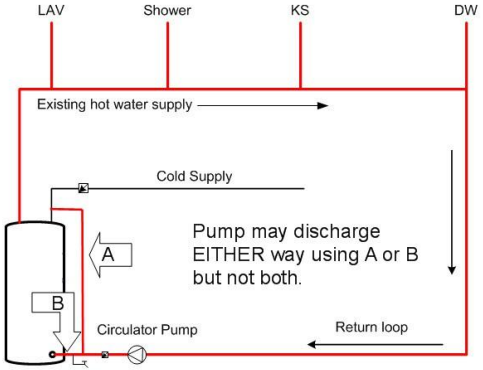


Takeaway

HVAC systems are the lungs of the home treat them with purpose and care.

The Basics

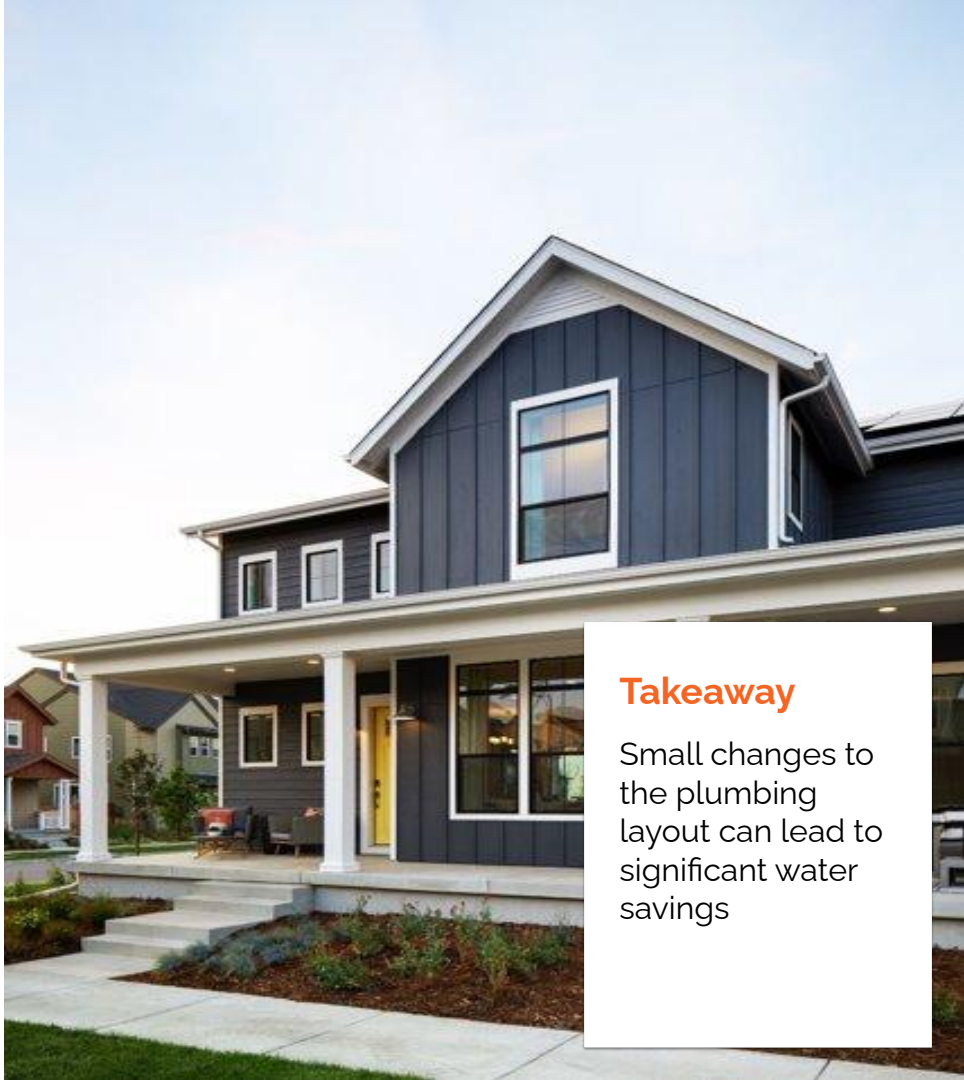
Water Efficiency



Hot water delivery system

1. Recirculation system must be demand controlled or have adaptive learning capability

2. System to deliver no more than 0.6 gal of water before hot water arrives at fixture



