

Getting to Zero

Progress towards
low-energy housing
in Canada

CanmetENERGY

Leadership in ecoInnovation



Natural Resources
Canada

Ressources naturelles
Canada

Canada

Questions I'll answer tonight:

1. Why is housing R&D important?
2. What is a Net-Zero home , and can you build one in Canada?
3. How do we define Net-Zero Energy Homes?
4. What barriers are keeping Net-Zero out of mainstream home production?
5. Should every home in Canada be Net-Zero?
6. What about homes that are already standing?
7. So what?





#1: Why is housing R&D important?



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12 million Canadian homes

150,000 new homes are built every year



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\$37B/year
New homes



\$56B/year
Renovation



\$26B/year
Utility bills

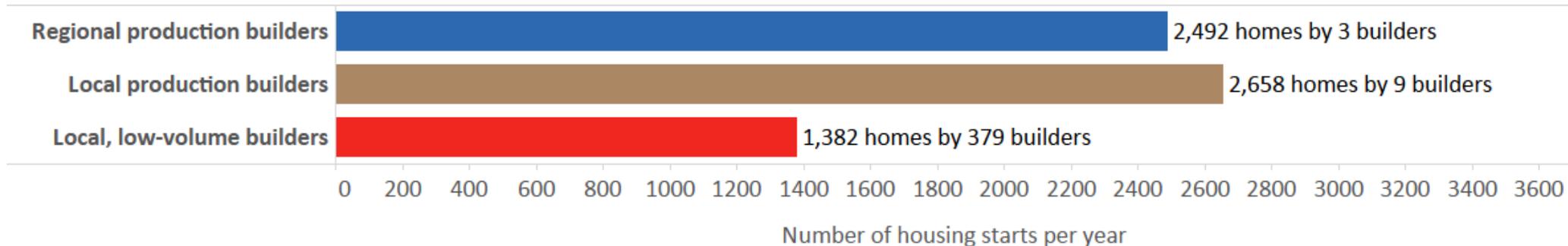


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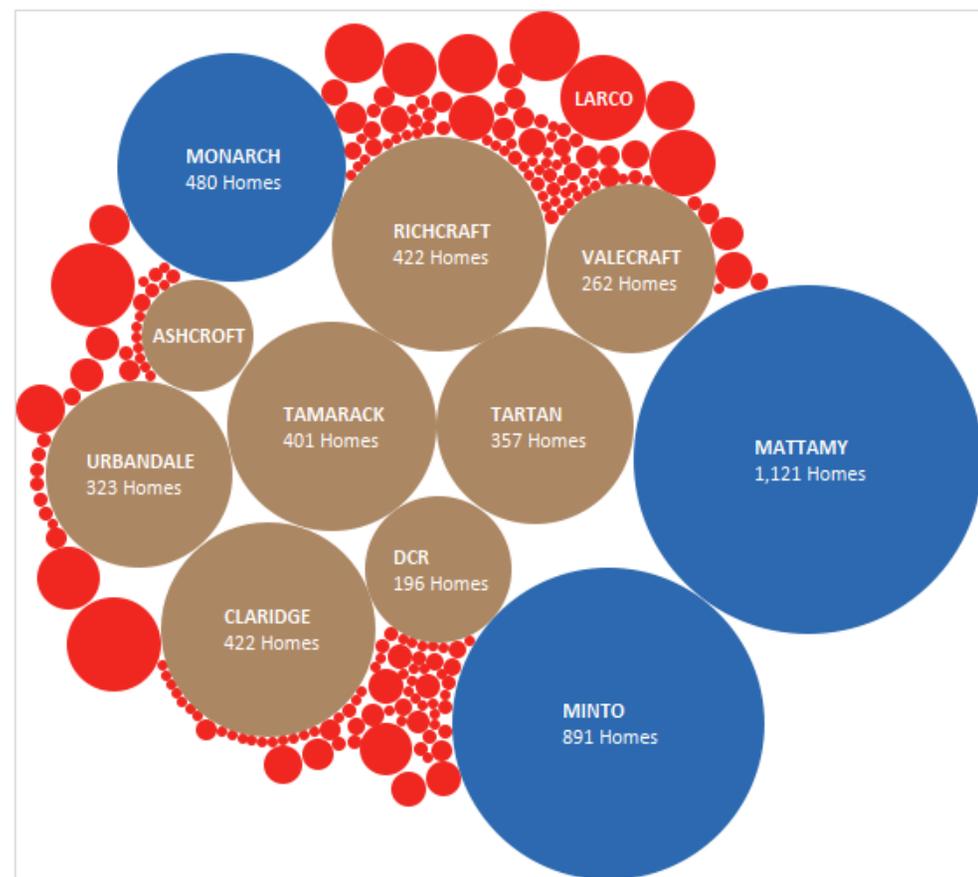
Ottawa-area housing starts since 2011



The housing industry is too fragmented to do R&D.

