

# The Acceleration of Net Zero:

## How the Canadian Home Builders' Association (CHBA) is Supporting Industry Innovation

Derek Satnik, Vice Chair  
CHBA NZE Program Standards Sub-Committee

November 8, 2016  
CaGBC Municipal Leaders Forum



Greater Toronto  
*Every Building Greener*

# About the CHBA

- Founded in 1943, the Canadian Home Builders' Association (CHBA) is **the voice of Canada's residential construction industry**.
- Representing **more than 8,500 businesses across Canada** (mainly small and medium sized) CHBA members include home builders, renovators, land developers, trade contractors, product and material manufacturers, building product suppliers, lending institutions, insurance providers, service professionals, municipalities and more.
- The residential construction industry is a vital part of Canada's economy **in every community** across the country:
  - ↳ Directly and indirectly supports 902,000 jobs
  - ↳ Pays \$51 billion in wages
  - ↳ Generates \$125 billion in economic activity annually

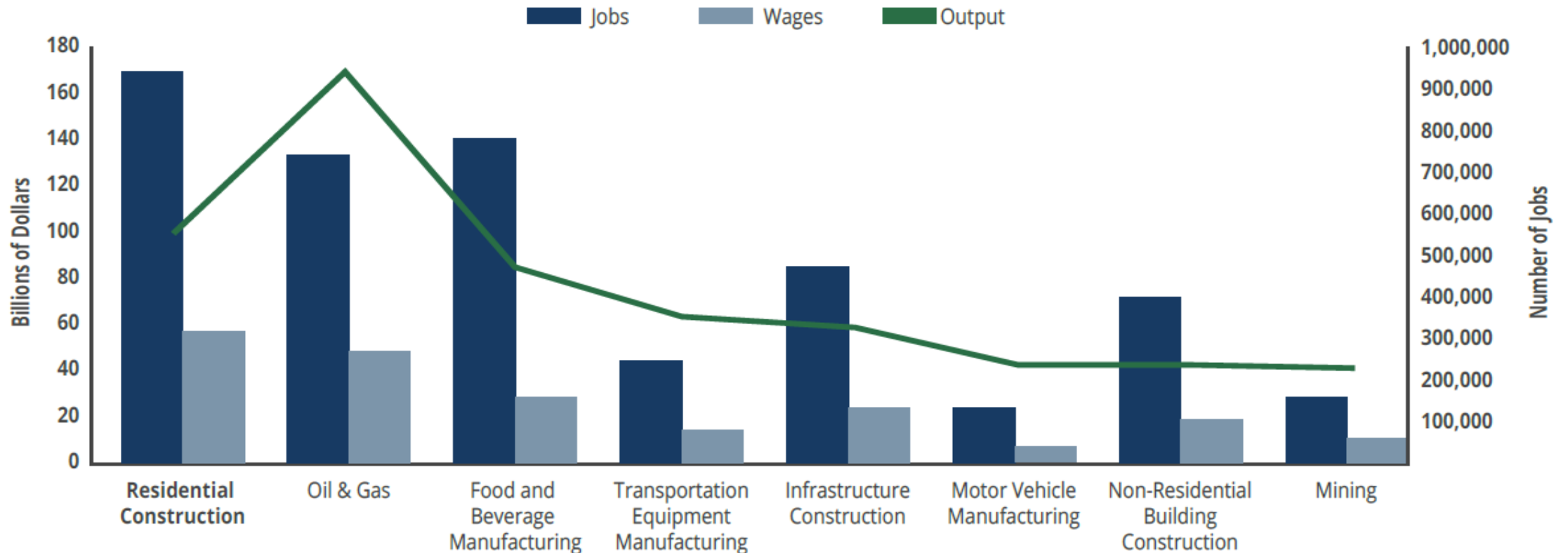


**Kevin Lee, CEO**  
*since May 2013*



# Residential Construction Industry

Jobs, Wages, and Economic Output of Canada's Industries, 2010



Residential Construction is the **largest industry** in Canada, representing **more jobs and economic impact** than any other.