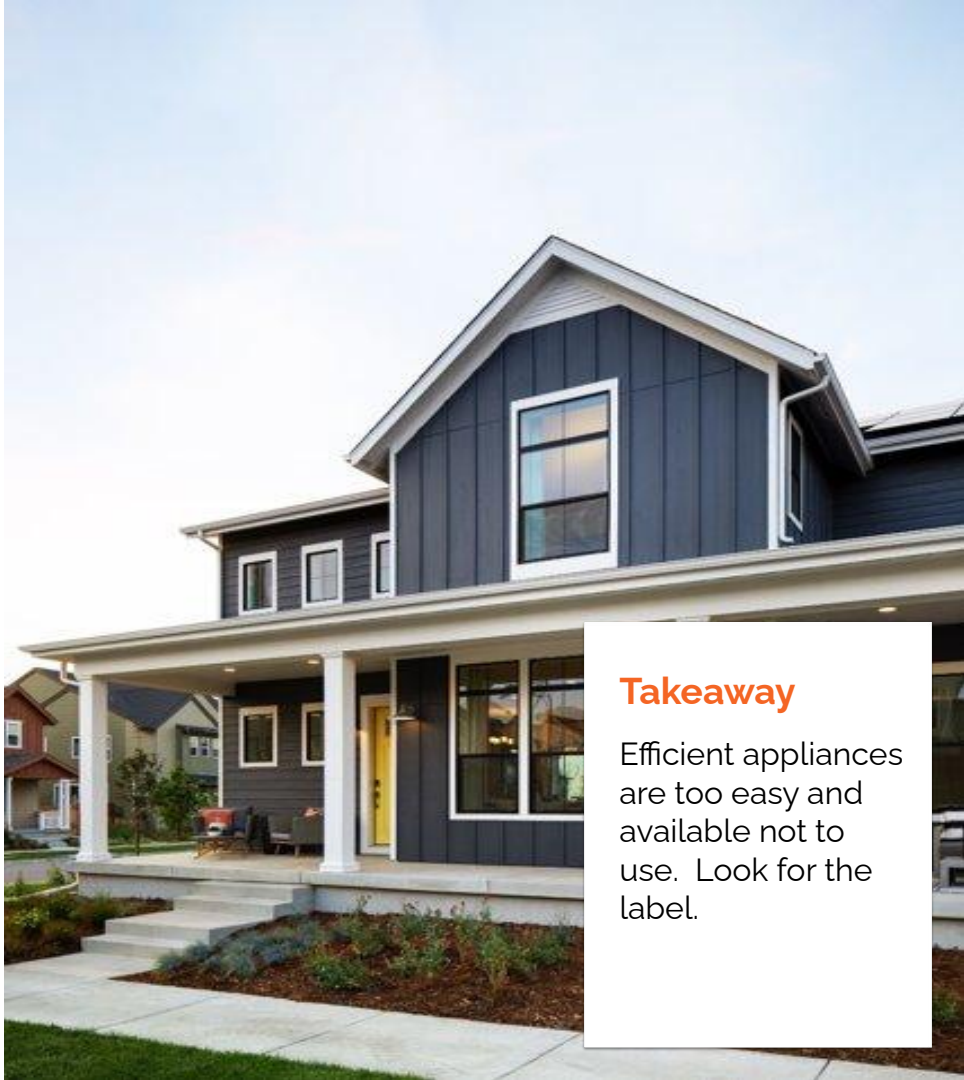
Takeaway

Small changes to the plumbing layout can lead to significant water savings

The Basics

Lighting and Appliances

1. Refrigerators, Dishwashers, Clothes Washers
2. 80% or lighting fixtures or installed bulbs
3. All installed bathroom ventilation fans and ceiling fans



