USING THE ZERO ENERGY CERTIFICATION ON YOUR NEXT PROJECT

ZERO ENERGY
CAPABLE

AIA Provider #50111106

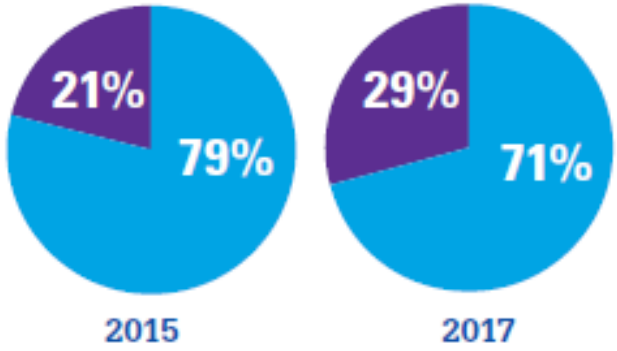
This course goes over the requirements of the zero energy capable program

Lessons Learned

- 1) Understand the meaning of net zero energy and how different programs define it.
- 2) Know where to go to get more resources to design, build or remodel to zero and easily market your success.
- 3) Articulate the basics of energy modeling & preliminary design & construction testing when it comes to planning for zero.
- 4) Feel empowered to truly achieve zero energy capable no matter the climate zone.

Net Zero Building

Built in the Last Two Years



Expect to Build in the Next Two Years

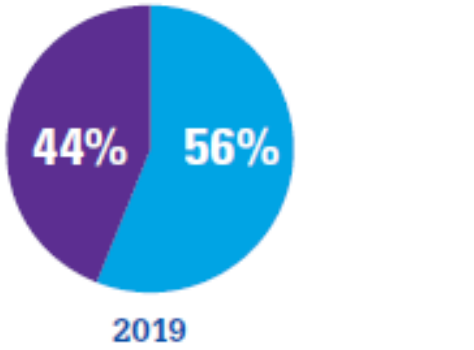
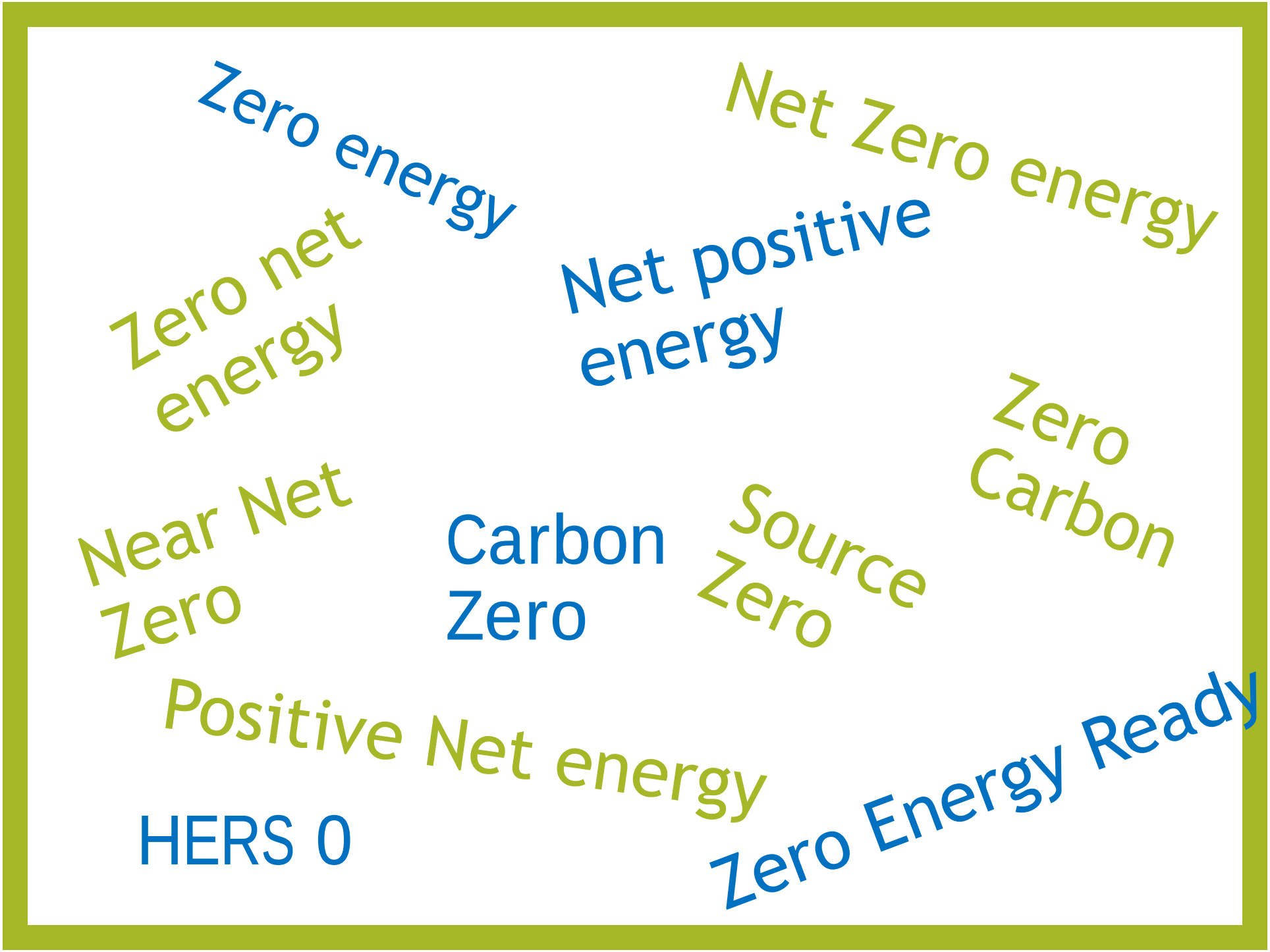


