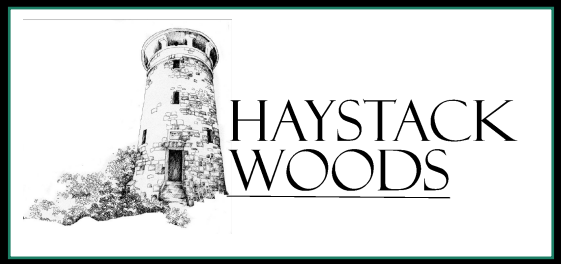
HAYSTACK WOODS

A Proposed Sustainable Net Zero
Affordable Housing
Homeownership Community

Norfolk, CT



- Introductions
  - Kate Briggs Johnson
    - Architect
    - President - Foundation for Norfolk Living - A non-profit affordable housing organization
  - David Jones -
    - Building Contractor
    - Katzin House - 2015 CT Net Zero Energy Challenge – Tied for 1st place.
- What is Affordable Housing and why- Kate Johnson
- Haystack Woods- Project Description - Kate Johnson
- Our approach to building and solar - David Jones
- Q&A –

The nut we have been trying to crack with respect to Affordable Housing

Mortgage

Utilities

+ Maintenance

Total cost of ownership

Foundation for Norfolk Living

A Private Non-Profit Affordable Housing Organization

The Shepard Road Property

The Burr Property

Norfolk Town Center Rentals

12 Rental Apartments

The Royal Arcanum Building

Partnership with The Norfolk Foundation

5 Rental Apartments

Haystack woods

10 Net Zero Energy Homes

(Home ownership)

Why is Affordable Housing Important?

Affordable Housing

CGS Sec. 8-39a. "Affordable housing" defined.

As used in this title, "affordable housing" means housing [rent or mortgage + utilities + other housing costs]for which persons and families pay thirty per cent or less of their annual income, where such income is less than or equal to the area median income [100% AMI] for the municipality in which such housing is located, as determined by the United States Department of Housing and Urban Development.

More generally:

This applies to all income categories

Those less than Area Median Income (100% AMI),

and 25% AMI, 50% AMI, 60% AMI, 80% AMI

Housing costs must align with the different income categories

LITCHFIELD COUNTY									
For use by ALL developments in this Federal Statistical Area (FY2021)									
INCOME LIMITS		1 person	2 person	3 person	4 person	5 person	6 person	7 person	8 person
20% of Median		14420	16480	18540	20580	22240	23880	25520	27180
25% of Median		18025	20600	23175	25725	27800	29850	31900	33975
30% of Median		21630	24720	27810	30870	33360	35820	38280	40770
40% of Median		28840	32960	37080	41160	44480	47760	51040	54360
50% of Median		36050	41200	46350	51450	55600	59700	63800	67950
60% of Median		43260	49440	55620	61740	66720	71640	76560	81540
70% of Median		50470	57680	64890	72030	77840	83580	89320	95130
80% of Median		57680	65920	74160	82320	88960	95520	102080	108720
RENT LIMITS		Studio	1 bedroom	2 bedroom	3 bedroom	4 bedroom			
20% of Median		360	386	463	535	597			
25% of Median		450	482	579	669	746			
30% of Median		540	579	695	802	895			
40% of Median		721	772	927	1070	1194			
50% of Median		901	965	1158	1338	1492			
60% of Median		1081	1158	1390	1605	1791			
70% of Median		1261	1351	1622	1873	2089			
80% of Median		1442	1545	1854	2141	2388			