Takeaway

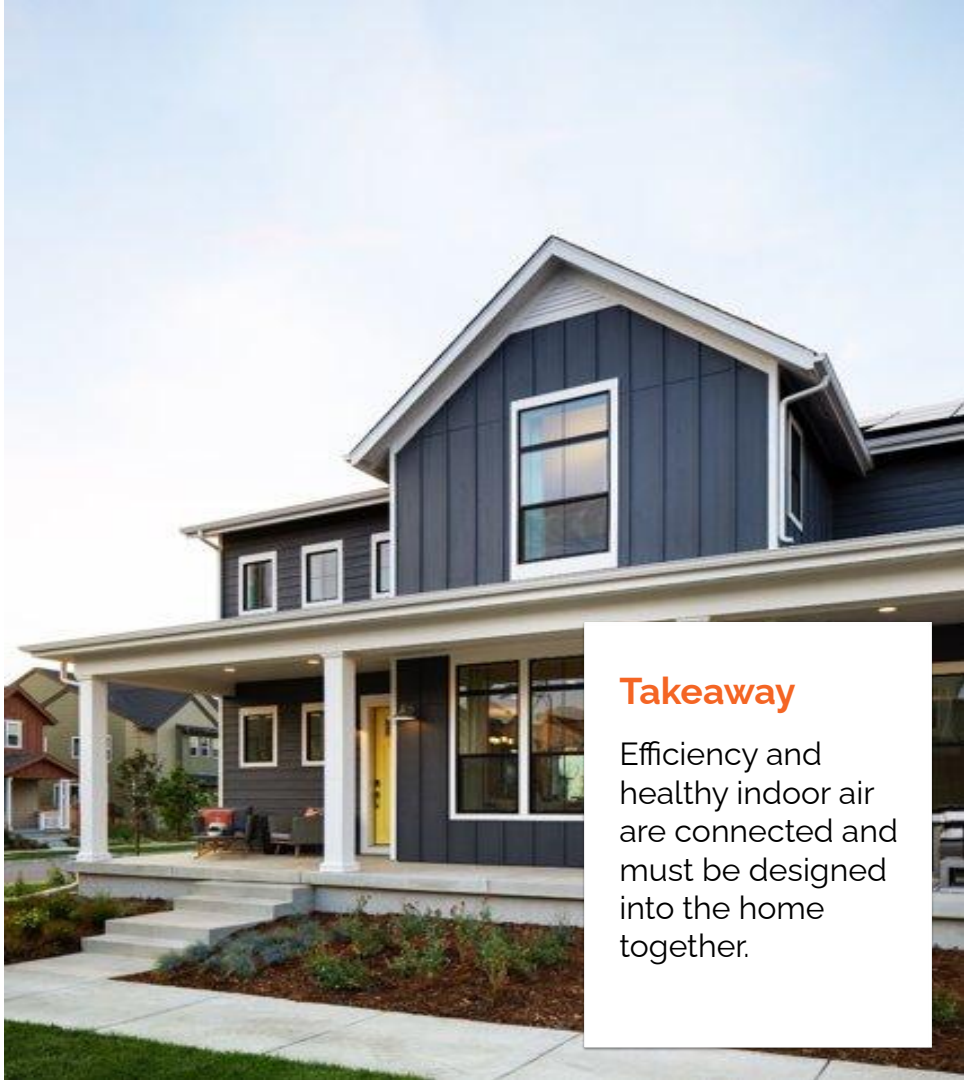
Efficient appliances are too easy and available not to use. Look for the label.