Chart source: Dodge Data & Analytics,
Green Multifamily and Single Family Homes 2017

Factors Influencing Net Zero Construction

Chart source: Dodge Data & Analytics,
Green Multifamily and Single Family Homes 2017

WHAT IS NET ZERO?


Zero energy
Net Zero energy
Zero net energy
Net positive energy
Zero Carbon
Near Net Zero
Carbon Zero
Source Zero
Positive Net energy
HERS 0
Zero Energy Ready

ZERO ELECTRIC USE?

Not zero energy!

Current Programs

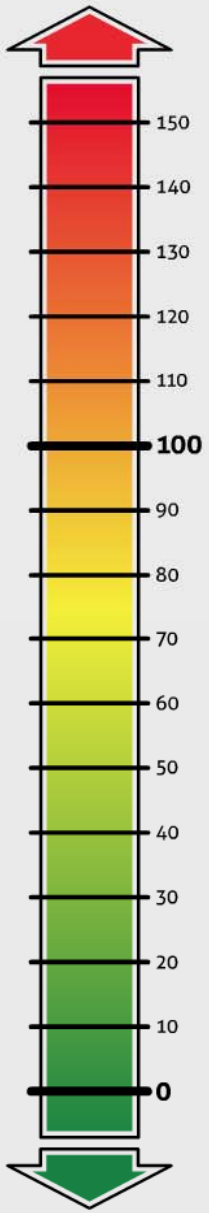
- Department of Energy - Zero Energy Ready
- Passive House Institute U.S. – PHIUS + 2015 Source Zero
- International Living Future Institute Net Zero Certification

Is this Zero Energy?

energy.gov/zero-energy-home-tour

Take the zero energy ready home tour.