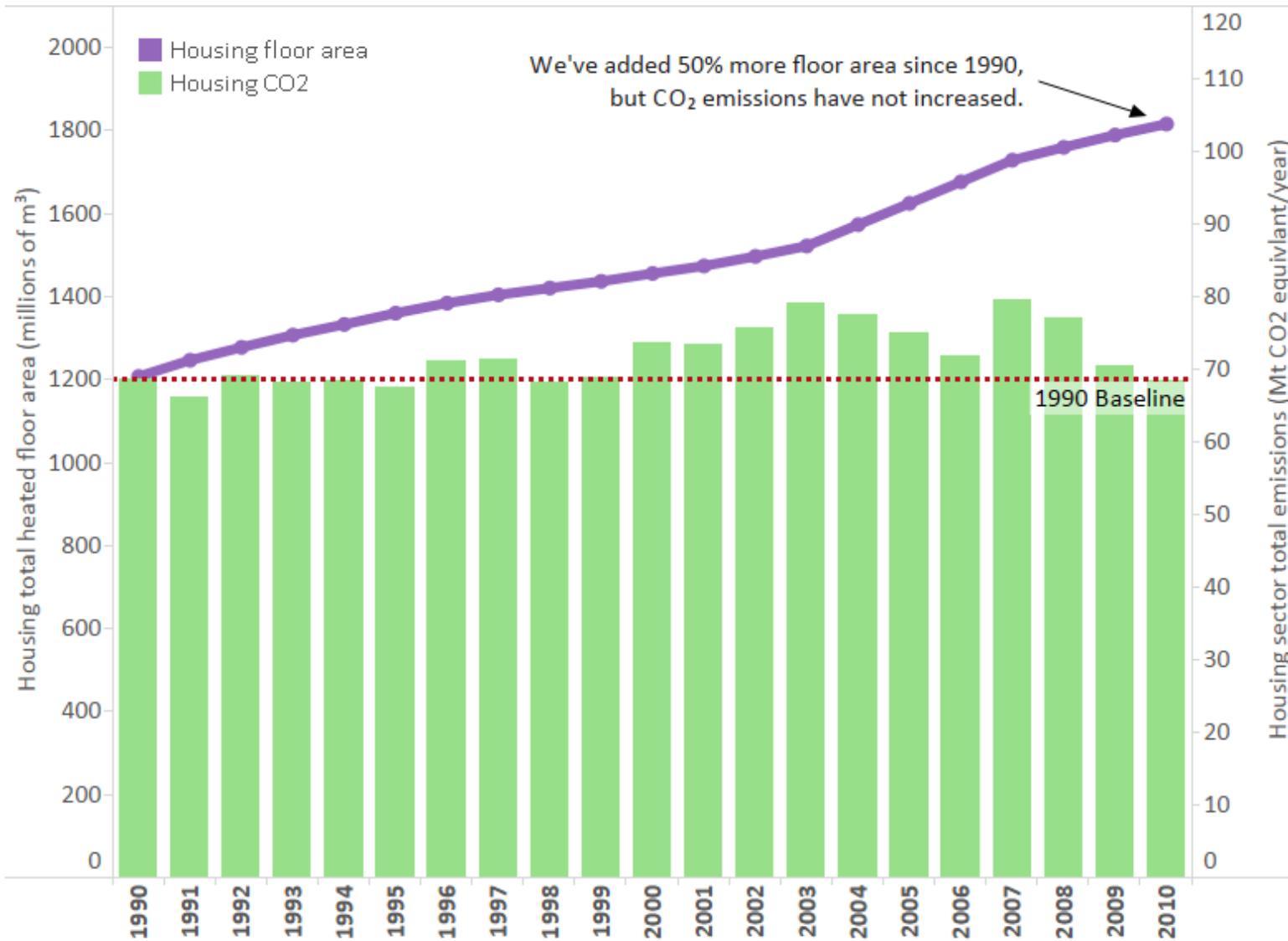
We spend \$37B on new housing every year, but that money is split a lot of ways. Ottawa alone has nearly 400 home builders.

(data from <http://data.ottawa.ca/en/>)



Each dot represents a home building company. The size of the dots correspond to the number of homes they have built since 2011.