# NZE Initiatives in Canada

## 2006 - CMHC & NRCan EQuilibrium™ Sustainable Housing Demonstration Initiative

- 12 Houses across Canada completed in 2009
- \$60,000/builder

## 2013 - NRCan R-2000 NZE Pilot

- 11 Houses across Canada - project completion Mar 2016
- *Only 2 completed/approved – others withdrew, did not meet final deadline, or used ineligible technologies*
- No funding to the builders

## 2013 - NRCan ecoEII - Owens Corning NZE Housing Community Project

- 5 builders in 4 provinces built 26 homes (5 NZEr) – project completion Apr 2016
- ecoEII contribution \$1,962,870 (Project Total \$4,200,042)

## 2015 - CHBA Net Zero Home Labelling Program

- Pilot launched Sep 2015 and version 1 (v1) is launching Jan 1, 2017



# Council Mandate

The Council supports the CHBA Strategic Priority to **advance innovation** in our industry, with the goal of creating a **market advantage** for CHBA builder and renovator members who choose to pursue Net Zero Energy housing.

*This will not only help to meet the housing aspirations of Canadians, but renew Canadian world leadership in high performance housing.*

The **MANDATE** of this self-funding Council is **to deliver services that will support members' voluntary adoption of NZE.**

# Council Member Composition

## GOLD



## SILVER



## BRONZE



- 10 Management Committee Members
- 5 Sponsor Members (*2 silver & 3 bronze seats open*)
- 21 Builder/Renovator Members
- 12 General Members (*3 seats open*)
- 3 Academia Members (*1 seat open*)

= 60 Voting Member Seats (*9 open*)

*Plus ex-officio non-voting members from  
NRCan OEE and CanmetENERGY as well as CMHC*

Visit the Net Zero Council webpage for a full listing

# Barriers to NZE

## Marketing and Promotion

- Poor branding, understanding, awareness, and demand
- Difficult to articulate value proposition (sales & marketing)

## Competency & Capacity

- Limited education/accreditation and training/skills development

## Technical Standards, QA & Tools

- Lack of standards and support tools

## Cost Reduction

- High cost to build or retrofit (capital & labour)

## Financing & Real Estate

- Lack of appropriate financing mechanisms and/or incentives

## Policy

- Limited enabling policy (e.g. net metering, codes and regulations)

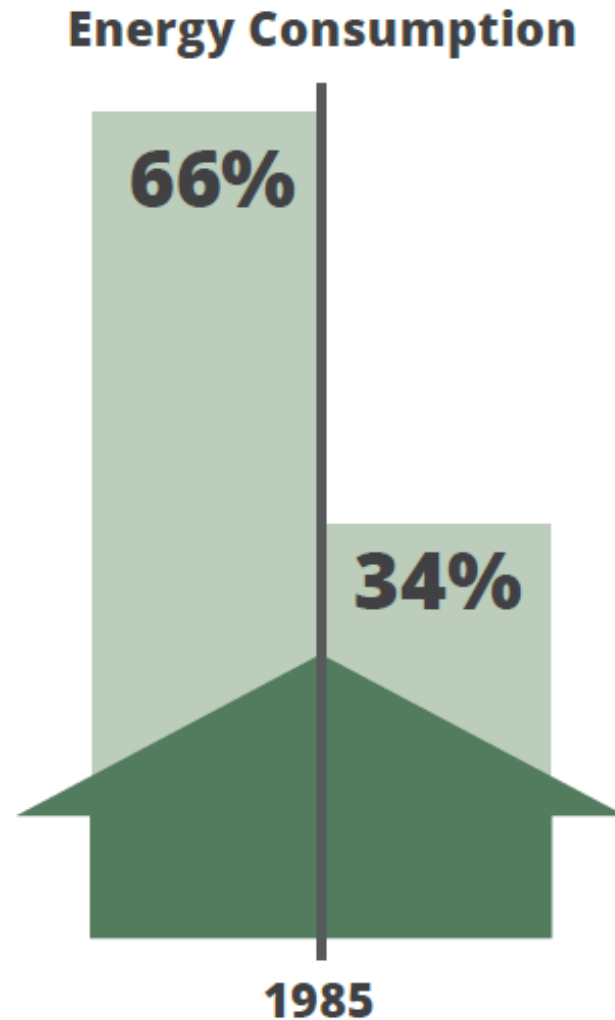
# NZC Key Priorities

- **A NZE Labelling Program** to distinguish and recognize NZE homes and the builders/renovators
- **Marketing & Communications initiatives** to develop the NZE brand, build awareness and understanding of the value of NZE homes, and stimulate market demand
- **Educational initiatives** to bridge the knowledge gap for early adopters and accelerate builder capacity to capitalize on NZE
- **Financing initiatives** to address the initial cost of NZE homes through innovative and effective financing mechanisms



# Future Program Development

- NZE Multi-Unit Residential Buildings (MURBs)
- NZE Renovations
- NZE Communities (District Energy, Micro Grid, CHP)
- The Water/Energy Nexus - water use affects NZE homes... but how, and by how much?