ZERO
ENERGY READY HOME
U.S. DEPARTMENT OF ENERGY



THE RESNET HERS INDEX

Find a RESNET Energy Smart Builder

ANNUAL SAVINGS

CARBON FOOTPRINT

COMFORT

★ 0

ANNUAL ENERGY SAVINGS

$2335 typical existing home ($/yr)* **$1796** typical new home ($/yr)**

This home is a Net Zero Energy Home. This means that this home produces as much energy through renewable resources, such as solar panels, as it consumes. Only a Net Zero Energy Home can score 0 on the RESNET HERS Index. Among the advantages of a Zero Energy Home are:

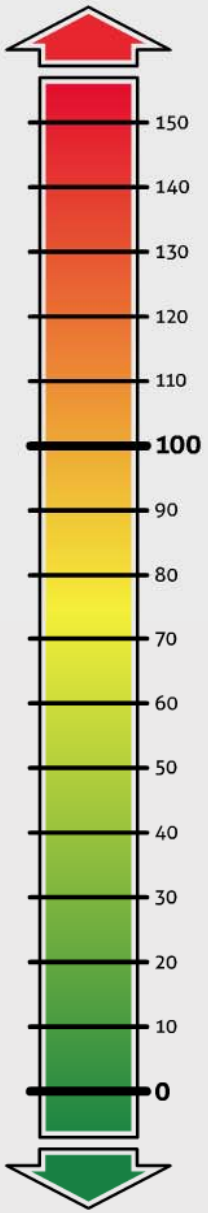
- ☑ Improved health and comfort: a Net Zero Energy Home reduces temperature fluctuations.
- ☑ Cost effective: a Net Zero Energy Home that produces energy not only shields its owner from fluctuations in energy prices but can eliminate energy bills altogether.
- ☑ Environmental sustainability: a Net Zero Energy Home protects the environment by reducing greenhouse gases, cutting carbon emissions and saving energy.

TRANSFORM YOUR HOUSE INTO A **ZERO ENERGY** HOME

Find a RESNET Certified HERS Rater

* Based on the U.S. Department of Energy definition of a HERS Index of 130.

**The information presented for educational purposes only. Savings are average estimates for single family homes in the U.S. developed by the National Renewable Energy Laboratory. Savings will vary based on house type, orientation, house size, utility rates, climate and operation of the home. For specific information on a home please have a home energy rating conducted by a certified RESNET Home Energy Rater.



THE RESNET HERS INDEX

Find a RESNET Energy Smart Builder

ANNUAL SAVINGS

CARBON FOOTPRINT

COMFORT

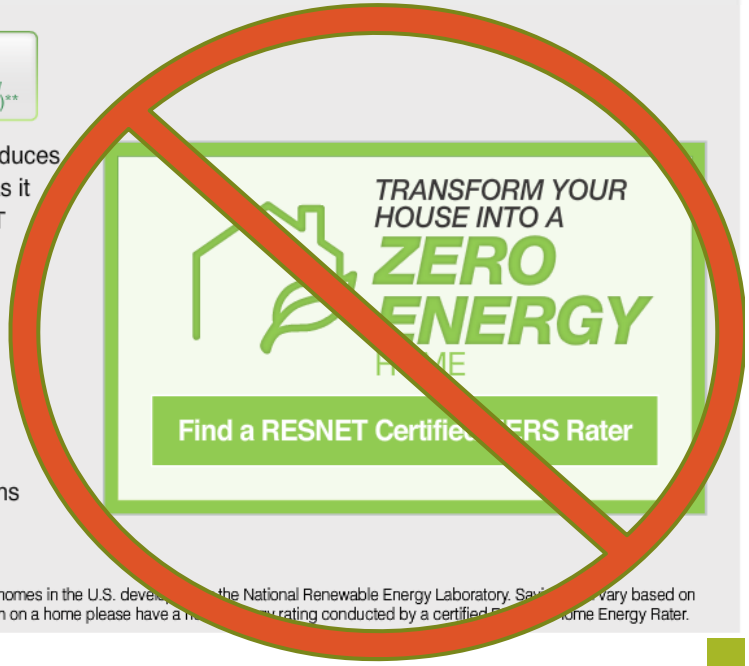
★ 0

ANNUAL ENERGY SAVINGS

$2335 typical existing home ($/yr)* $1796 typical new home ($/yr)**

This home is a Net Zero Energy Home. This means that this home produces as much energy through renewable resources, such as solar panels, as it consumes. Only a Net Zero Energy Home can score 0 on the RESNET HERS Index. Among the advantages of a Zero Energy Home are:

- ☑ Improved health and comfort: a Net Zero Energy Home reduces temperature fluctuations.
- ☑ Cost effective: a Net Zero Energy Home that produces energy not only shields its owner from fluctuations in energy prices but can eliminate energy bills altogether.
- ☑ Environmental sustainability: a Net Zero Energy Home protects the environment by reducing greenhouse gases, cutting carbon emissions and saving energy.