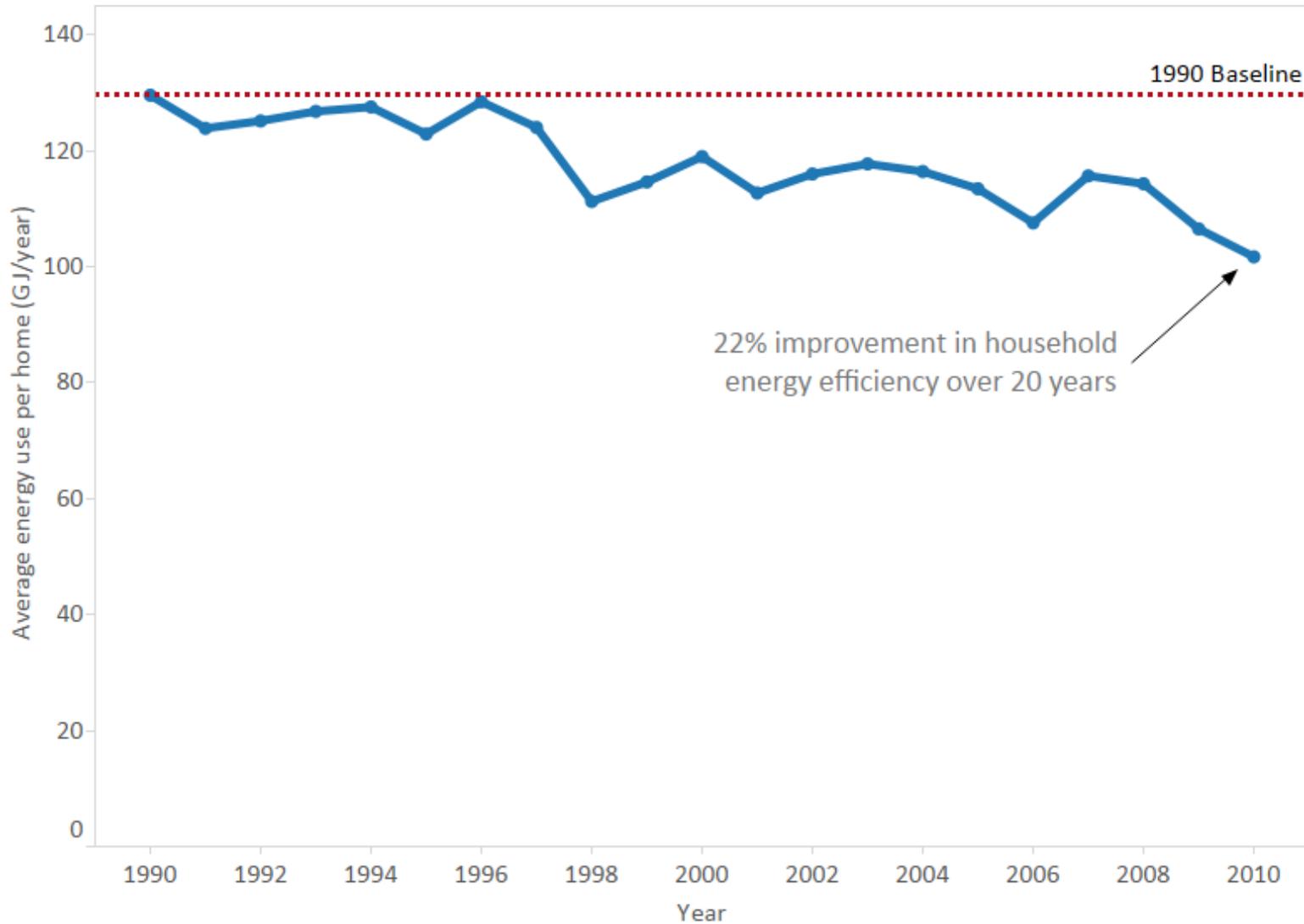




We've added 50% more floor area since 1990



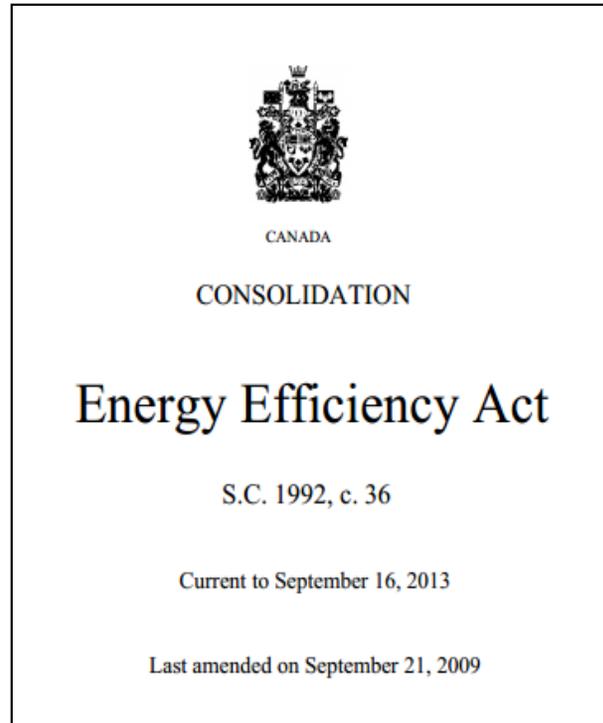
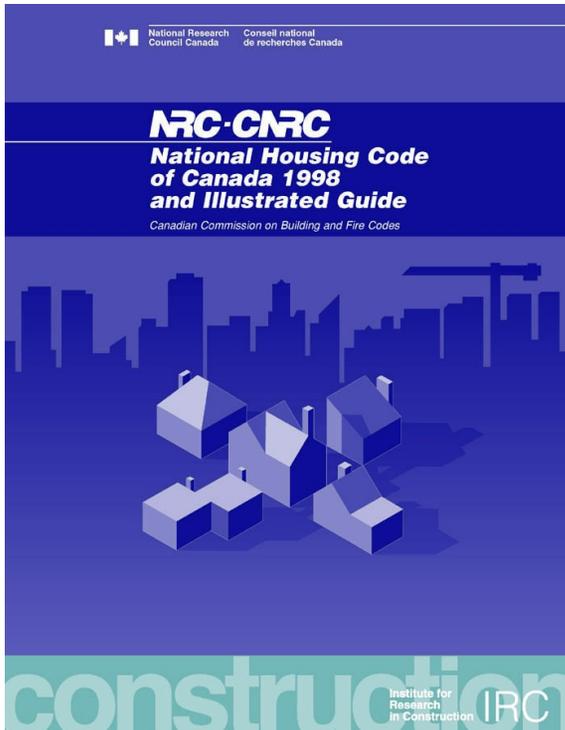
Average Household Energy Use: 1990-2010