Half of Canada's housing stock was built before 1985. That half uses twice as much energy as the stock built since 1985.

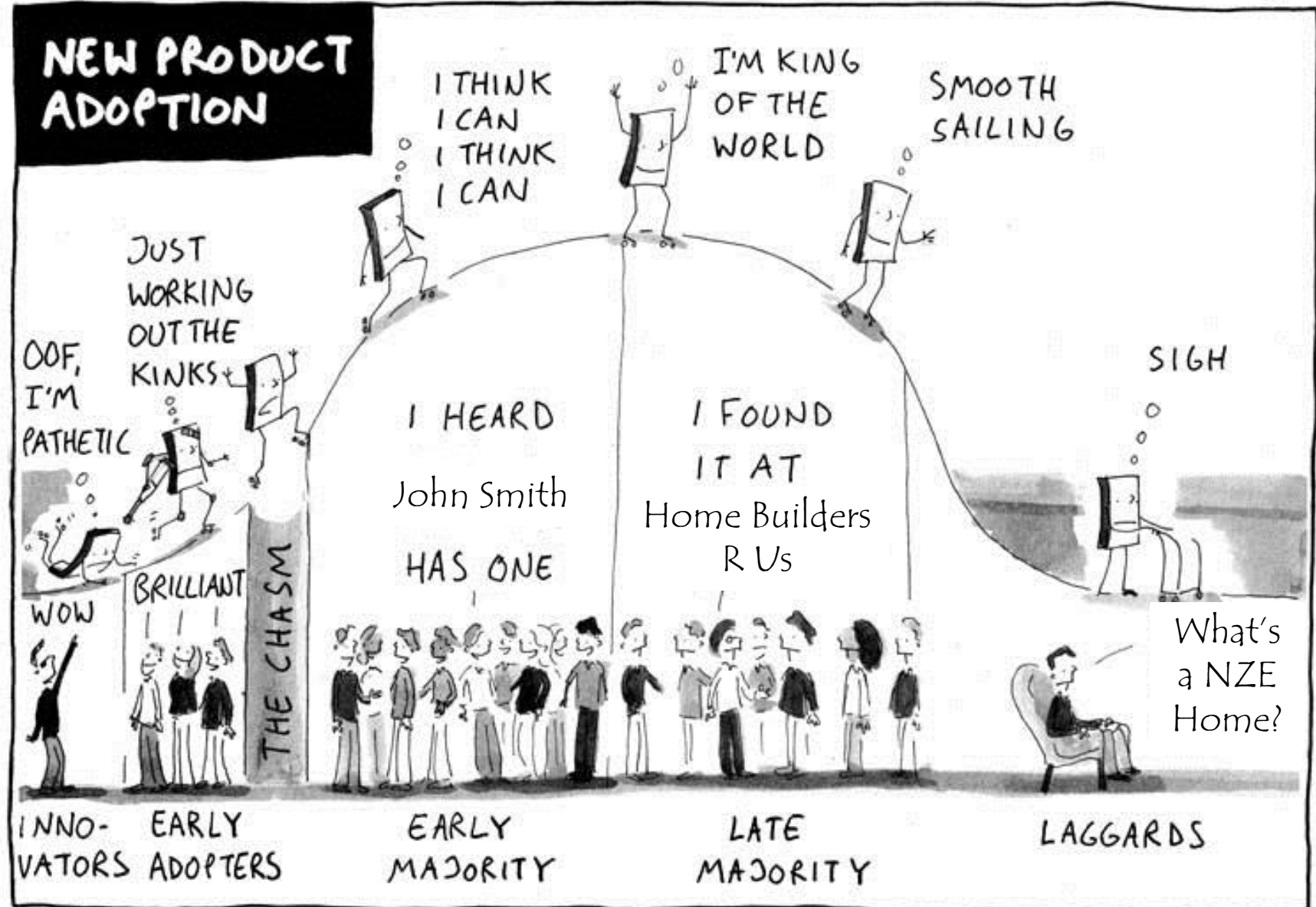
# NZE Labelling Program Objectives

- Distinguish/recognize NZE builders *and* homes
- Achieve a technical standard (2 tiers: NZE and NZE Ready)
- Track/measure success (ie increase in # of labels)
- Leverage the name recognition and cachet of “net zero energy”
- Develop a program that has technical rigor and simplified administration
- Targeting the mass market