* Based on the U.S. Department of Energy definition of a HERS Index of 130.

**The information presented for educational purposes only. Savings are average estimates for single family homes in the U.S. deve… the National Renewable Energy Laboratory. Sav… vary based on house type, orientation, house size, utility rates, climate and operation of the home. For specific information on a home please have a … rating conducted by a certified … ome Energy Rater.

PHIUS

Passive House Institute US

phius.org/PHIUSplusdocs/PHIUS+CertificationGuidebook_v1.03.pdf

Appendix A – Renewables Credits and Co-Generation in the Calculation of Source Energy

Renewables

The annual source energy for a building is calculated by multiplying the site energy by the fuel-dependent primary energy factor, and then subtracting credit for renewable energy production multiplied by the fuel-dependent primary energy factor of the fuel type it is offsetting. Generally, the total annual source energy use of the building is calculated as

$$PE_A = \sum_{Fuel} \sum_{EndUse} SE_{A,Fuel,EndUse} F_{PE,Fuel} - TE_{DHW} F_{PE,DHW} - TE_{SH} F_{PE,SH} - RE_A C_{RE} F_{PE,elec}$$

where

Fuel = gas, oil, coal, propane, biomass, electricity

SE_A = total annual site energy use (from the building energy model)

F_{PE} = primary energy factor

TE_{DHW} = usable onsite solar thermal energy for domestic hot water

TE_{SH} = usable onsite solar thermal energy for space heating

RE_A = total annual onsite renewable electricity generation

C_{RE} = coincident production-and-use fraction of renewable electricity generation (zero to 1)

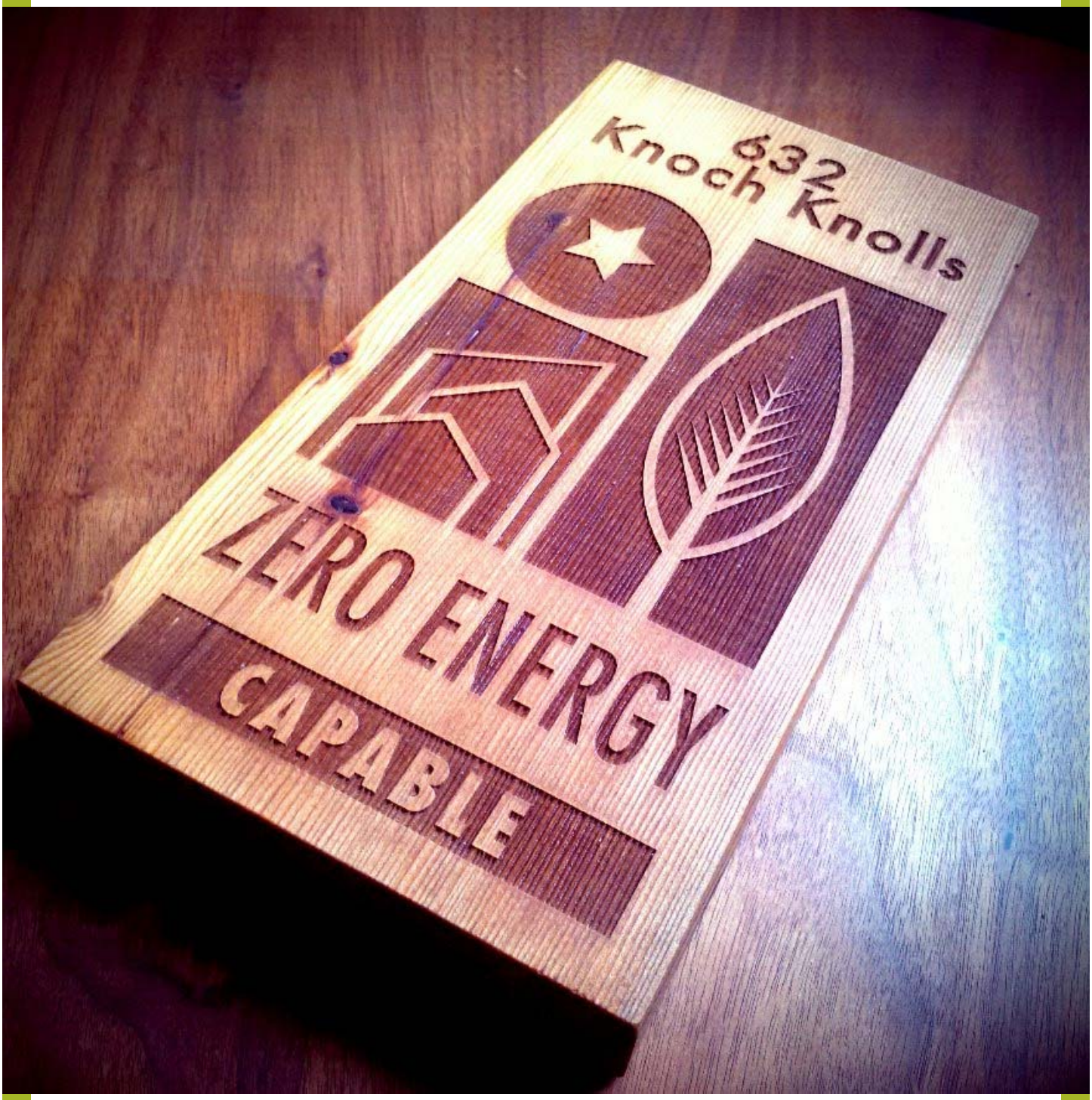
F_{PE} = 3.16 for electricity, 0.2 for biomass, and 1.1 for fossil fuels.