The Basics

Indoor Air Quality

Key Program Requirements

1. Energy Star for Homes
2. Moisture control measures for bulk water and water vapor
3. Radon resistant construction
4. Pest control features
5. HVAC systems with humidity controls and advanced filtration
6. Combustion and pollutant control features and alarms
7. Low emitting materials



Takeaway

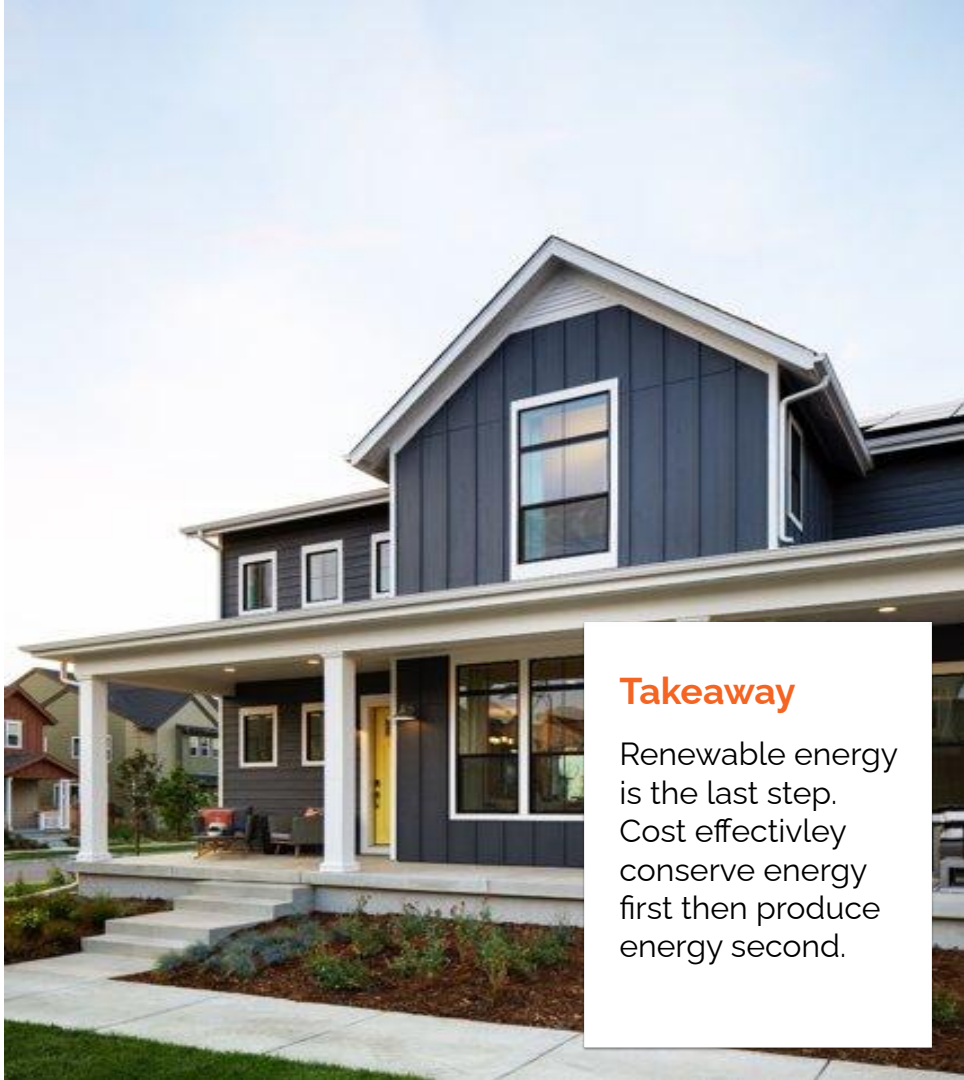
Efficiency and healthy indoor air are connected and must be designed into the home together.

