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BY REID'S HERITAGE HOMES

LiveNetZero.com

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PARTICIPATION IN THE ECO EII NET ZERO PROJECT

- **Improve the lives of homeowners by providing a healthier, more comfortable, and affordable home**
- **Build better homes today for tomorrow**

Centre: Tim Blevins, President
Left to right behind: Robert Dewar, President Hy-Mark ; Scott Reid, VP RHH/RHP;
Blake Seeberger, (former)Senior VP RHH

DESIGN OPPORTUNITY

Climate Zone 6: 4270 HDD (ESNH ON Zone 1)

PV Potential: 4.7 GJ/kW x 8.5 KW =38.25 GJ (house load)

South, 8:12 Slope, module eff. 15.5%

Heating Design Temp: –19°C

Cooling Design Temp: 29°C

March 2016 – Homes under Construction

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WHAT ARE THE FUNDAMENTAL ELEMENTS OF A NET ZERO ENERGY HOME

- **5 KEY ELEMENTS:**
  - AIR SEALING AIR SEALING AIR SEALING – Increased insulation in attic, main floor walls, basement exterior walls and under slab
  - TRIPLE PANE WINDOWS THROUGHOUT – excluding the basement pour in place
  - RIGHT SIZED MECHANICALS / VENTILATION – avoid oversizing equipment
  - EFFICIENT ELECTRICAL EQUIP – LED, Energy Star appliances, Air Source Electric hot water tank, larger drain water heat recovery unit
  - RENEWABLES – A solar array sized to the needs of the home with appropriate inverters to the needs (i.e. standard to grid, or with battery opportunity)

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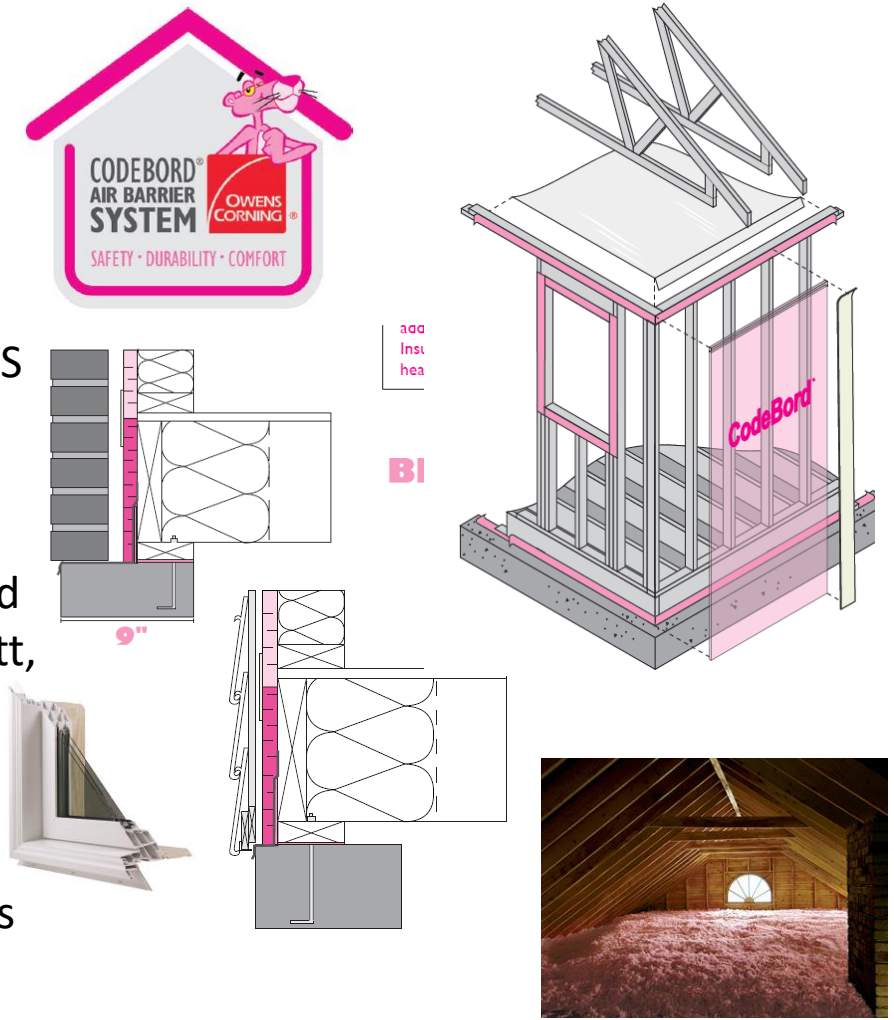
IN THE DETAILS
ELEMENT 1 & 2