## BRAND CAMP

by Tom Fishburne



© 2007 Thanks to G. Moore

SKYDECKCARTOONS.COM

# Existing Programs





# A Full Spectrum of Market Offerings

**ENERG****GUIDE**  
RATING SYSTEM

100%	Net Zero Energy (NZE)
+/- 80%	NZE ready (NZEr)
+ 50%	R-2000
+ 20%	ENERGY STAR®
"Ground 0"	Building Code

# A few thoughts...

- NZE today is NOT NZE 5 years from now:
  - Developing technologies
  - Efficiency of Renewables in increasing aggressively
  - Balance our aspirational END GAME with a series of balanced steps forward
- **What we cannot compromise:**
  - Exceptional COMFORT (envelope & passive measures)
  - Enhanced IAQ /IEQ (control & conditioning)
  - Durability
  - Minimum maintenance and complexity
  - **Affordability**



# What are the costs?



## Net Zero Utility Consumption vs. Input Review

### Equilibrium Program

\$120-160,000

### Now (NRCan initiatives)

\$60-80,000

(15-20% of standard construction costs)

### Some Targets

\$40,000 for NZE

\$15,000 for NZEr

#### 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*	\$6,028
NZ Annual Utility Charges*	\$301
Code Per Month Utility**	\$502
NZ Per Month Utility**	\$25
Net Difference - Mortgage less utility savings	-\$217

\* REFERS TO GAS AND ELECTRICITY ENERGY CONSUMPTION ON AVERAGE

\*\*DOES NOT INCLUDE DELIVERY CHARGES/HOOK UP/DISTRIBUTION CHARGES AS RELATIVE TO YOUR SERVICE AREA

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

\$502  
-\$25  
\$477  
-\$260  
\$217



# Definition

A NZE home is one that is *designed, modelled and constructed* to produce as much energy as it consumes on an annual basis.

- **NOT NZE “as operated”** – but uses assumptions for occupant consumption (Plug/occupant loads in NZE homes are between  $\frac{1}{2}$  to  $\frac{2}{3}$  of total energy use)
- The energy produced is a) generated on-site and b) renewable.
- NZE can be achieved via net-metering AND/OR battery storage.
- It includes all forms of energy (ie passive and thermal) including acknowledgment of gas and electrical base loads.

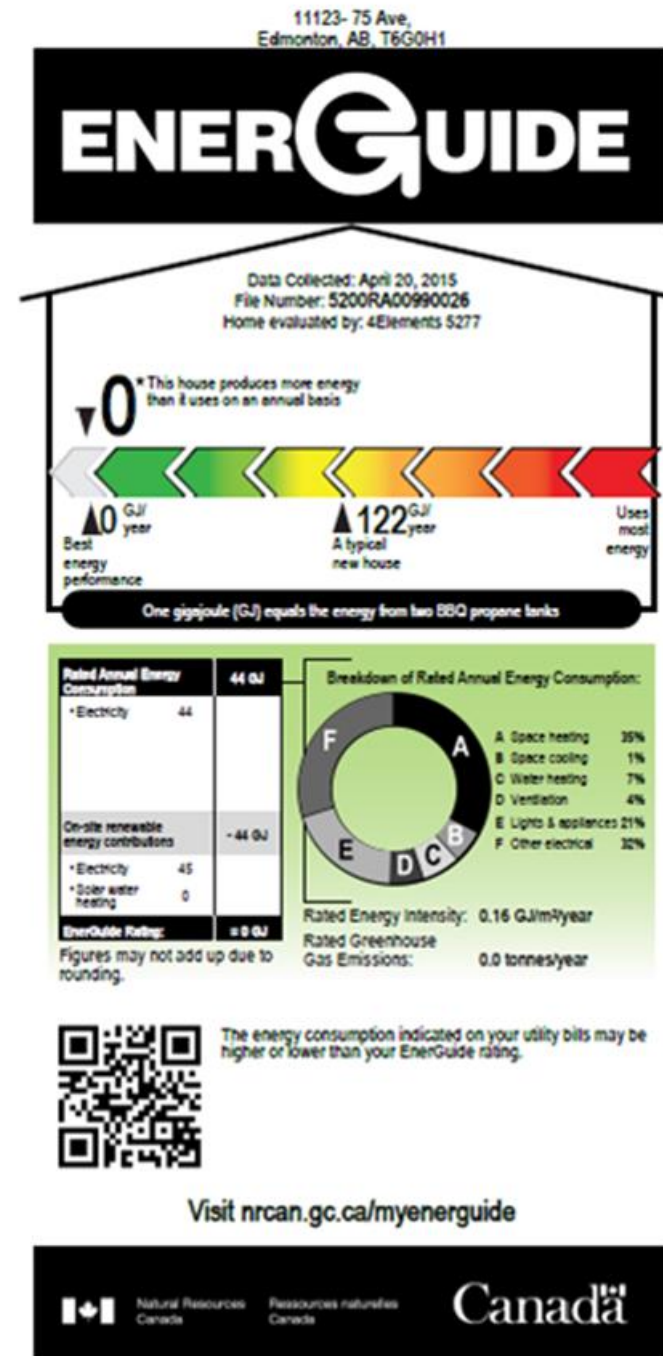
**NZE Ready (NZEr) = A NZE home that has not yet installed the renewables**