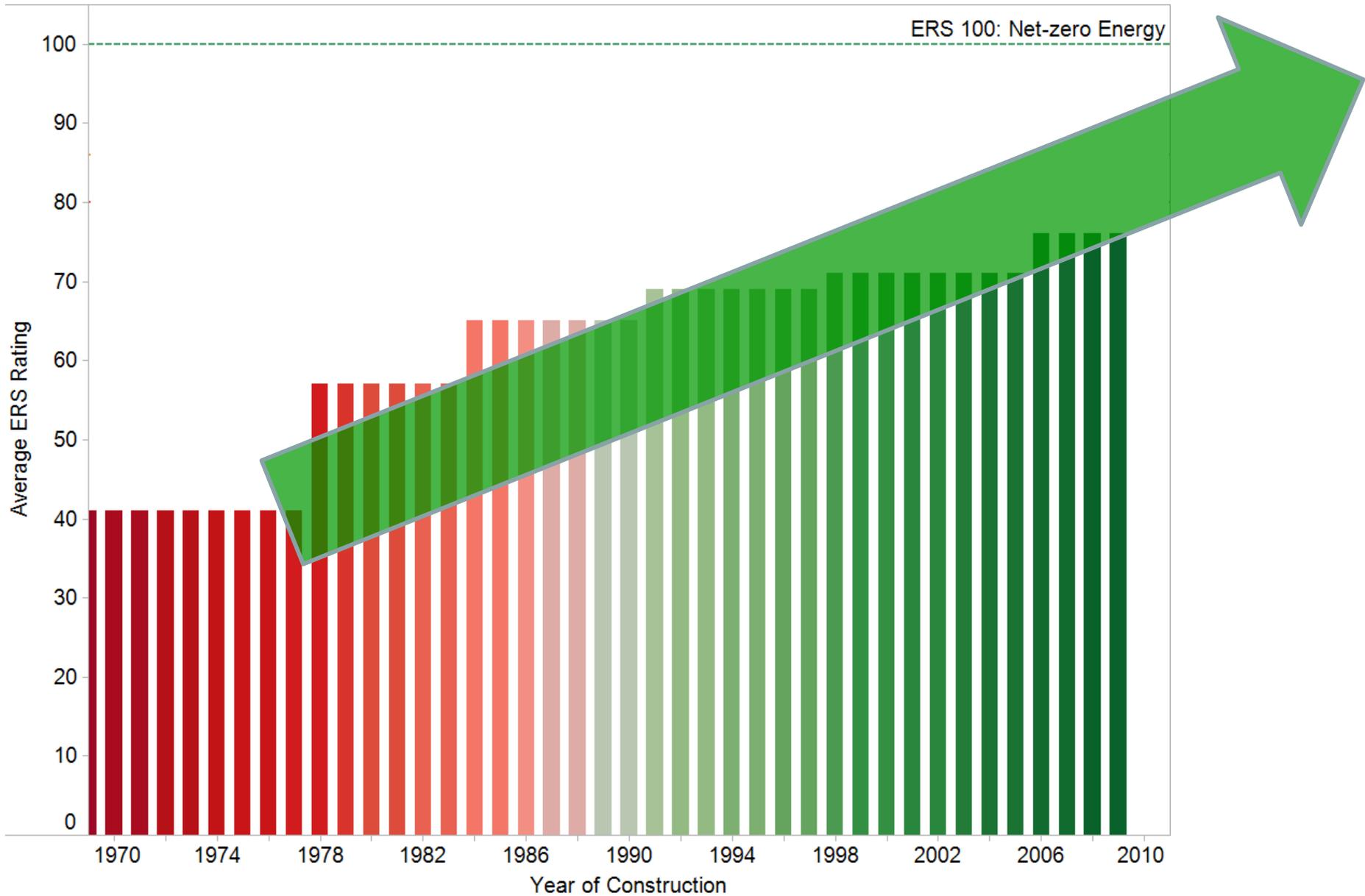
Canadian housing is more efficient than ever before



These improvements stem from 30 years of legislation, regulations and programs



Progressive changes to the building code



Potential unintended consequences of regulation



- prove too expensive or risky to adopt



- prohibit traditional building methods



- conflict with other regulations



- introduce health and durability risks





Our building codes will not move forward,
**unless industry has clear, pragmatic
solutions to achieve those objectives**



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Canadian R&D partners create the solutions industry needs



University
research



Government
labs



Leading-edge
homebuilders
& CHBA





#2: What is a Net-Zero Energy Home?

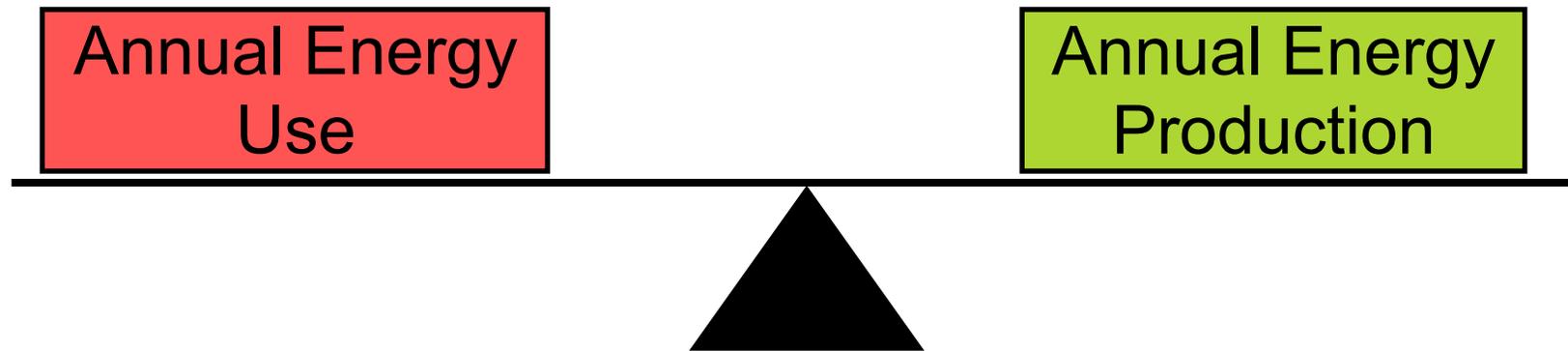
Conservation + Generation



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Why not build zero-energy homes?