- Air sealing & increased insulation values throughout the home via Owens Corning CABS system – reduces the ACH to less than 1.5 (Ideally 1). Increased insulation levels throughout via thicker walls – 2x8 w 2” foam/R28 batts. Basement R10 under slab and basement walls 2” + R23 min. thermafibre batt, R60 in the attic

- Triple pane windows – provide increased insulation with added benefit of sound reduction – no drafty feeling. Consider various U ratings to get most cost effective solution



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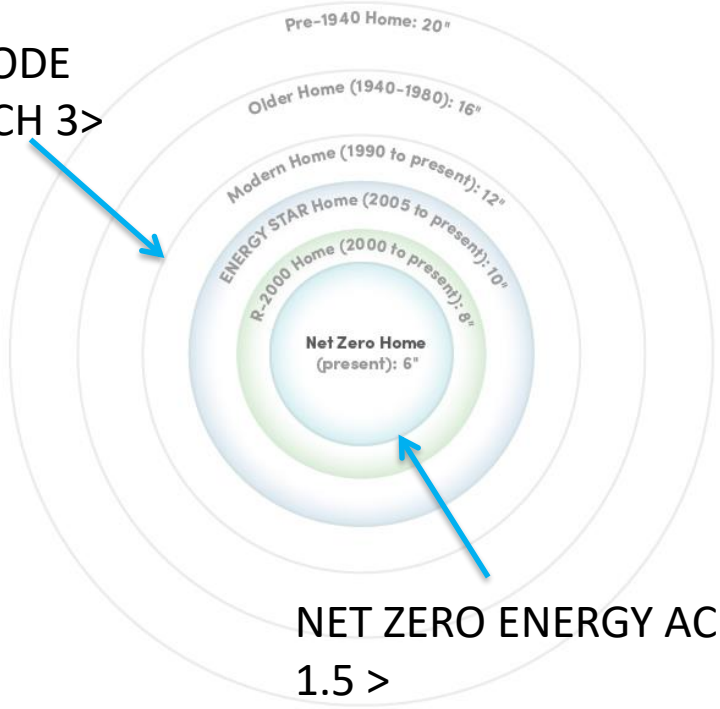
HOW DOES THIS COMPARE TO CODE?

	Ontario Building Code (Pkg J)	Energy Star by Reid's Heritage Homes	Net Zero Homes Reid's Heritage Homes
Attic	R-50	R-50	R-60
Above Grade Exterior Walls	R-22	R-29	R-38 min
Below Grade Exterior Walls	R-12	R-20	R-24 min
Basement Slab	0	0	R-10
Windows (Max U-Value)	1.8	Low E Double Pane (1.6)	Low E Triple Pane (1.1)

Fix the Hole in Your Wall

CODE
ACH 3>



NET ZERO ENERGY ACH
1.5 >

*The diameters for air leakage shown are estimates based on a sample of national averages and can vary depending on circumstances. They are meant to illustrate the significance of air leakage in Canadian homes.

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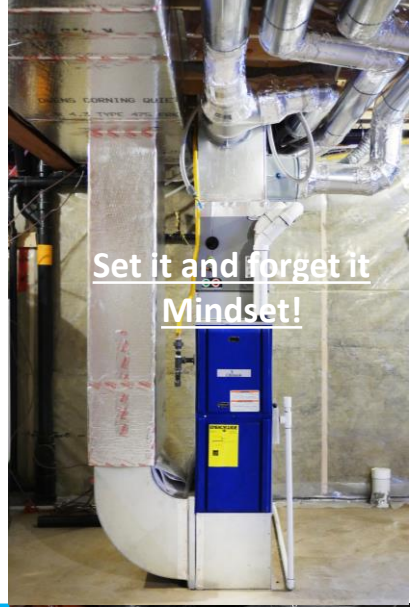
ELEMENT 3

HY-MARK
EST. 2004
REDEFINING COMFORT



Space Heating/Cooling:

- Loads **NOT** exceeding 20-25,000 BTU compared to a typical home with a 40-45,000 BTU mechanical system
- Dettson Alizé Air Source Heat Pump with modulating Chinook gas backup with high wall supply = **RIGHT SIZED EQUIPMENT** and total comfort, better air flow

Run longer more efficient cycles than blast on and blast off with heating not reaching the end point. **WITH** Zoning ~ Indoor temperature will **NOT** change drastically with outdoor fluctuations

