

# Net Zero Renovations

Pilot Program Development, Launch, Results





# Today's Webinar

1. 15 minute introduction to project plan & results to date: **Marie Hanchet**
2. 15 minute training review: **Gary Sharp**
3. 45 minutes PANEL discussion with **3 NZ Renovators & NZ Energy Advisor**
4. 15 minutes Question & Answers on NZ Renos

BUT FIRST – POLL 1 & 2



# POLL

1. POLL : Who has joined us today?

2. POLL: Where are you located?

# The Objective & Original Plan

“Develop a Net Zero/ Net Zero Ready Renovation program in order to provide a pathway for owners of existing homes to achieve deep energy retrofits.”





# The Reno Working Group

**Call for applications** with terms and expectations of volunteers. Above & Beyond!  
Nothing was finalized in this without the **review** of this Renovation Working Group.



## Regular NZ RWG Volunteers

Blaise McDonald, *MAC Renovations Ltd. (BC)*  
Brad McLaughlin, *MCL Constructions Ltd. (NB)*  
Brad Sveinson, *Character Homes Ltd. (MB)*  
Dale Rott, *Effect Homes (AB)*  
Dave Butterwick, *Butterwick Construction & Carpentry Ltd (AB)*  
Derek Taylor, *Whitehall Homes & Construction (ON)*  
Luke Dolan, *Capital Home Energy (BC)*  
Nick Gazo, *NAIMA Canada (ON)*  
Peter Darlington, *Solar Homes Inc (AB)*  
Shawna Henderson, *Bluehouse Energy (NS)*  
Stephen Magneron, *Homesol (ON)*  
Steve Snider, *Steve Snider Construction (ON)*  
Gary Hamer (*Net Zero Technical Committee Rep.*)

## Additional Contributors / Guests

Bob Deeks, *RDC Fine Homes (BC)*  
Cooper Le, *4 Elements Design (AB)*  
Gord Cooke, *Building Knowledge Canada (ON)*  
Jack Zhou, *AJ Energy Consultants (ON)*  
Joe Geluch, *Naikoon (BC)*  
Peter Amerongen, *Butterwick Construction (AB)*  
Stefanie Coleman, *Pretty Smart Homes (ON)*  
Toby Smith, *Building Knowledge Canada (ON)*  
Tyler Hermanson, *4 Elements Design (AB)*  
Wil Beardmore, *Bluewater Energy (ON)*  
(and more!)

Mark Carver, *NR Can*  
Lucas Coletta, *NR Can*  
Charles Mougeot, *NR Can*  
Chris McLellan, *NRCan*



# Net Zero Renovator Tools & Training



## Net Zero Energy Renovations: The Ideal Candidate House Checklist

These 9 characteristics help you and your client determine whether a house is a good candidate for a Net Zero Energy Renovation or not. The more characteristics you can check off, the better. When you can only check off a few characteristics, the house is better suited to a different approach to renovating for energy conservation.

<input checked="" type="checkbox"/> Pre-1980s Construction	<input checked="" type="checkbox"/> Simple House Shape
<input checked="" type="checkbox"/> Simple Roof Shape	<input checked="" type="checkbox"/> Southerly Roof Face
<input checked="" type="checkbox"/> No Recent Major Upgrades	<input checked="" type="checkbox"/> Low Deferred Maintenance

When a house meets the checklist, then assess:

- The performance of the house
- The IAQ
- The level of mold mitigation
- Radon testing/mitigation strategy
- Hazards: asbestos, or knob and tube wiring
- Ventilation

## Occupant Comfort Questionnaire

This questionnaire is meant as a starting point to assist renovators in identifying home comfort issues to be addressed in a Net Zero renovation. It can be utilized in guiding and informing discussions between a renovator and occupant or homeowner prior to the renovation and after a renovation to ensure needs are met and can highlight benefits of Net Zero homes.

### WELL BEING

1. How long are you planning to live in this home?

2. I feel happy in my home because the layout meets my needs and suits my lifestyle:

☐ yes ☐ no ☐ neutral

Comments:

3. You feel your family is healthy in our home because the air is fresh and clean:

☐ yes ☐ no ☐ neutral

Comments:

### TEMPERATURE/DRAFTS

4. When thinking about your home in the summer, are there any rooms you find you use less, avoid, or find uncomfortable because they are too hot or muggy?