energize CONNECTICUT

Empowering you to make smart energy choices

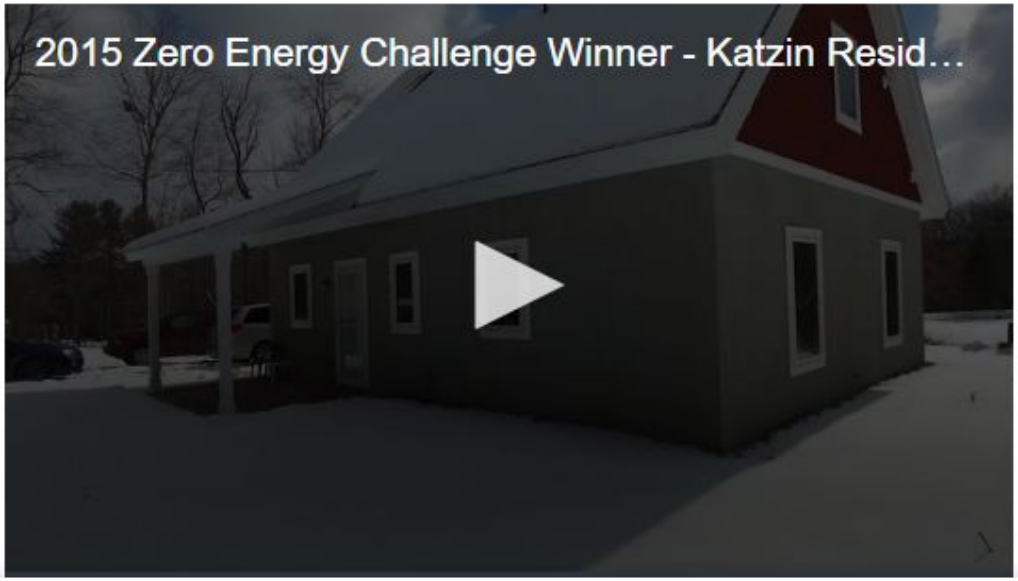
Overall Winner (tied): Katzin Residence. Builder: Revival Homes LLC

Overall Winner (tied)

Project: James and Phoebe Katzin Residence, Litchfield, Conn.

Builder: Revival Homes LLC, New Hartford, Conn.

"Building high performance, energy efficient homes is one of our specialties. The CT Zero Energy Challenge gave us an opportunity to quantify our results and be recognized for our efforts. We were lucky to find a client interested in pushing the boundaries of high performance while minimizing the total cost of owning and operating a home." – David Jones of Revival Homes, LLC.



https://energizect.com/zero-energy-challenge-home/ct-zero-energy-challenge-winners-2015

2015- CT Zero Energy Challenge

Outside the Box

Imagine what you consider a typical car from the 1960-1970s

You probably didn’t imagine the VW Beetle

Yet there were 21 million sold.
More than any other model car.

The Beetle didn’t fit the concept of what a car “was supposed to be”

- Didn’t look like other cars in the US
- Smaller than most cars in the US
- Simple design made it inexpensive to purchase and maintain (TCO)
- Air cooled vs. liquid cooled engine
- The engine was in the back! Challenging our expectations of how a car functions

VW Beetle vs. Katzin House

VW Beetle

- Didn't look like most cars
- Smaller than most cars
- Simple design
- Very low TCO
- Air cooled
- Engine in the back

Katzin House

- Doesn't look like most CT houses/ no horizontal siding
- Smaller than most homes
- Simple design
- Very low TCO
- No basement/foundation
- No wood walls
- No central heat

Katzin house like the VW Beetle is different than our expectations. It eliminates things we expect to see in homes

- Foundation
- Basement
- Wood floor system
- Wood in exterior walls
- Traditional exterior siding
- Central heating/cooling system
- Exterior siding to maintain
- Rain gutters to maintain

Katzin house does have

- Air source heat pump that is efficient and simple to maintain
- Concrete walls that require no maintenance and won't burn, rot, or support mold
- A durable concrete floor
- Very low TCO and Zero Energy costs
- Storm/fire resistance
- Passive survivability
- Comfort- no drafts/very quiet indoors

Superior Walls

The precast Superior Walls are the most obvious change from typical home construction techniques

Concrete 1st floor walls arrive from factory

Concrete wall panel being “flown in” by crane

Concrete wall panel

Window and door openings formed at the factory

Interior of pre-cast concrete wall panels

Ready for wiring/plumbing/additional mineral wool insulation

2nd Floor uses open web trusses

Easier to run plumbing/ducting/electrical both during construction and after

Trusses offer clear spans/no job site waste

SIP Roof and 2nd floor walls

R-40 walls R-49 roof

SIPs are both insulation and structure. No wood studs/rafters

Great air sealing, with no path for air leaks and condensation

SIP Panel Roof about to be set in place with a crane

Each side of the roof is assembled and raised into place as one piece.

Minimal Mechanical Equipment

Can’t afford a to live in a “cheap” house

Low priced homes are typically expensive to live in

Existing Housing Stock

- We haven't built many small homes since 1970
- Outdated mechanical systems, siding, roofing and windows are likely all at the end of their life cycle resulting in **high maintenance costs**
- High risk of unanticipated and expensive repair costs
- Large fluctuations in energy costs month to month
- Often has poor indoor air quality which can lead to respiratory problems and increased medical costs.
- Lead paint, radon, and asbestos can make repairs even more expensive.