Essential with the tighter envelope to ensure fresh air throughout

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ELEMENTS 4 AND 5

- ERV – <u>critical</u> in providing the fresh air these air tight homes need

- DRAIN WATER HEAT RECOVERY unit 60” to 72” to optimize energy savings in water heating

- AIR SOURCE ELECTRIC HOT WATER TANKS – use energy within the space to pre-warm the water in the tank

- LOW FLOW faucets for added water savings

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ADDITIONAL REQUIRED ITEMS

Necessary Components:

- TED energy monitoring to assist with 54% of energy consumption being occupant behaviour
- Solar array monitoring data via Inverter manufacturer
- Energy Star appliances, LED lighting

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ELEMENT 5 - RENEWABLES

Push ridgeline forward and drop pitch to contain all needed panels

Reduce array to a maximum of 32 panels – 8.5 KW – <u>size to the needs of the home</u>

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ADDITIONAL OPTIONS

- Battery bank for 3 days off the grid – due to pricing of batteries I would suggest this is not far away but at this time would be very expensive given times the grid is actually down in urban setting
- Shown are upgraded inverters to send the energy produced to the dedicated loads whether it be batteries, or the home with excess to the grid
- Electric Car chargers

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WHY CONTINUE WITH NZE TYPE HOMES

- Increased comfort, better air quality, durability, quality, security from rate increases

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ONLY possible with communications with your trade and supplier partners to ensure deliverability of this type of product going forward

NATIONAL PARTNERS

Rheem — The new degree of comfort.™
JELD-WEN WINDOWS & DOORS
OWENS CORNING
MITSUBISHI ELECTRIC — Changes for the Better
CanadianSolar

SPONSORS

Dettson
Air Solutions
ROOFING Solutions
American Standard
Bluewater Energy
BRAMPTON BRICK
BROAN
BUILDING KNOWLEDGE
WATFORD
STONEX
mirage
canplas
CENTURY STAIR SYSTEMS
CERAMIC DECOR
CertainTeed
Net Zero Energy Housing Council
CIPA DRYWALL
BLUEBUILT HOME
strathcona energy international
TED — The Energy Detective
RIVERSIDE
Electrolux
HY-MARK
IRWIN-FOSTER
WEISER
KINGSMAN
DOOR INSTALLATIONS
LENNOX
The Bamco Group
STONEROX — Facing the Future
Mirolin
Classic Designs
MOEN — Buy it for looks. Buy it for life.
novanni
OAKS
POWER-PIPE — DRAIN-WATER HEAT RECOVERY SYSTEMS
ST MARYS CBM
The BRICK
vinEB
RCM ALUMINUM
ROGERS
ROYAL Building Products
Sarmazian
SHERWIN WILLIAMS
SPARTAN ELECTRIC
SUMARAN

Work with your partners to find cost savings, best practices; to ensure optimal costing and quality. And definitely take advantage of any rebates where possible

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SINGLE HOME ANALYSIS COMPARED TO:

- Ontario Building Code
- Energy Star
- Net Zero Energy

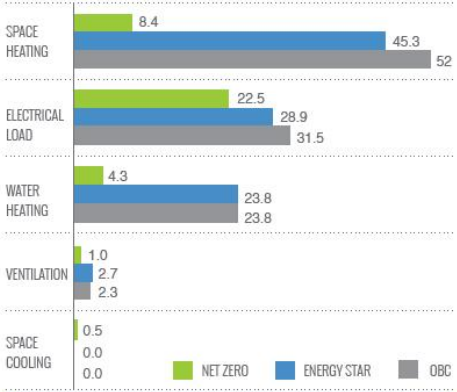
The bar graph CLEARLY shows the "why"

BUILDING KNOWLEDGE CANADA INC.

NET ZERO PROJECT PROFILE

BUILDER	Reid's Heritage Homes
MODEL	Townsend Craftsman A
TECHNICAL STANDARD	R2000 Net Zero Energy Home
PROGRAM	ecoENERGY Innovation Initiative

ENERGY CONSUMPTION



NET ZERO CONSUMPTION 36.7 GJ/yr

NET ANNUAL ENERGY - 1 GJ

BUILDING ENCLOSURE

Air Barrier
Owens Corning FOAMULAR® CodeBord™ Air Barrier System

Framing
2x6 @24" o.c. I Optimal Value Engineering

Insulation
Ceiling I R60 Blown
Main Walls I R15 Exterior Foam, R24 Batt
Foundation Walls I R10 Foam, R22 Batt
Basement Slab I R10 Foam