☐ yes ☐ no

If yes, elaborate

5. If applicable, in the summer, how does the basement feel/smell?

- ☐ much cooler than upstairs  
☐ damp  
☐ basement smells musty  
☐ stored items smells musty

6. Do you find you have to use additional heating appliances to keep all rooms warm?

- ☐ fireplace  
☐ heaters  
☐ space  
☐ other

Comments:

7. In the summer, does your cooling system provide you with a desirable temperature in all rooms?

- ☐ never  
☐ sometimes  
☐ most of the time  
☐ all the time

## EXTERIOR RENOVATION CHECKLIST



### STAGE 1

DETERMINE ENERGY MODEL OF EXISTING HOME



### STAGE 2

DETERMINE RENEWABLE ENERGY GENERATION CAPACITY

### STAGE 3

INSULATION / AIR TIGHTNESS / MECHANICAL VENTILATION

- Add exterior insulation from the ground up
- Define control layers (air/vapour/thermal/weather)
- Add balanced whole house mechanical ventilation

ASSESSMENT / LANDSCAPING

- Make sure drainage is appropriate
- Keep trees and landscape, if needed

### STAGE 4

SPACE CONDITIONING & DOMESTIC HOT WATER

- Replace mechanical equipment, upgrade delivery system and controls

### STAGE 5

RENEWABLE ENERGY

- Install renewable and add battery storage (optional)

FOR MORE INFORMATION VISIT NETZERORENOS.COM

## SOLAR PRODUCTION ESTIMATOR FOR RENOVATORS

Intent: These calculations are meant to be very basic in nature and provide a rough estimate to determine if a home could have sufficient roof space to model solar for a Net Zero or Net Zero Ready Project. These calculations are intended to allow a renovator to perform a preliminary evaluation to determine if a Net Zero renovation could be feasible prior to consulting an Energy Advisor or professional PV designer. These calculations use general values and assume photovoltaics are performing optimally.

Estimate the usable roof surface area for solar panels in ft<sup>2</sup>. Usable roof space =  ft<sup>2</sup>

Determine the energy production per unit area annually for an ideally oriented array by using the calculation below:

$$\frac{\text{ft}^2 \div 13 \text{ GJ/ft}^2}{\text{yr}} = \text{GJ/yr (optimal)}$$

Use the energy production based on the orientation of the array. Use the "solar energy yield" percentage in the chart below that most appropriately represents the orientation of the usable roof space for PV.

$$\text{GJ/yr (optimal)} \times \frac{\text{GJ/yr (estimated)}}{\text{GJ/yr (optimal)}} = \text{GJ/yr (estimated)}$$

For roof pitches between 4:12 and 12:12 should use the angled values as pictured (4.0, 6.0, 8.0).

NOTE: >40 GJ/yr is a fair target for NZ and NZR projects.

Content courtesy of Will Beardsmore from:



netzero home  
The ultimate in comfort and efficiency



# Value of High Performance

## Calculating the Value of Net Zero Energy Renovations

CHBA has been working with the Appraisal Institute of Canada to bring best practices from the US Appraisal Institute's Green and Energy Efficient Addendum to Canada.

Once the full approach is approved for pilot, renovation pilot participants can opt to receive pre-renovation and post-renovation appraisals of their homes, noting the increased value from a Net Zero Renovation, specifically focusing on **energy cost**

**savings.**  
**Example:**

\$2,000/yr utility savings → \$40,000 increased home value?

## Challenge with comparables; Energuide & MLS

[illegible]



# PILOT CRITERIA

## 1. Minimum Requirements for NZ Reno Labels (pilot)

- ☐ Pre-Renovation ERS report
- ☐ Post-Renovation ERS report
- ☐ PV checklist
- ☐ Photos

## 2. Additional Information Request

- ☐ Disclose cost of renovation with the program to share publicly or confidentially?
- ☐ Disclose utility bills pre and post renovation to share publicly or confidentially?
- ☐ Disclose the funding tools/mechanisms used to finance the renovation publicly or confidentially?
- ☐ Have photographs taken pre, post and during renovation to share publicly or confidentially?
- ☐ Have thermal imaging photos taken pre and post renovation to share publicly or confidentially?
- ☐ Participate in pre and post appraisals to share publicly or confidentially?
- ☐ Complete a home comfort questionnaire pre and post renovation to share publicly or confidentially?
- ☐ Provide feedback and a testimonial post renovation to share publicly or confidentially?