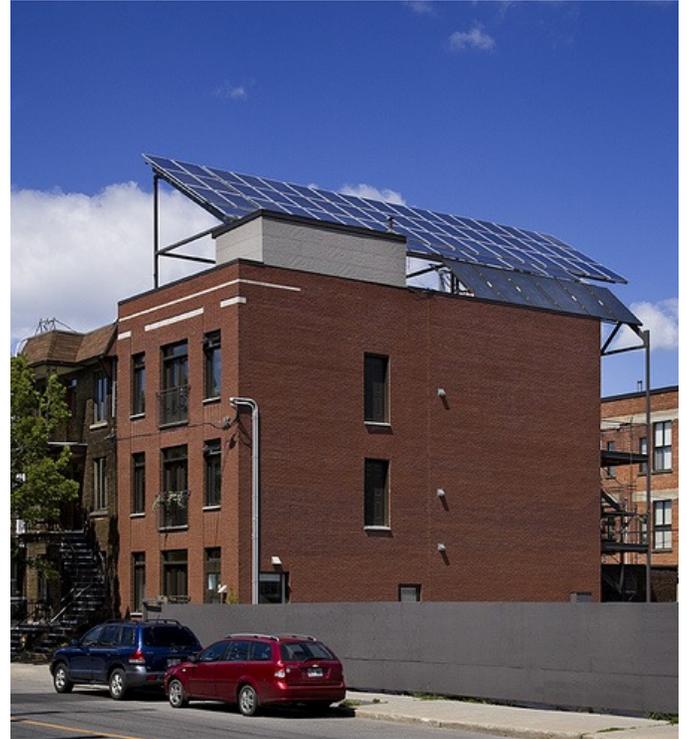


The mismatch between solar resource and load makes zero-energy homes much less practical in Canada.





Can you build net-zero in Canada?



Equilibrium Homes



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CANADA MORTGAGE AND HOUSING CORPORATION

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EQUILIBRIUM™ Sustainable Housing Demonstration Initiative

Equilibrium™ is a national Sustainable Housing Demonstration initiative, led by CMHC, that brings the private and public sectors together to develop homes that combine resource and energy-efficient technologies with renewable energy technologies in order to reduce their environmental impact.

[Learn more about the CMHC EQUILIBRIUM™ Housing Initiative](#)



The EQUILIBRIUM™ Housing Demonstration Projects

- | | |
|---|---|
| <ul style="list-style-type: none"> ▶ Abondance le Soleil Montreal, Quebec ▶ ÉcoTerra™ Eastman, Quebec ▶ Avalon Discovery 3 Red Deer, Alberta ▶ EchoHaven Calgary, Alberta | <ul style="list-style-type: none"> ▶ Riverdale NetZero Project Edmonton, Alberta ▶ The Laebon CHES Project Red Deer, Alberta ▶ Urban Ecology Winnipeg, Manitoba ▶ Harmony House Burnaby, British Columbia |
|---|---|

EQUILIBRIUM™ Housing Virtual Tours

- [Inspiration — The Minto ecohome](#)
- [The Laebon CHES Project](#)
- [Éco Terra™](#)

 Events Calendar

 Publications and Reports

 CMHC Events



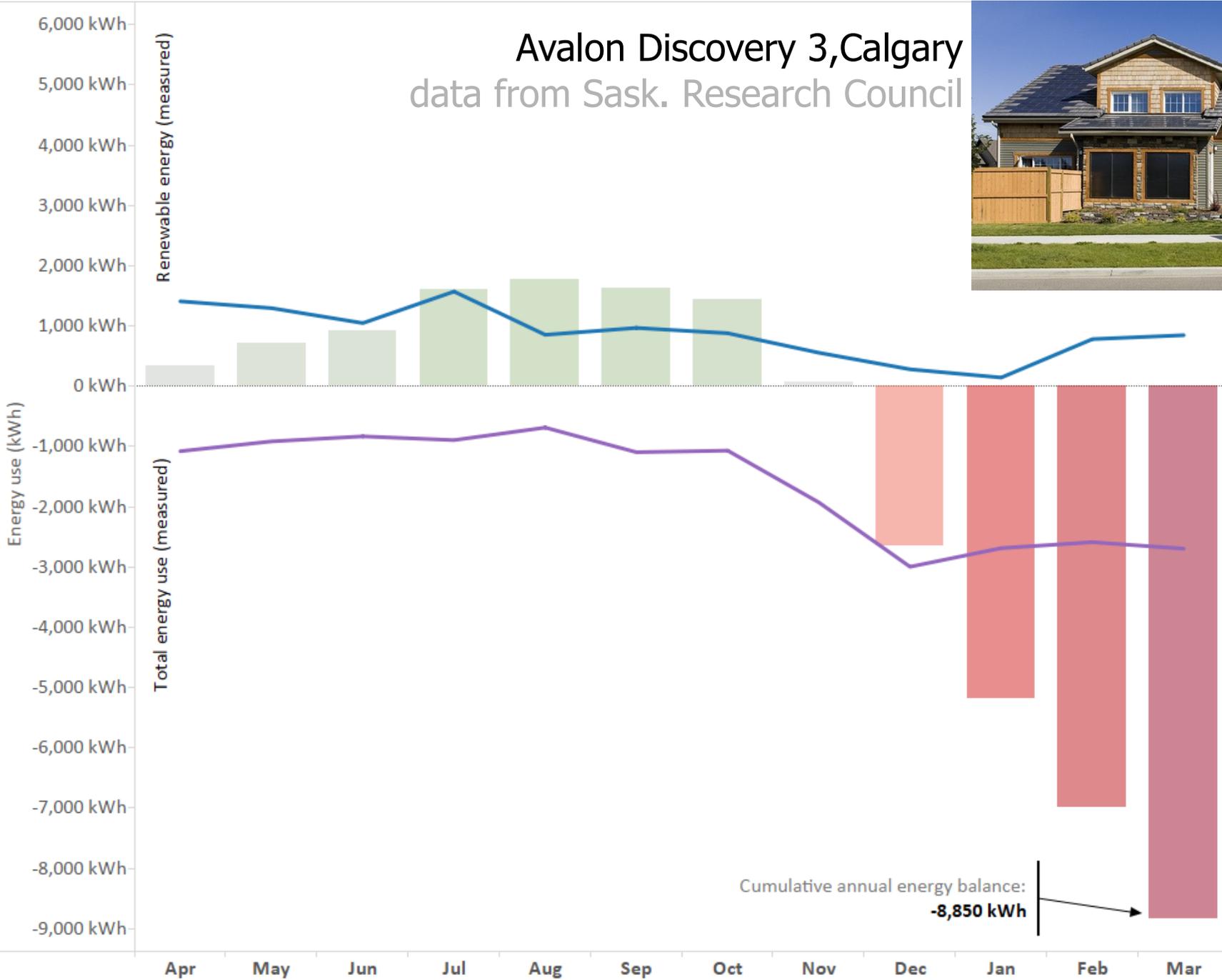
Equilibrium:

- **Innovative**
- **Efficient**
- **Comfortable**



Avalon Discovery 3, Calgary

data from Sask. Research Council



Cumulative annual energy balance:
-8,850 kWh

70 % less than code!

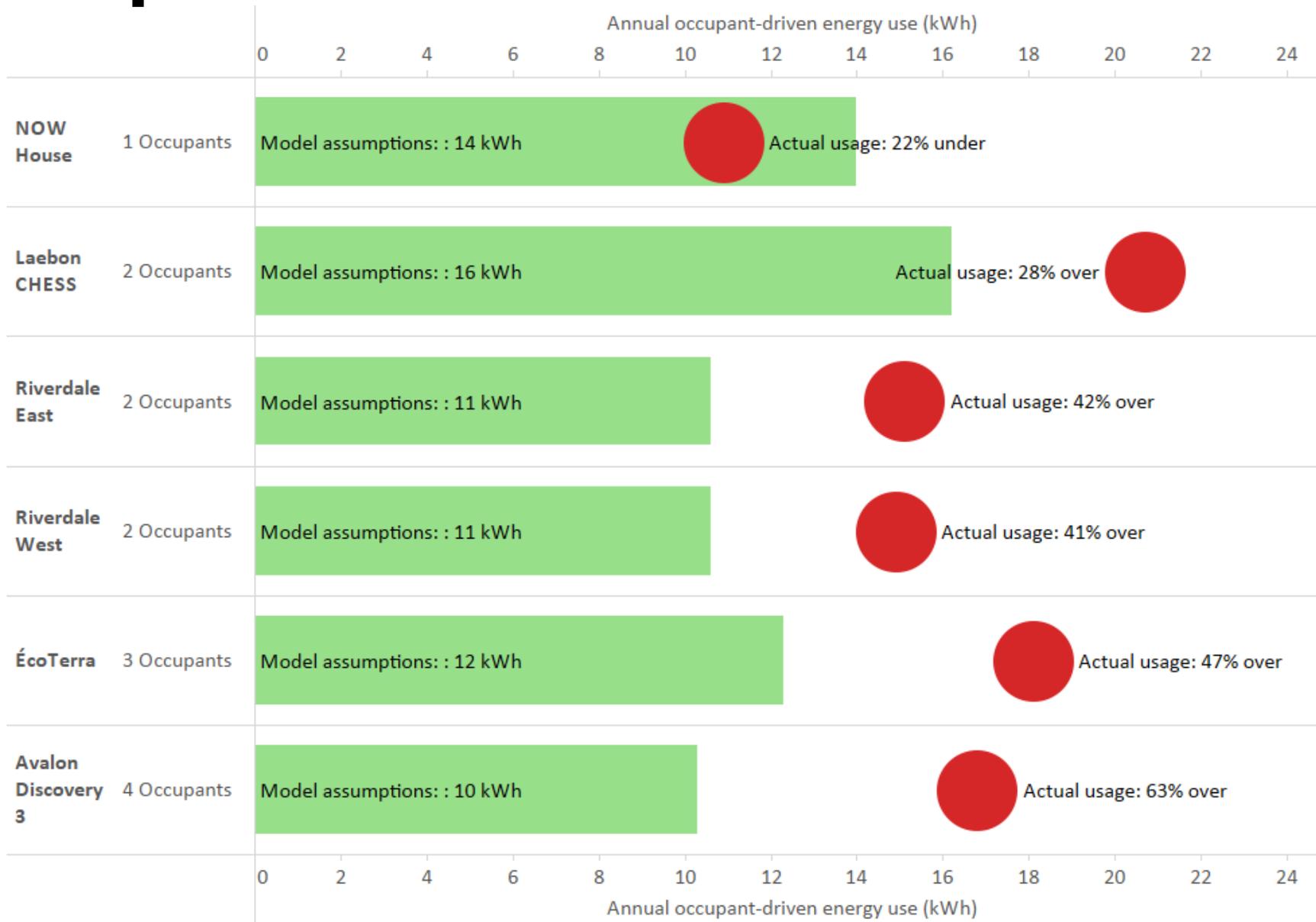




Issue #1:
Electric
Load reductions
are too optimistic



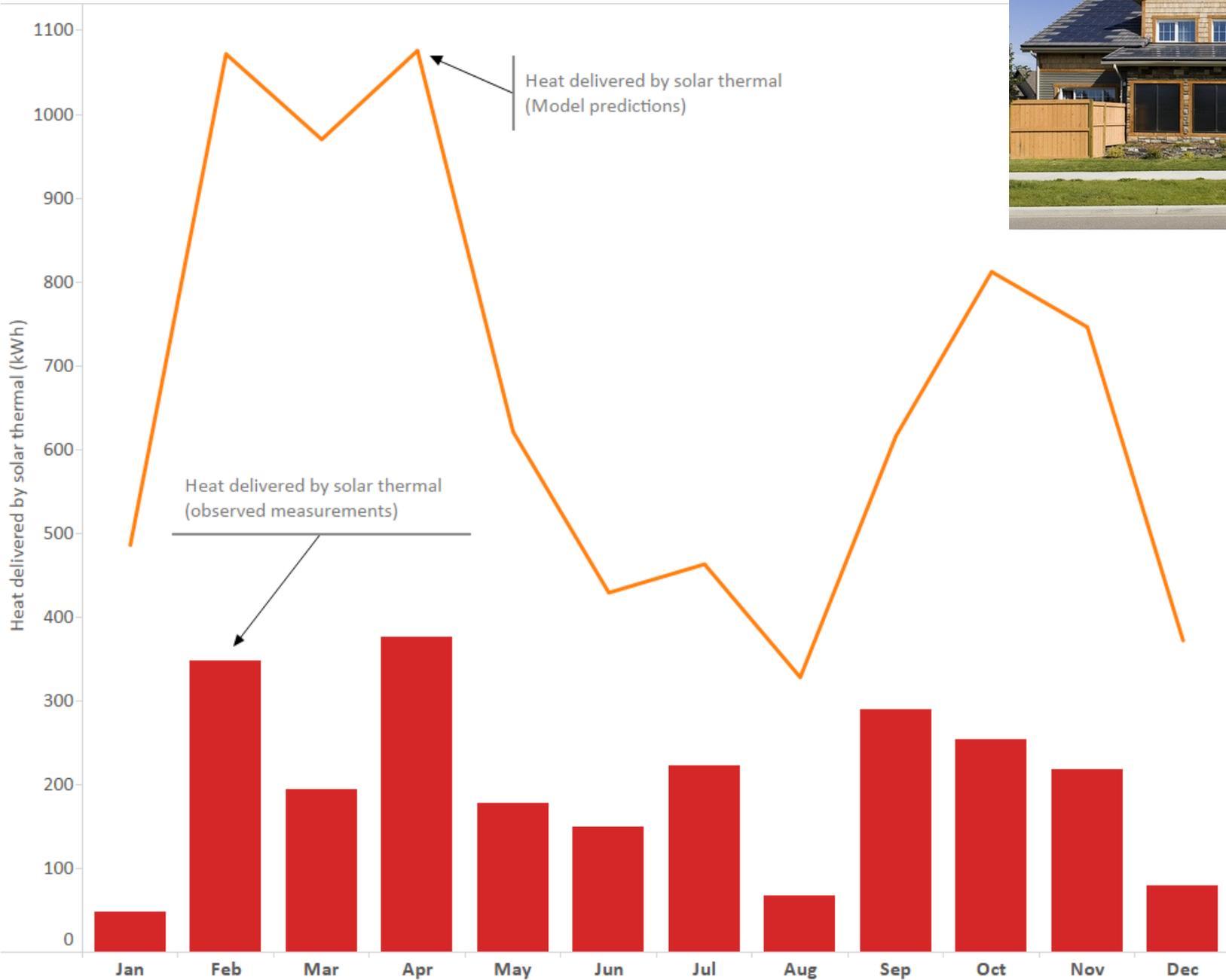
Expected vs. Actual use

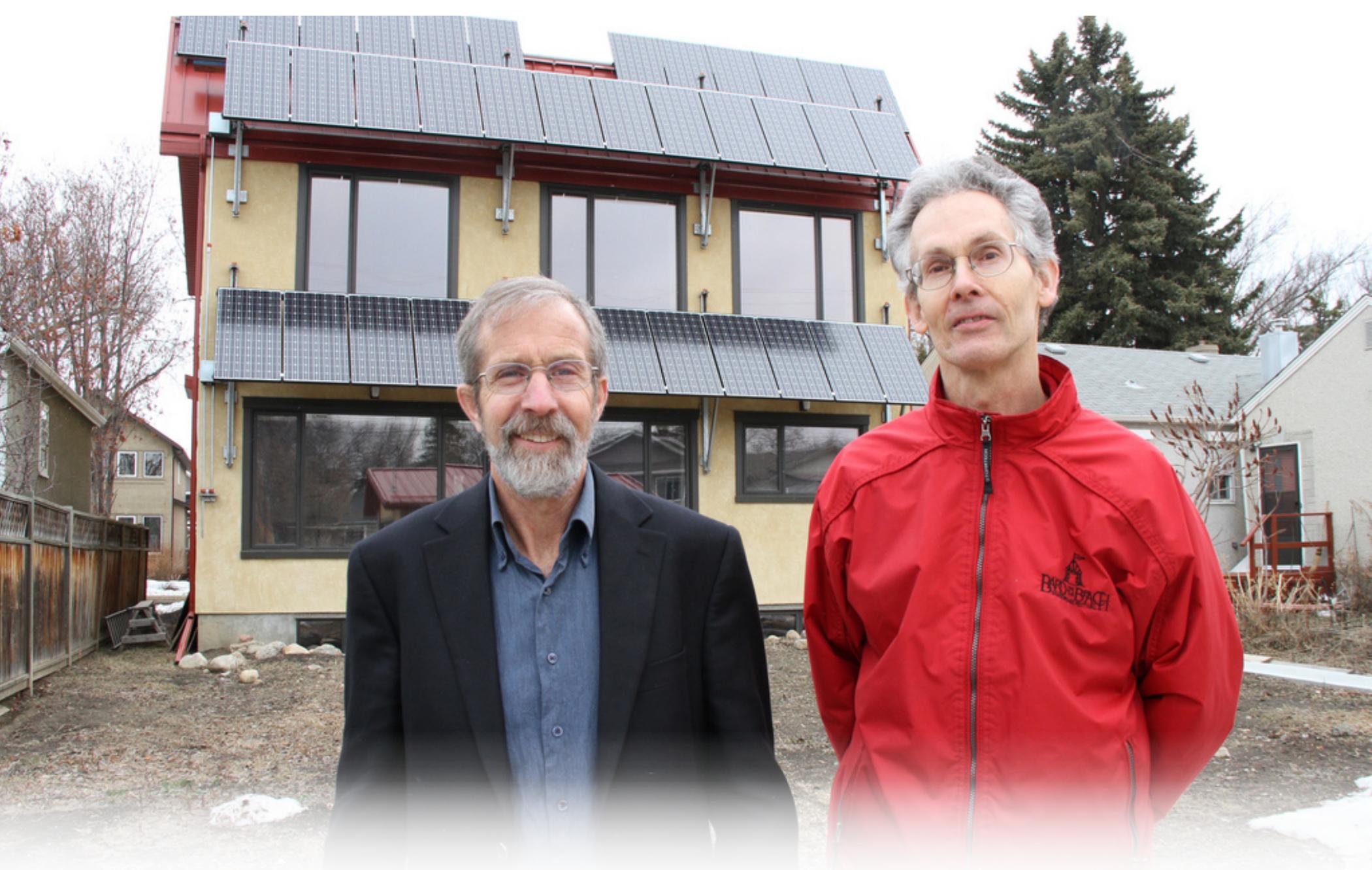


Issue #2: Solar-thermal under-performed



Avalon Discovery 3, Calgary





There is at least one NZEH in Canada



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#3 How do we define Net Zero?

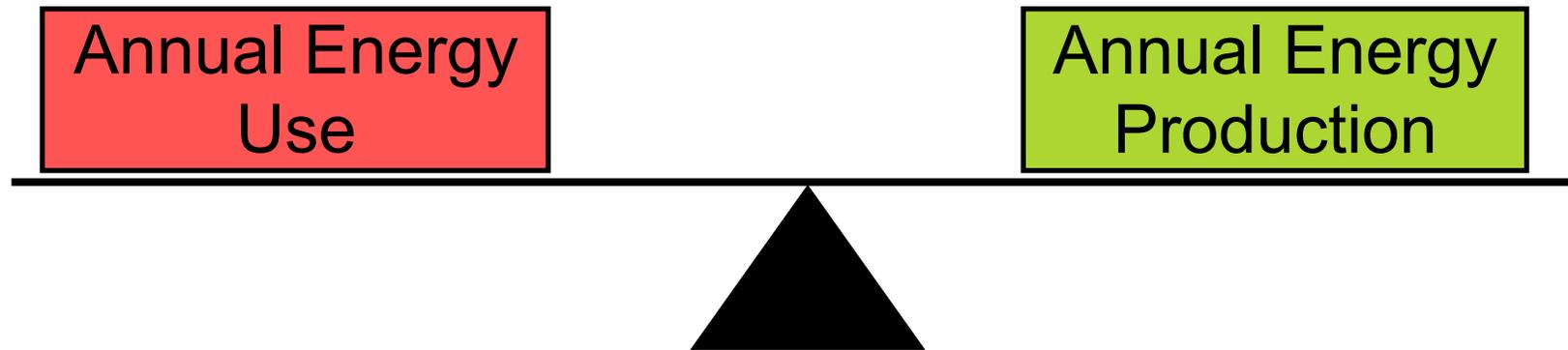