# NZE Labelling Program PILOT

- 23 homes approved as Qualified under the Pilot to-date:
  - ✓ Reid's Heritage Homes      Guelph, ON      5 NZE Homes
  - ✓ Lucchetta Homes      Welland, ON      1 NZEr Home
  - ✓ Doug Tarry Homes      St. Thomas, ON      1 NZE Home
  - ✓ Construction Voyer      Laval, QC      6 NZE Homes (Stacked MF Units)
  - ✓ Mattamy Homes      Calgary, AB      5 NZE Homes
  - ✓ Minto Communities      Kanata, ON      5 NZE Homes (4 townhomes)
- One reno application came in – need to explore a Reno Program/Standard!
- **Dec 2<sup>nd</sup> final deadline for PILOT applications from SO's**





# First 0 GJ Label in Canada Issued to Habitat Studio, Edmonton, AB by NRCan





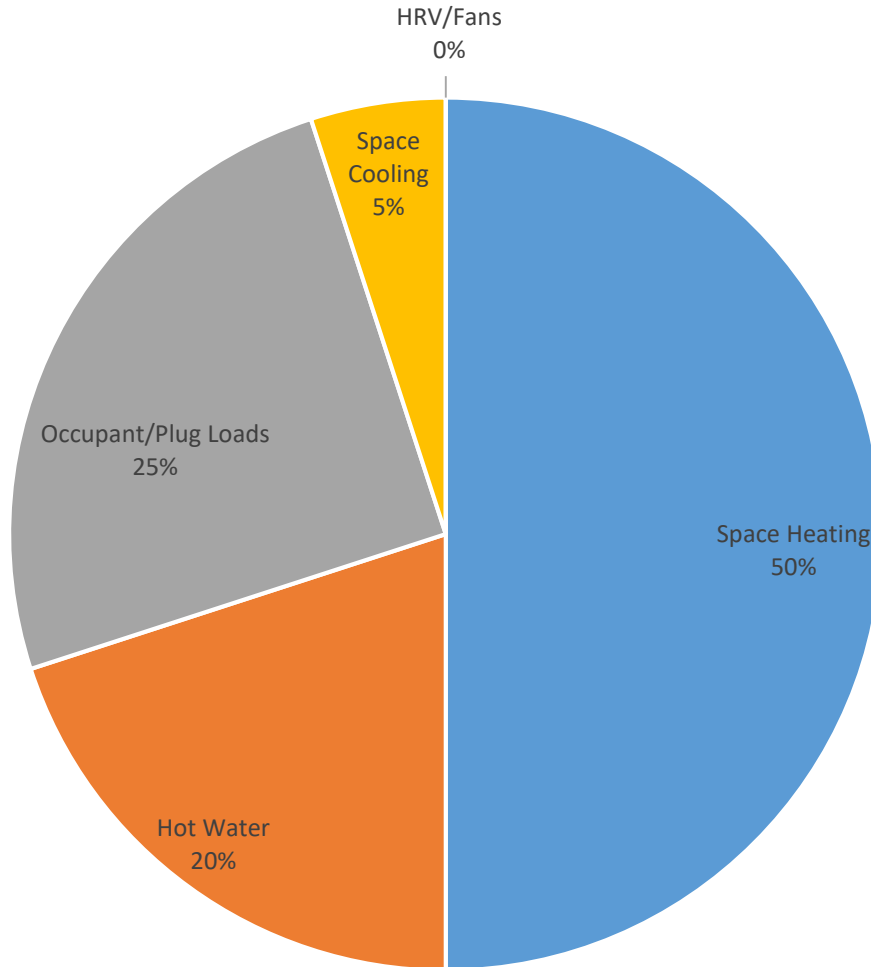
# NZE Labelling Program v1

## “Benchmark” Programs/Pathways to NZE for v1

			
BASE: Net Annual Energy Use $\leq 0$ GJ (via HOT2000 v.11 ERS label)			
CHBA NZE Tech Specs	ENERGY STAR® Requirements	NovoClimat Requirements	R-2000 Requirements
	+ any additional NZE Tech Specs	+ any additional NZE Tech Specs	+ any additional NZE Tech Specs
<p><b>ALL PATHS MEET THE SAME TECHNICAL SPECIFICATIONS.</b></p> <p><i>The builder can choose to “co-brand” the NZE label with one of these existing brands.</i></p>			

# Occupant Behaviour – Biggest Loads!

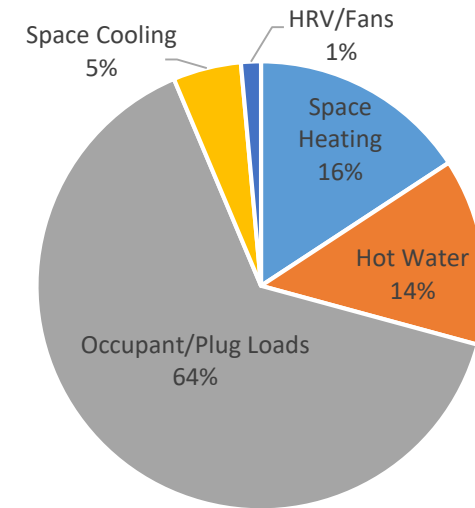
Standard NBC 9.36 Home



Average Canadian household uses  
**105 GJ/year**

Source: [NRCan](#) and [StatsCan](#)

A NZEr Home



Average NZEr home uses  
**35 GJ/year**  
(range of 34-44 for the attached, detached & MURBs combined)

**Average 66.7% reduction compared to code!**

Roof space is prime real estate for PV panels!



# NZE Labelling Program

## What have we learned so far about how to get there? (Zones 4-6)

- Design and aesthetics matter – understand your “bank account”