# 1<sup>st</sup> Net Zero Reno Approved by Technical Committee!



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## CHBA Qualifies First Home with Net Zero Energy Renovation Label

**Ottawa – July 30, 2020** – The Canadian Home Builders' Association (CHBA) is pleased to announce the first renovation labelled under its recently launched Net Zero Energy Renovation Labelling Program Pilot. The pilot project is a RenoMark member Solar Homes Inc. of Calgary, Alberta, was originally built in 1985 and now has achieved Net Zero Energy (NZE) status.

Net Zero Energy (NZE) homes produce at least as much energy as they consume on an annual basis. NZE homes built and labelled in Canada under CHBA's program since 2016, achieving net zero energy status with many additional challenges.

"Homes built to code today are much more efficient than they were in the past. For that reason, retrofits necessary to make substantial improvements to residential sector greenhouse gas emissions (GHGs). The Net Zero Energy Renovation Labelling Program supports continued improvement in the performance of homes, which is where we need to focus to address climate change when it comes to housing—and of course, the benefits of net zero housing, like lower energy bills and greater comfort for homeowners," said CHBA President Peter Darlington.

Solar Homes Inc. President Peter Darlington and his team are excited about being the first to achieve Net Zero Energy (NZE) status. The renovation focused on retrofitting the exterior of the home, with the result being occupants and results in an extremely comfortable home. In addition to decreasing the home's energy consumption by \$2,500 lower than before – the renovation has resulted in completely netting out the home's GHGs emissions per year.

The accomplishment is perhaps even more meaningful because Peter is the homeowner. As such, he can now decrease in energy bills and enjoy the improvements to the home's comfort. The Solar Homes Inc. team is proud to grow their business and is sharing details of the project to help other renovators who are interested in achieving Net Zero Energy status.

**NET ZERO RENOVATIONS PILOT HOME**

<b>Renovator</b> Peter Darlington, Solar Homes Inc.	<b>Service Organization</b> Envision
<b>Energy Advisor</b> Cooper Lee, 4 Elements Integrated Design LTD.	<b>Net Zero Pilot Home</b> Calgary, AB (Climate Zone 6)

GHG Emissions -  
**14 TONNES /YR**

**BEFORE RENOVATIONS**

**167 kWh/m²**

**AFTER RENOVATIONS**

GHG Emissions -  
**0 TONNES /YR**

**AFTER RENOVATIONS**

**NET ZERO RENOVATIONS PILOT HOME POST-RENOVATION DETAILS**

<b>BUILDING ENCLOSURE</b> Windows: Lux Windows & Glass, Triple Glazed Low-E Walls: R16 EPS, R12 Batt Ceiling: R60 Blown Foundation: R20 Batt Envelope: 35% better than NRCan reference house Airtightness (ACH @ 50 Pa): Pre-reno 4.55 → Post-Reno 1.27	<b>MECHANICALS</b> Fuel Source: All Electric Heating & Cooling: Mitsubishi ASHP & Electric Furnace Water Heating: Electric heat pump Ventilation: Nu-Air HRV
<b>RENEWABLE ENERGY</b> PV System: 15.6 kW Hanwha & CanSolar array Energy Monitor: Neurio	

**Testimonial**

"I started planning a fairly typical renovation and stumbled across an article that was talking about net zero. A lightbulb went off. I realized that I could generate all my own energy for the rest of my life. Not only is it cost-effective, but the home is more comfortable: year-round spring fresh air, consistent temperatures everywhere, no bugs, no outside noises, and virtually no energy bills for the home and [electric] car!"

**\*Estimated \$2,500/yr SAVED On energy bills!**

\*Utility cost savings based on 2019 utility profiles and assumes the following utility rates: Natural Gas: \$4.25/G plus carbon price: \$11.85/G; 44¢/month admin. Electricity: 4.17¢/kWh electricity plus 45¢/month admin.

2,154 followers

"I started planning a fairly typical renovation and stumbled across an article that was talking about net zero. A lightbulb went off. I realized that I could generate all my own energy for the rest of my life," explains Peter Darlington, president of Solar Homes Inc., the first RenoMark member to renovate under the Net Zero Energy Renovation Label Pilot.