ZERO ENERGY
CERTIFICATION

Zero Energy (ZE) Certification
Energy Perfomance and EUI Table

	Performance Month	1	2	3	4	5	6	7	8	9	10	11	12	
Performance Period	Monthly period (should match raw billing or meter data)	*10/16/16 - 11/14/16*	*11/14/16 - 12/15/16*	*12/15/16- 1/18/17*	*1/18/17- 2/6/17*	*2/6/17- 3/20/17*	*3/20/17 - 4/8/17*	*4/8/17 - 5/17/17*	*5/17/17- 6/18/17*	*6/18/71- 7/18/17*	*7/18/17- 8/16/17*	*8/16/17 - 9/17/17*	*9/17/17 - 10/16/17*	Total
Zero Energy Performance	Electricity received from grid, kwh	662	1344	1628	1055	729	589	360	367	339	355	367	401	8196
	Electricity provided to grid, kwh	468	107	176	549	1407	1293	1675	1761	1761	1448	1681	958	13284
	Net usage or generation (negative = net positive)	194	1237	1452	506	-678	-704	-1315	-1394	-1422	-1093	-1314	-557	-5088
Total generation	Total renewable generation, kwh	779	298	421	848	1774	1622	2012	2233	2221	1860	2113	1241	17422
EUI	Total Energy Use	973	1535	1873	1354	1096	918	697	839	799	767	799	684	12334
	Gross square footage													3640
	kwh to kbtu conversion rate													3.412
	EUI (kbtu/square foot/year)													11.56143077
	Renewable Production Intensity (RPI)													16.33073187
	Net EUI (kbtu/square foot/year)													-4.769301099

THE SOLUTION!


632
Knoch Knolls
ZERO ENERGY
CAPABLE

DESIGNED

BUILT

TESTED

Design + Built + Tested to

Produce as much (or more) renewable energy as the building takes from the grid over the course of a full year considering the average climate, with the average size family (according to that home) operating the home in an average way.

NOT

~~SACRIFICING~~

COMFORT

OR OPERATIONS!

How to prove zero energy capable?

- Designed
  - Use 3rd party approved software to show that the building will achieve these results.
    - Home Energy Rating System (HERS)
    - DOE Home Energy Score
    - R2000
    - WUFI Passive
    - Passive House Planning Package
    - ASHRAE 90.1 (corresponding tools)
    - DOE Building Asset Score
    - Other valid tools may be approved!