- Building envelope requirement 33% more efficient than Building Code (R-2000 is 25%)
- Air Tightness target is 1.0 ACH50 or less (max. 1.5) because air leakage is still 20-40% of the heating load – and it impacts durability and comfort
- Enclosure:
  - ✓ Attic effective R60+ (at least 10” raised heel trusses)
  - ✓ Walls **effective** R30+
  - ✓ Below grade walls **effective** R24+
  - ✓ Below grade slab **effective** R10+
  - ✓ Windows **effective** R5+ (triples)
- Simple and right-sized mechanicals (set it and forget it)
- Ventilation is key for IAQ





# NZE Labelling Program

## PV Considerations

- Better initial ROI with enclosure and mechanical upgrades vs PV (renewable energy)
- Grid Constraint: Are our utilities REALLY ready for the implications of net metering?
- 10Kw> no separate electrical engineered drawing (ESA)
- Product recognition by insurance carrier
- Utilities and end-of-year reconciliation for net metered homes: Cash, Credit or No Credit?



Actual home in Ontario -  
what we *don't* want!

# Where are Building Codes Going?

## Canadian Commission on Building and Fire Codes (CCBFC) Long-term Energy Strategy:

- Tiered approach to support harmonization across Canada – for example:
  - Tier 1      9.36
  - Tier 2      R-2000 2005      ERS 80
  - Tier 3      Energy Star 2012      ERS 83
  - Tier 4      R-2000 2012      ERS 86
  - Tier 5      NZEr      ERS 88/90?
- Ultimate performance target: Net Zero Energy *ready* (NZEr)
- Energy – not carbon
- Improving the energy performance of existing houses is a critical component to achieving meaningful energy reductions
- Education, incentive programs and enforcement tools are necessary to build industry capacity



## Contact / More Info

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