The Basics

Renewable Ready

Renewable Ready Requirements

1. Predesigned array location and PV system components
2. Roof structure designed for future solar dead and live loads
3. Conduit for future solar wiring from roof to inverter
4. Conduit for future solar wiring from panel to inverter
5. Blocking for inverter and system component installation
6. Dual pole breaker or labeled breaker slot for future solar



Takeaway

Renewable energy is the last step. Cost effectivley conserve energy first then produce energy second.

DOE ZERH to Zero Energy

1. High Efficiency Mechanical Systems
2. Renewable Energy

What did Thrive do?

1. Dollars per HERS point analysis
    i. Increased wall and window insulation values
    ii. Increased mechanical system efficiencies
    iii. Achieved pre solar HERS of approximately 40
    iv. Installed Solar PV

Takeaway

Run the modeling software and find your point of diminishing return **but do it with a Buiding Science Expert!**

What's Next?

Carbon

CARBON NEUTRAL

Balancing greenhouse gas (GHG) emissions by 'offsetting'—or removing from the atmosphere—an equivalent amount of carbon for the amount produced. This can be achieved through investing in 'carbon offset' projects such as renewable energy production or reforestation.

NET ZERO CARBON

A commitment to reducing greenhouse gas (GHG) emissions with the goal to balance the emissions produced and emissions removed from the earth's atmosphere.

ESG

E NVIRONMENTAL

Considers effects of company's operations on environment, such as:

- Greenhouse gas emissions
- Waste and pollution
- Resource depletion
- Treatment of animals