DOE Zero Energy Ready Home

Energy Performance	
House Type	DOE Zero Energy Ready Home Builder Partner ID#
Single-family detached	1250
Year built	Square footage of Conditioned Space including Basement
2015	1431.0
Number of Bedrooms	Square footage of Conditioned Space without Basement
3	1431.0
Site address (if not available, list the site Lot #)	Registered Builder
	Habitat for Humanity
Traverse City	Certified Rater
MI, 49686	
HERS Index without On-site Generation	Date of Rating
34	12/4/16
HERS Index with On-site Generation	Rating Software
-5	REM/Rate - v14.6.4 Wisconsin
HERS Index of the Target Home using size adjustment factor	Estimated annual energy costs($)
52	10
Estimated annual energy use	Estimated annual energy savings
Electric: -1221 kWh	Electric: 23293 kWh
Energy cost rates	Estimated annual emissions reductions
Electric: 0.10 $/kWh	CO2: 17.8 tons / SO2: 130.7 lbs / NOx: 39.8 lbs

How to prove zero energy capable?

- Built
  - Home must actually be built to it's designed parameters
  - Advanced airsealing + correctly installed insulation
  - Installing the correct specified HVAC + appliances
  - Passive solar strategies enacted

How to prove zero energy capable?

- Tested
  - Follow the protocols of the energy inspections
    - Predrywall (if required)
    - Final testing
    - Final energy model

THAT'S IT!

Design + Build + Test

Show me the model

3rd party green certification – achieve the baseline (required)

- LEED for Homes Certified
- National Green Building Standard Bronze
- GreenStar Bronze or 1 star
- Enterprise Green Communities – All prereqs
- 1 Green Globe
- Passive House
- DOE Zero Energy Ready
- Etc

What if I use wood heating?

Heavy energy users?

- Your model or separate calc will need to account for things like
  - Driveway warmers
  - Ice dam metlers
  - Hot tubs
  - Pumps
  - Elevators
  - Etc.

GreenHome Institute hereby certifies that

MN Net Zero Victorian

Has achieved zero energy or has produced more energy than consumed during the period of:

November 2016 to October 2017

Brett Little

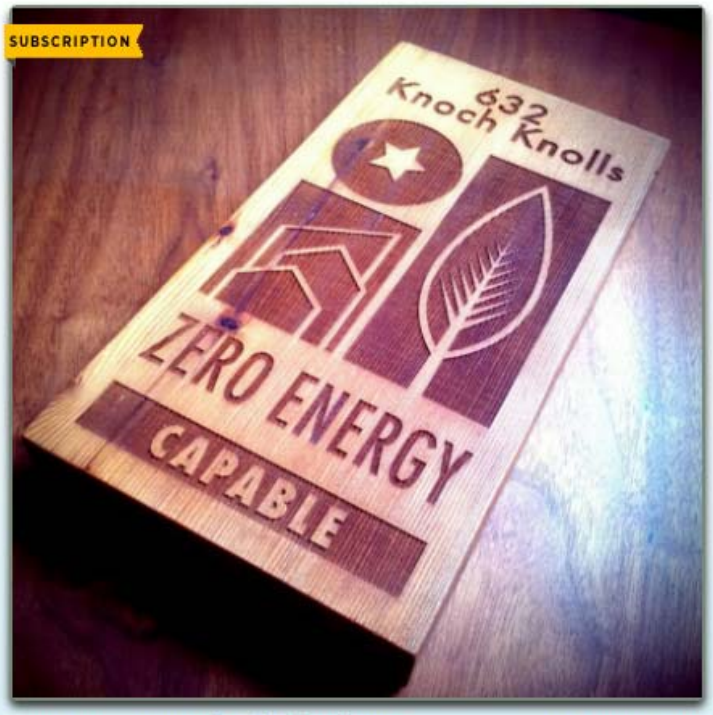
Brett Little, Executive Director, GreenHome Institute

GreenHome INSTITUTE




LEED
GreenStar
Certified Home



How to Achieve Zero Energy Capable Residential Buildings

GBCI: 0920014809

Come find out what it truly means to design and build zero energy residential buildings that are capable of achieving zero energy when operated by occupants in a normal matter.