To reduce Total Cost of Ownership

- Minimize maintenance costs with durable materials, and simple mechanical systems
- Use Energy modeling to minimize energy requirements
- Use PV to (built into home price) to have zero energy cost risk

HERs Energy Rating

- HERs index -12
- 112% less energy required than a house built to current energy code standard

Estimated Annual Energy Cost before PV

- Heating $343
- Cooling $71
- Hot water $304
- Lights/Appliances $774
- Photovoltaics produce annual estimated credit of $443 per year
- Energy modeling proved to accurately represent true energy use.

Minimize Energy Demand

- Control air leakage (.64 ACH)
- High “whole wall” R-values
- Minimize thermal bridging
- High efficiency HVAC (air source heat pump)
- Heat pump cloths dryer (highly efficient and no exhaust/make up air required)
- LED lighting
- Direction specific window glazing.

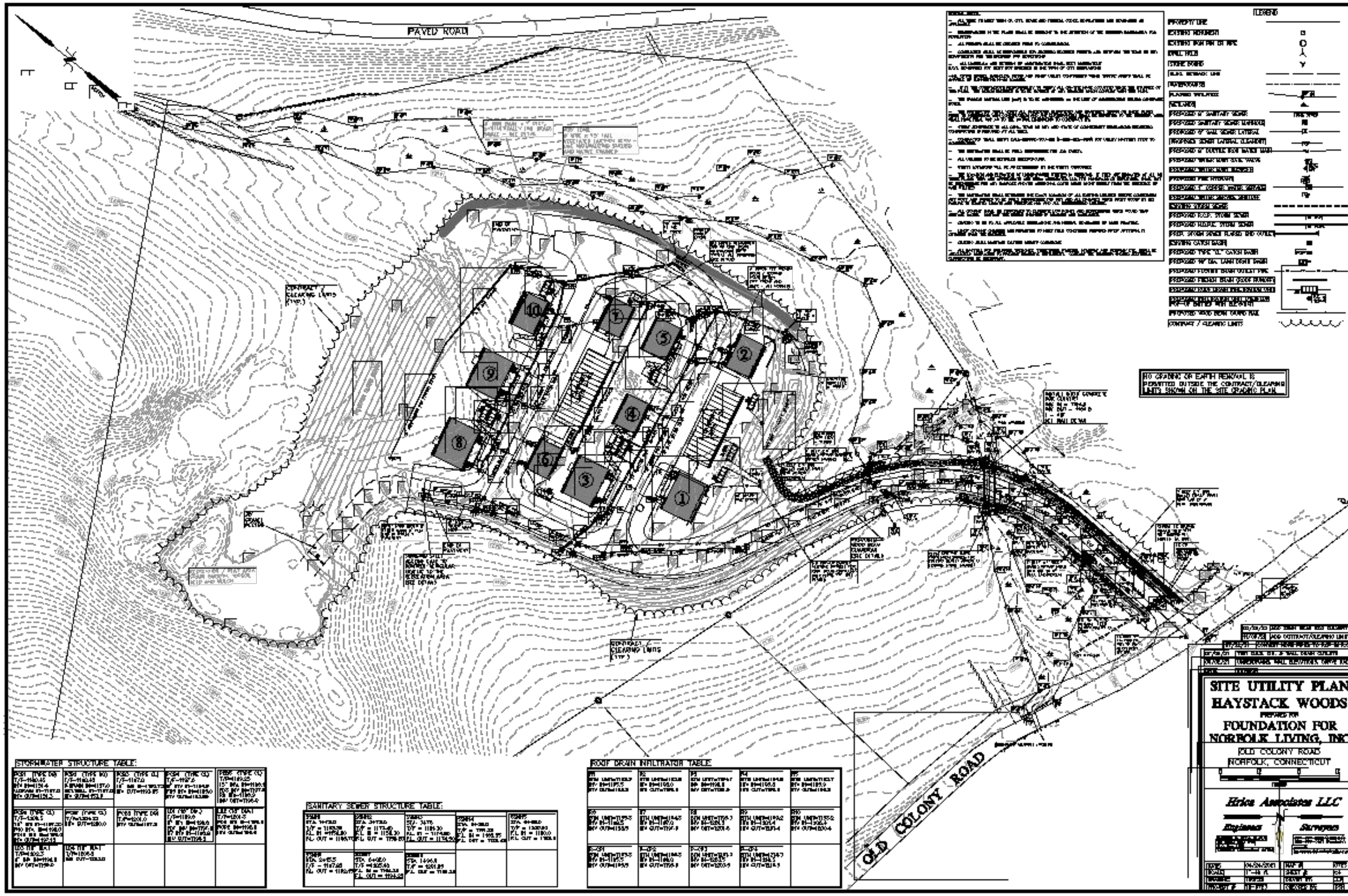
FERRERO HIXON ASSOCIATES
landscape architecture and planning