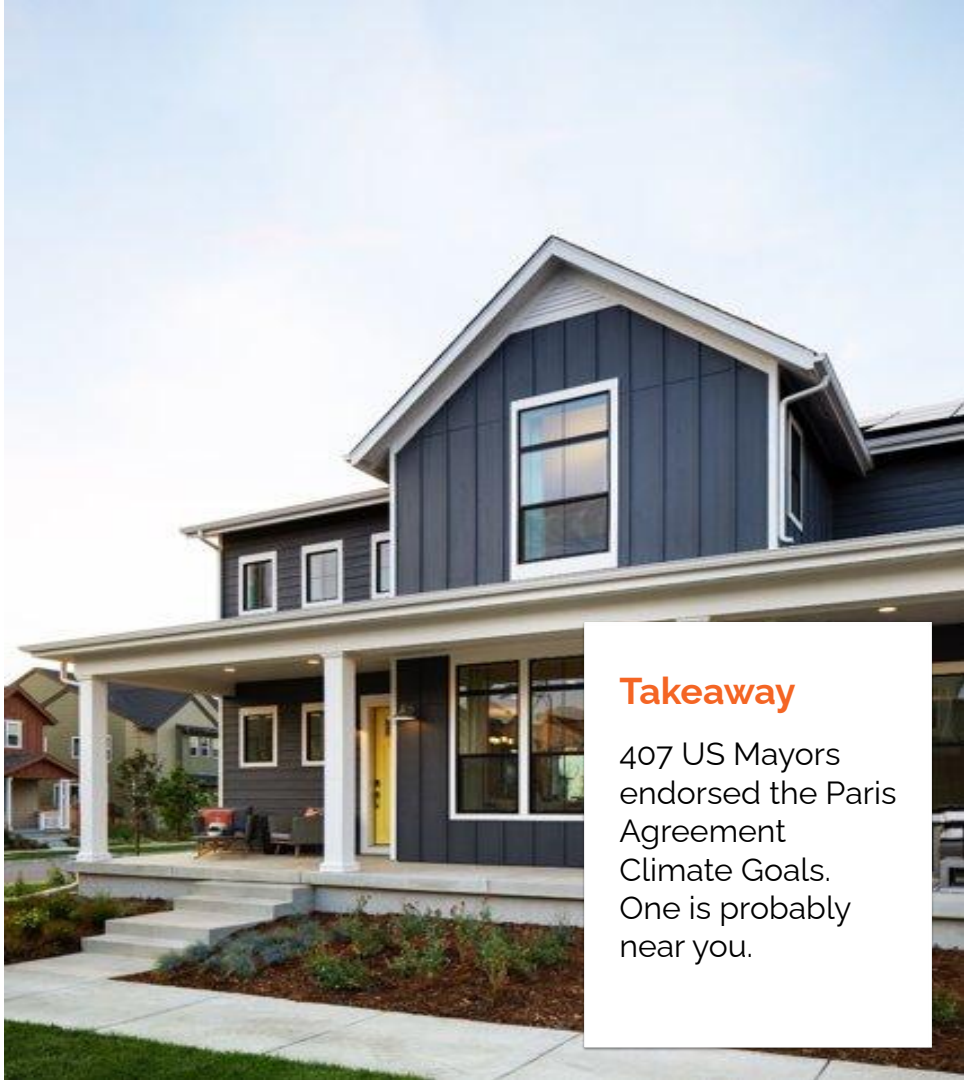
S OCIAL

Looks at company's ability to deal with social trends, labour and politics, including:

- Working conditions
- Employee relations and diversity
- Data security
- Ties with local communities

G OVERNANCE

Considers how a company is run, taking into account factors such as transparency, board diversity and corporate governance



Takeaway

407 US Mayors endorsed the Paris Agreement Climate Goals. One is probably near you.

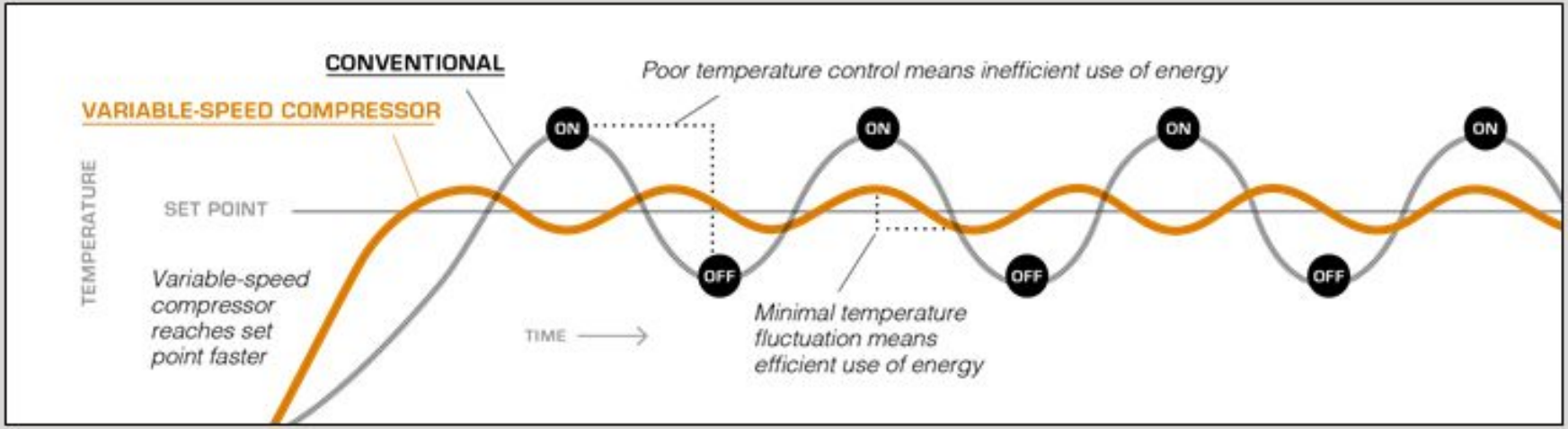
Chad Gillespie

Sales Manager
Performance Construction
Mitsubishi Electric Trane HVAC
Suwanee, Ga.