1 CE

Rating system: v4, v2009

Published on: November 06, 2017

Average: 3.9 (20 votes)

★★★★☆

Need help? Contact education@usgbc.org 327 completions

Need help? Contact education@usgbc.org 432 completions

7 Steps for Designing an Economical Net Zero Energy Residence and Tools to Help

GBCI: 0920014519

Seven steps for transforming a conventional house to an economical, net zero energy home are presented. The energy and economic impacts of infiltration sealing, wall/roof insulation, windows, heat pumps, fresh air ventilation, water heating, appliances and solar photovoltaic systems are covered.

1.5 CE

OHM Sweet OHM: Come Inside of this Zero Energy Capable LEED Platinum Home

GBCI: 0920014149

Join us as we give you an exclusive tour of Hanson's trending zero energy and LEED Platinum certified home.

1.5 CE LEED AP HOMES LEED GREEN ASSOCIATE

Virtual tour of the Habitat for Humanity LEED Platinum Zero Energy Depot Neighborhood

GBCI: 0920013921

Habitat for Humanity Grand Traverse Region decide to pilot a Zero Energy Capable LEED Platinum community in the City of Traverse City, Michigan

1 CE LEED AP HOMES LEED GREEN ASSOCIATE

Need help? Contact education@usgbc.org

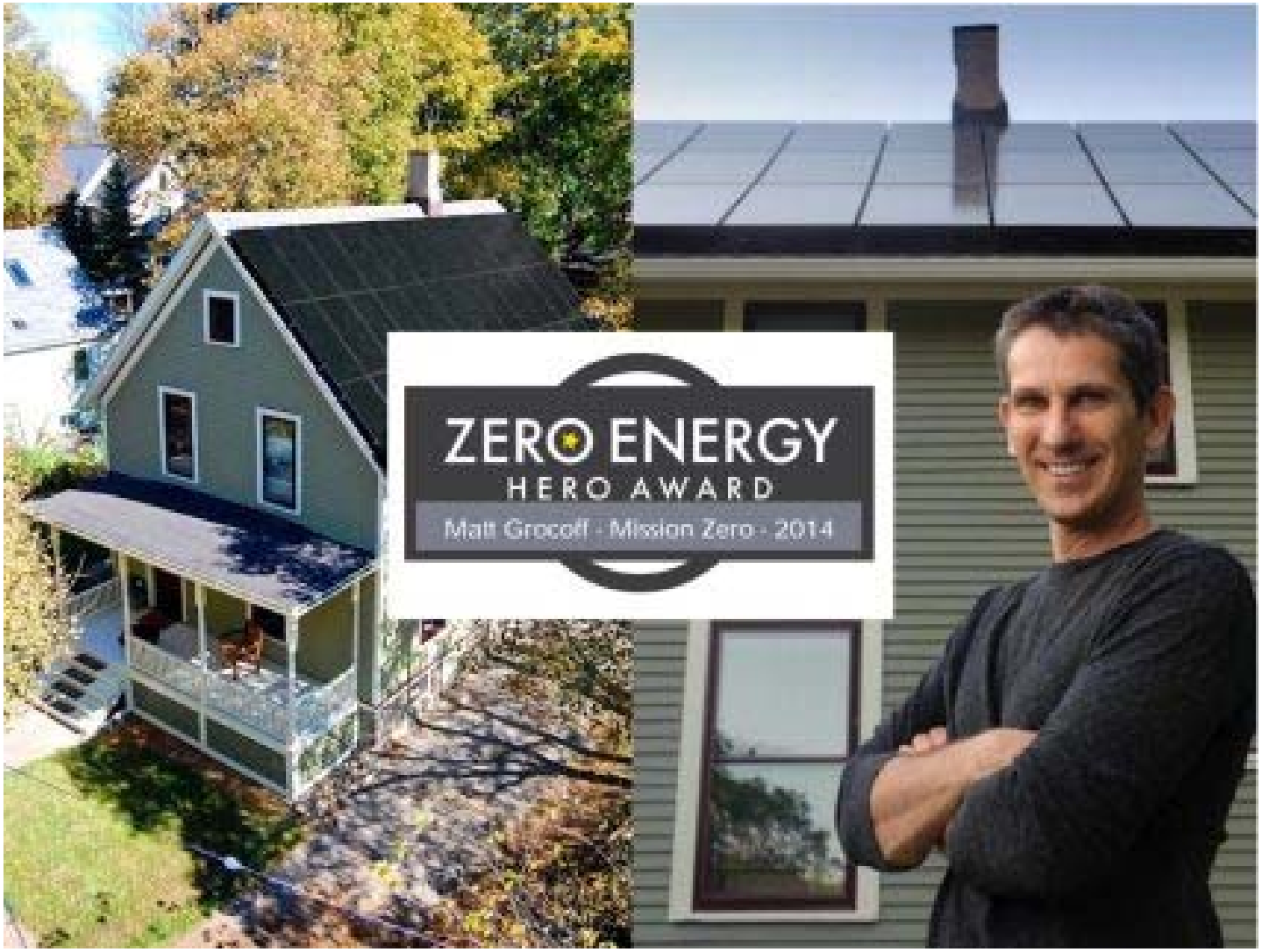
512 completions

Rating system: v4, v2009

Published on: July 26, 2017

Average: 3.7 (48 votes)

★★★★½


ZERO ENERGY
HERO AWARD
Matt Grocoff - Mission Zero - 2014

Zero energy hero award

1. Proven buildings that have achieved more renewable energy production than consumed from the grid over the course of a year.
2. Submit completed form

Zero Energy Hero Data Verification Sheet

House Name	"" Residence		**Home Type:**
Address	Address	123 Main St	(Example Single Family)
	City, ST Zip	Grand Rapids, MI 49506	
Conditioned Square Footage	**2000**		