AERIAL

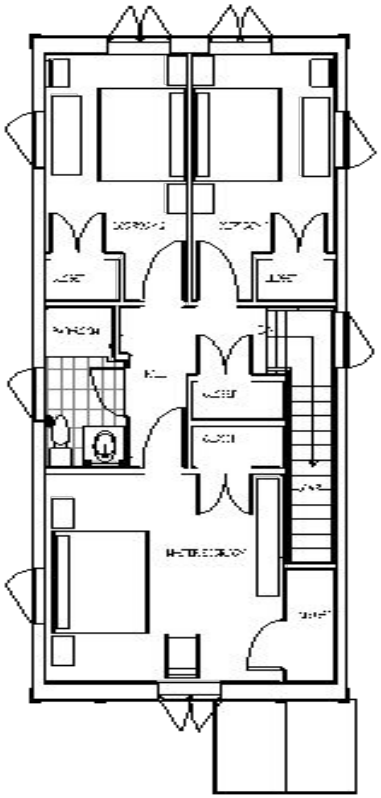
OLD COLONY ROAD NORFOLK, CT.

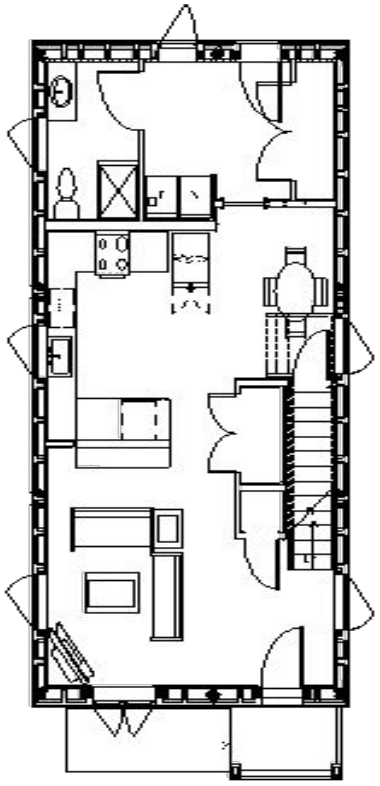
DATE: 18 SEPT 07

Net Zero - A building or complex, which produces as much energy as it uses in the course of a year.



PAVED ROAD
OLD COLONY ROAD
STORMWATER STRUCTURE TABLE
SANITARY SEWER STRUCTURE TABLE
ROOF DRAIN INFILTRATION TABLE
LEGEND
NO GRADING OR EARTH REMOVAL IS PERMITTED OUTSIDE THE CONTRACT/CLEARING LIMITS SHOWN ON THE SITE GRADING PLAN.
CONTRACT / CLEARING LIMITS
SITE UTILITY PLAN
HAYSTACK WOODS
FOUNDATION FOR NORFOLK LIVING, INC.
OLD COLONY ROAD
NORFOLK, CONNECTICUT
Hrica Associates LLC
Engineers
Surveyors





Haystack Woods
Neil Zarrilli Homes
NORFOLK, CT

ATION -

CAPE

Haystack Woods
Net Zero Homes
Northford, CT

Funding for Haystack Woods

Gap Funding- Difference between the cost to produce the house and the sale price.

- CDBG
- DOH Bonding
- Private Grants and Donations

Sale of houses

Haystack Woods

Why car ports for solar?

- Norfolk (Ice box of CT) requires covered parking to attract older residents
- State funding doesn’t support garages
- Low pitch roof simplifies PV installation and maintenance
- House design wasn’t driven by solar exposure requirements
- Requires less land than individual garages
- Can help build a sense of community vs. isolation

PV System Considerations

- Sizing system to include car charging capacity.
- Battery Storage:
  - Battery Storage provides resilience and back up for power outages.
  - Batteries can help support the grid during peak demand periods, by sending electricity out to the grid when it is most needed.
  - When net metering goes away battery storage will become more important.
  - They may help in the future with Time of Use metering and load management.

In the long run, a simple, durable and energy efficient house reduce total cost of ownership…
making it AFFORDABLE