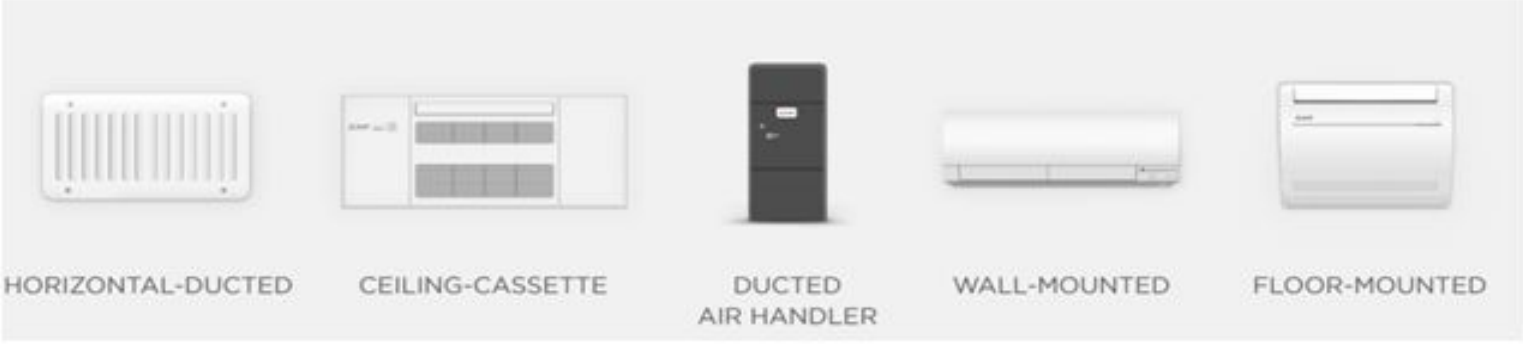
Getting To Zero Energy Ready In Homebuilding