Windows and Doors
Jeld-Wen Triple Glazed IGUs I R5+, <0.2 SHGC

MECHANICALS

Heating and Cooling
Mitsubishi CITY MULTI VRF Heat Pump PUMY-P36

Water Heating
Rheem Hybrid Heat Pump HB50RH

Ventilation
VanEE 90H-V ECM ERV

RENEWABLE ENERGY

Photovoltaic System
33 panels I 255W Polycrystalline Modules

Electrical Storage Capacity
3 day battery storage capacity I 20 kWh/day

240 HOLIDAY INN DRIVE, UNIT O, CAMBRIDGE, ON, N3C 3X4 | TEL: 1-800-267-6830/519-658-6232 | WWW.BUILDINGKNOWLEDGE.CA

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2nd "WHY" CONTINUE WITH NZE

Energy Data:

• Space Heating	8.4 GJ	23%
• Electrical Plug Loads	22.5 GJ	61%
• Water Heating	4.4 GJ	12%
• Ventilation	1.0 GJ	3%
• Space Cooling	0.5 GJ	1%

Annual Energy Use	36.8 GJ
Annual Energy Generation	37.4 GJ
Net Annual Energy Use	-0.6 GJ

The NZ Magic Number

37 GJ

1 ACH or less

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3RD WHY CONTINUE WITH NET ZERO ENERGY TYPE HOMES – COMMUNITY SCALE

HOMES OFFERED TODAY	PER HOME Annual Energy	COMMUNITY SCALE	NET IMPACT
Current Ontario Building Code Home	110 GJ	100 Homes	11,000 GJ
Energy Star Home	101 GJ		10,100 GJ
NET ZERO READY Home	37 GJ		3,700 GJ
NET ZERO Home with Solar	37 /-37 GJ		0 GJ

REDUCTIONS IN PRICE TO GO NET ZERO ENERGY COMPLETE:

Started at $90,000 → $75,000 → $65,000 → now under $60,000

NET ZERO ENERGY READY …. UNDER $20,000

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BUILDING KNOWLEDGE CANADA INC.

ADD IN GHG AND IMPACT OF NET ZERO ENERGY TYPE HOMES

Homes offered today	Per Home Energy Consumption *	By Scale of Community	Community Net Energy Impact*	Community Net GHG Impact*
Current Ontario Building Code Home	110 GJ	100 Homes	11,000 GJ	900
Energy Star Home	101 GJ		10,100 GJ	800
NET ZERO READY Home	**37 GJ**		**3,700 GJ**	**150**
NET ZERO Home with Solar	37 /-37 GJ		0 GJ	

*SUBJECT TO HOUSE SIZE, MECHANICALS AND FUEL SOURCE / *GHG BASED ON AVERAGES / *ALL ENERY REFERENCES ABOVE ARE BASED ON ANNUAL CALCULATIONS

- **Compared to current Building Code:** **Reductions in Energy Demands by 67% in NZE-R Homes**
  Reductions in GHG by 83%
- **Review infrastructure needs for the future demand of the new housing stock**
- **Look at community planning in a different light**

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DO YOU HAVE A CHOICE – SURE YOU DO BUT…..

20-25% Improvements

Based on this progression – its not a matter of IF but When as Andy Goyda would say!

2012 Ontario Building Code

ERS 80

ERS 83

New Reid's Heritage Energy Star Homes

ERS 86

R-2000

ERS 88

"Net-Zero Ready"

ERS 95+

"Net-Zero"

Based on current building code cycles – projections suggest by 2028 we are here!

Every 5-6 years

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PROVE THE RETURN ON INVESTMENT

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Net Zero Utility Consumption vs. Input Review

Input Data

Principal Cost for Net Zero	**$55,000**
Annual, nominal interest rate	2.98%
Amortization Period (years)	25
Initial Date	01-Jan-16

Computed Data

Effective Annual Rate						3.00%
Periodic Interest Rate			Annual	2.9617%	Monthly	0.246805%
Periodic Payment, Monthly						$260
Code Annual Utility Charges*						$4,336
NZ Annual Utility Charges*						$217
Code Per Month Utility**						$361
NZ Per Month Utility**						$18
Net Difference - Mortgage less utility savings						**-$84**

* REFERS TO GAS AND ELECTRICITY ENERGY CONSUMPTION ON AVERAGE *ENERGY CONSUMED BASED ON AVERAGE USER * BASED ON ROUGHLY 2,000 SF CURRENT 2012 OBC

**DOES NOT INCLUDE DELIVERY CHARGES/HOOK UP/DISTRIBUTION CHARGES AS RELATIVE TO YOUR SERVICE AREA *BASED ON SW ONTARIO DATA CLIMATE REGION