zeph·yr \ˈzef-ər\ *n* [M] **zephyr** (personified), fr. *L* *zephyrus*, god of the west wind (fr. *Gk* *Zephyros*, fr. *zephyros*), & *zephyr*, fr. *Gk* *zephyros* west wind, *zephyr*] (bef. 12c) **1** : a breeze from the west **2** : a gentle breeze **3** : any of various weight fabrics and articles of clothing

Zeph·y·rus \ˈzef-ə-rəs\ *n* [*L*] : the Greek god of the west wind

zep·pe·lin \ˈzep-(ə-)lən\ *n* [Count Ferdinand von Zeppelin] (1852) **1** : a rigid airship consisting of a cylindrical trussed and covered framework supported by internal gas cells; *broadly* : AIRSHIP

¹*ze·ro* \ˈzē-(,)rō, ˈzi(ə)r-(,)ō\ *n, pl zeros also zeroes* [*F* or *It*; *F* *zero*, fr. *ML* *zephirum*, fr. *Ar* *ṣifr*] (1604) **1** **a** : the arithmetical symbol 0 or Ø denoting the absence of all magnitude or quantity **2** **TIVE IDENTITY**; *specif* : the number between the set of all negative numbers and the set of all positive numbers **3** **c** : a value of an independent variable that makes a function equal to zero (< +2 and -2 are





Annual purchased energy = **Annual exported energy**



Definitions

Net-Zero Energy
Carbon
Electricity
Lifestyle



See <http://task40.iea-shc.org/>

Primary, or site?

As designed, As built, As operated?



When will NRCan recognize a Net-Zero Home?

Build a R-2000 home... that also uses zero energy.