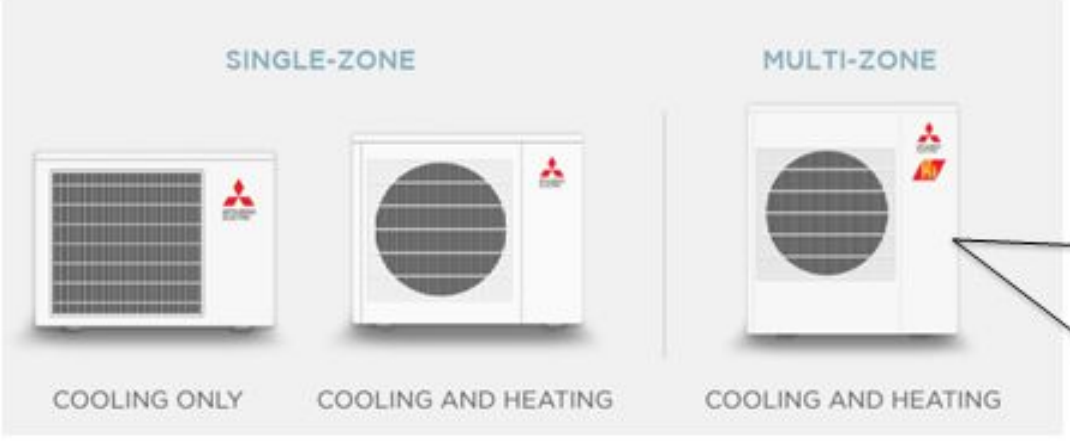
Increase Efficiency and Durability

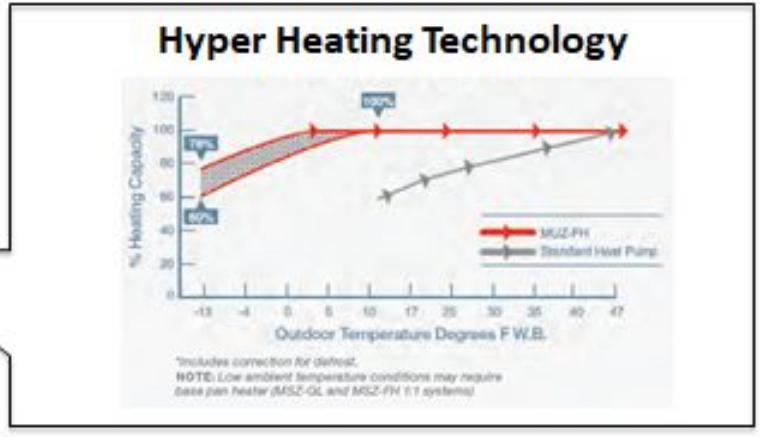
Split-ductless + ducted systems with variable-speed compressors use only precise amount of energy needed to meet a space's actual load at any given point of time



Residential Product Offering







M&P Series Products

AIR HANDLER

SVZ 12-18 | MVZ 12-36 | PVA 12-42

CEILING MOUNT

SLZ 9-15 | MLZ 9-42 | PLA 12-42 | PCA 12-42

FLOOR MOUNT

KJ 9-18

HORIZONTAL DUCTED

SEZ 9-18 | PEAD 12-42

CONTROLS

kumo cloud®

Wireless Sensor

kumo station™

BACnet/Modbus

Thermostat Adapter

Wired and Wireless Controllers

WALL MOUNT

HM 9-24 | GL 9-24 | D 30-36 | EF 9-18 | FH 6-24 | PKA 12-36

SINGLE-ZONE

COOLING ONLY
STANDARD HP
HYPER-HEATING

MULTI-ZONE

STANDARD HP
HYPER-HEATING

BRANCH BOX

3 & 5 ZONE

LOAD CALCULATION: key inputs

DESIGN

Orientation

Rhvac - Residential & Light Commercial HVAC Loads Elite
EcoScience LLC
Austin, TX 78704

Load Preview Report

Scope	Net Ton	ft.²/Ton	Area	Sen Gain	Lat Gain	Net Gain	Sen Loss
Building	5.05	654	3,302	56,448	4,132	60,580	73,988
System 1	3.43	574	1,972	38,833	2,372	41,205	49,524

Load Preview Report

Scope	Net Ton	ft.²/Ton	Area	Sen Gain	Lat Gain	Net Gain	Sen Loss	
Building	6.96	474	3,302	79,433	4,132	83,565	73,988	2
System 1	5.24	377	1,972	60,462	2,372	62,834	49,524	1

90°

2 tons

DESIGN

LOAD CALCULATION: key inputs

HVAC in Conditioned Space

Rhvac - Residential & Light Commercial HVAC Loads El
EcoScience LLC
Austin, TX 78704

Load Preview Report

Scope	Net Ton	ft.²/Ton	Area	Sen Gain	Lat Gain	Net Gain	Sen Loss
Building	6.17	536	3,302	68,535	5,450	73,985	79,236

> **1** ton

Load Preview Report

Scope	Net Ton	ft.²/Ton	Area	Sen Gain	Lat Gain	Net Gain	Sen Loss
Building	5.05	654	3,302	56,448	4,132	60,580	73,988

Q&A

Getting To Zero Energy Ready In Homebuilding

Closing Remarks

Thank you to our speakers:

- Jay Epstein
- Bill Rectanus
- Chad Gillespie

Thank you to our sponsors:

- Boral Building Products
- JELD-WEN
- Mitsubishi Electric
- Panasonic
- Schneider Electric

This webinar will be available on demand at this URL and at www.constructutopia.com.

Next Utopia Webinar

UTOPIA

Thursday, December 9, 1 pm eastern

Designing, Building, and Selling Smart and Sustainable Homes
A panel of experts offers proven advice for building and selling homes that are both smart and sustainable.

Registration page goes live next week at:
Constructutopia.com/Smart-Sustainable