***SAVINGS WOULD APPLY TO THE ** COMMENTS YOU WOULD BE CONSUMING LESS IN ENERGY AS A BASELINE WHICH WOULD BE REFLECTED IN THE CONSUMPTION

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EStar Annual Utility Charges*						$3,469
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Code Per Month Utility**						$289
NZ Per Month Utility**						$18
Net Difference - Mortgage less utility savings						**-$11**

* REFERS TO GAS AND ELECTRICITY ENERGY CONSUMPTION ON AVERAGE *ENERGY CONSUMED BASED ON AVERAGE USER * BASED ON ROUGHLY 2,000 SF ENERGY STAR 2015

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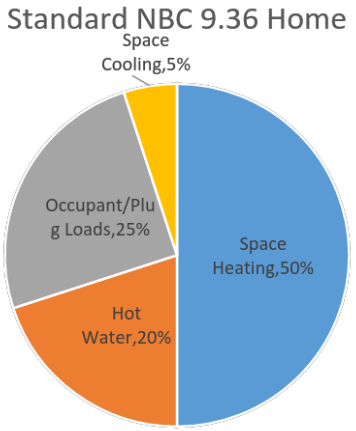
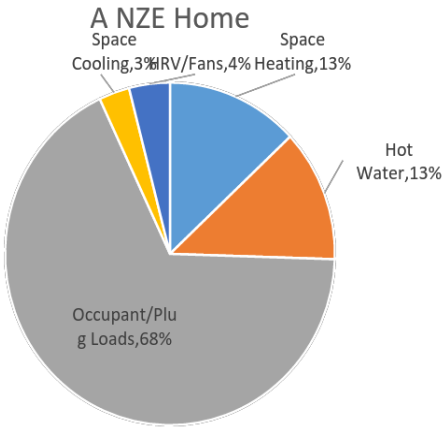
LOAD COMPARISON: CODE TO NZE





LESSONS OR CONSIDERATIONS

- **Conservation first!** Air Sealing is critical to reducing the loads in the home, if you do not get the air sealing right you will need larger equipment and thus more energy production to offset (your largest expense)

- Sometimes you have to trade more expensive equipment for less solar panels – an example is the hot water tank – the air source electric hot water tank will reduce your panels and loads as will the Vanee Gold ERV. The roof is your most expensive real estate now

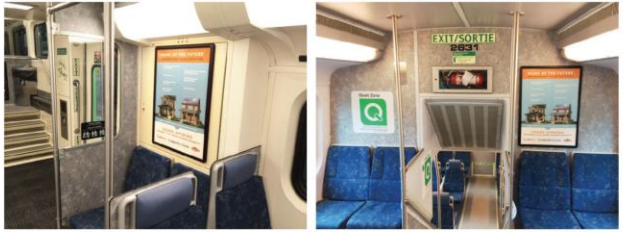
- Keep it **SIMPLE** – for yourself – and your buyer i.e. framing, HVAC, maintenance, presentation

Finally…Critical, effective marketing campaign to educate consumers and the industry

GUELPH TRIBUNE
QUARTER PAGE AD

GUELPH MERCURY
HALF PAGE AD

NEW HOME AND CONDO GUIDE
FULL PAGE AD



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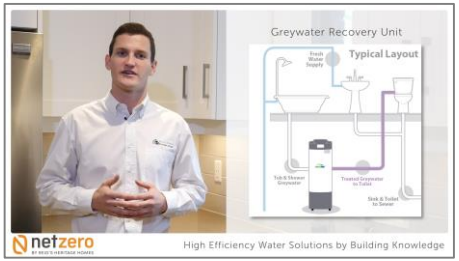
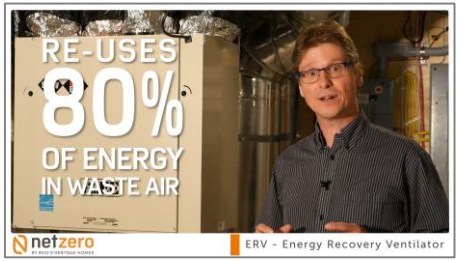
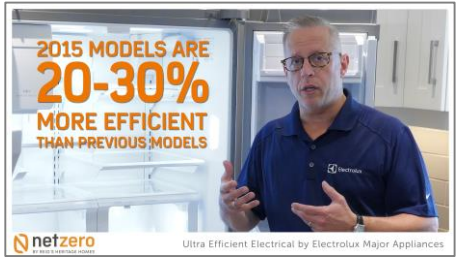
CONSUMER ENGAGEMENT:

- Social media contest
- Education using dedicated LiveNetZero.com website, videos, guided tours





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