Enter your data into colored cells only.

Year	Month	Natural Gas Consumed	Electric Consumed	Solar generated	Total energy consumed	Total energy produced	Add in electric vehicle u
2016	December	0	2000	400	2000	1600	0
2017	January	0	1500	350	1500	1150	0
2017	February	0	1200	600	1200	600	0
2017	March	0	400	700	400	-300	0
2017	April	0	300	800	300	-500	0
2017	May	0	300	1200	300	-900	0
2017	June	0	500	1500	500	-1000	0
2017	July	0	600	1500	600	-900	0
2017	August	0	400	1500	400	-1100	0
2017	September	0	900	1300	900	-400	0
2017	October	0	800	700	800	100	0
2017	November	0	1500	500	1500	1000	0
	Totals	0	10400	11050	10400	-650	

Negative number = That much produced vs used

Liquid Propane (Per gallon)

Year	Month	Usage	Propane KWH Conversion
			0
			0
			0
			0
			0
			0
			0
			0
			0
			0
			0
		0	0
		Gallons	Total

Wood (English Ton)

Year	Month	Usage	Wood KWH Conversion
			0
			0
			0
			0
			0
			0
			0
			0
			0
			0
			0
		0	0
		Tons	Total

Zero energy hero award

1. Proven buildings that have achieved more renewable energy production than consumed from the grid over the course of a year.
2. Submit completed form
3. Send over actual utility bills
4. Sign utility release form









ZERO ENERGY
HERO AWARD

ZERO WATER CAPABLE & ZERO WATER HERO AWARDS?

Yes!

Water Efficiency Rating Score (WERS)

GreenHome INSTITUTE MEMBER

EDUCATION PARTNER

NIAGARA CONSERVATION®

INTELLIGENT FRESH AIR VENTILATION
CERV®
WWW.BUILDEQUINOX.COM

We couldn't do it without you!

Panasonic Ventilation

GeoComfort®
Geothermal Systems
Live comfortably.®

CertainTeed
SAINT-GOBAIN
AirRenew™

CEU Reporting Live Attendees

1. Check email / spam for details
2. Take Survey
3. Report GBCI
4. GHI Reports AIA

Watching on demand?
Complete 5 question
quiz with 80% passing Rate