For information about the labelling program and more, visit [netzerorenos.com](http://netzerorenos.com)

#chbanetzero #chbanetzeroreno #energyefficiency #sustainability #calgary #renomark Natural Resources Canada | Resources naturelles Canada | 4 Elements Integrated Design LTD | #Envision

**Home energy savings**

OF THE FIRST CHBA-LABELLED NET ZERO HOME RENOVATION

By **SOLARHOMES INC.**

Reduction in energy consumption

**73%**

Decrease in heat usage

**86%**

LEARN MORE AT [NETZERORENOS.COM](http://NETZERORENOS.COM)

# Net Zero Renovator Training

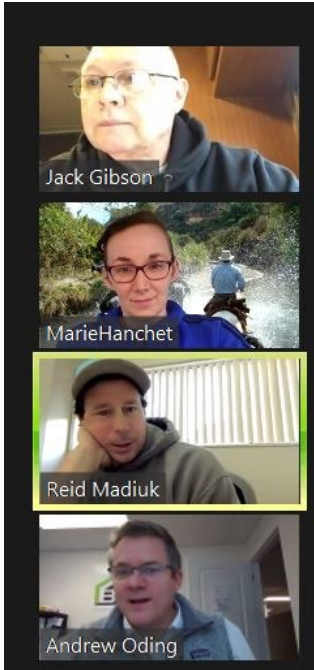
- Adjusted to ONLINE Training (COVID)
- Andy Oding as Trainer. Included Train-the-Trainer sessions with reviews from other NZ Trainers
- 4 NZ Reno training sessions total
- Updates between each delivery, refining the process and material
- 8 hours of content; delivered in 6 hours \*Pre-requisites trade-off\*
- Feedback & Exam
- Cross-promoted NRCan LEEP for Renos (Dec 2020)

**Result: Almost 140 trained**

**Next: Requests from municipalities to offer this**



# BONUS: Training Reviews



- Anyone with **follow-up questions** after the initial online training session and exam could sit in on one of three follow-ups.
- We made **changes to the Exam** based on this feedback.

# BONUS 2: Reno Working Group: Ask the Expert!

About the project form

NZ RWG solution session

Report back potential solutions and collective wisdom.



**Net Zero Renovation Ask the Experts Form**

Objective: To speed up learnings, the NZ Reno pilot is offering to review NZ Reno challenges and have the Net Zero Reno Working Group share their learnings from past deep energy retrofits experiences, offering potential solutions.

Instructions: CHBA members who took the Net Zero Renovation course can submit this completed form to [Marie.Henderson@chba.ca](mailto:Marie.Henderson@chba.ca) to have questions on NZ Renovations reviewed and answered by the Net Zero Reno Working Group subject matter experts. Either CHBA National staff or a member of the Net Zero Reno Note: As this is a voluntary advisory activity for the Net Zero Renovation Working Group, we may not be able to answer all questions directly, if there is significant overlap.

Please provide as much detail as possible on your project.

Name: \_\_\_\_\_

Company Name: \_\_\_\_\_ City & Province: \_\_\_\_\_

Email Address: \_\_\_\_\_ Phone Number: \_\_\_\_\_

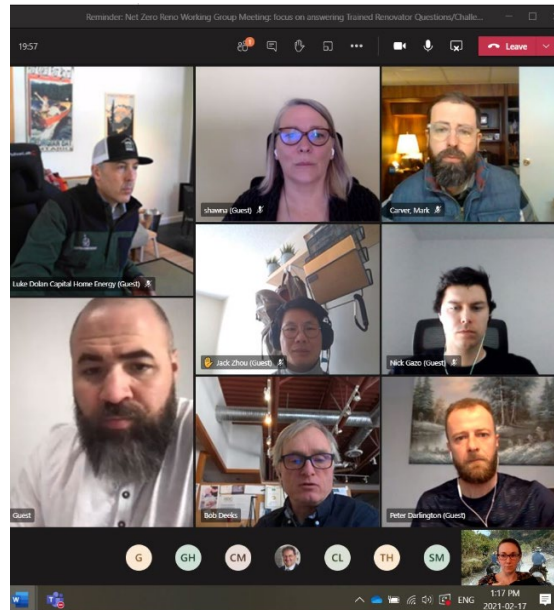
Home Pre-Renovation Description & optional Picture: \_\_\_\_\_

Occupant Goal: \_\_\_\_\_

Renovation work to date: \_\_\_\_\_

Challenge/ Question: \_\_\_\_\_

For more information and news on the Net Zero Renovation Pilot visit [www.netzerohome.ca](http://www.netzerohome.ca) or follow [@netzerohome](#) on LinkedIn



# RESULTS → LABELLED HOMES RENOVATED



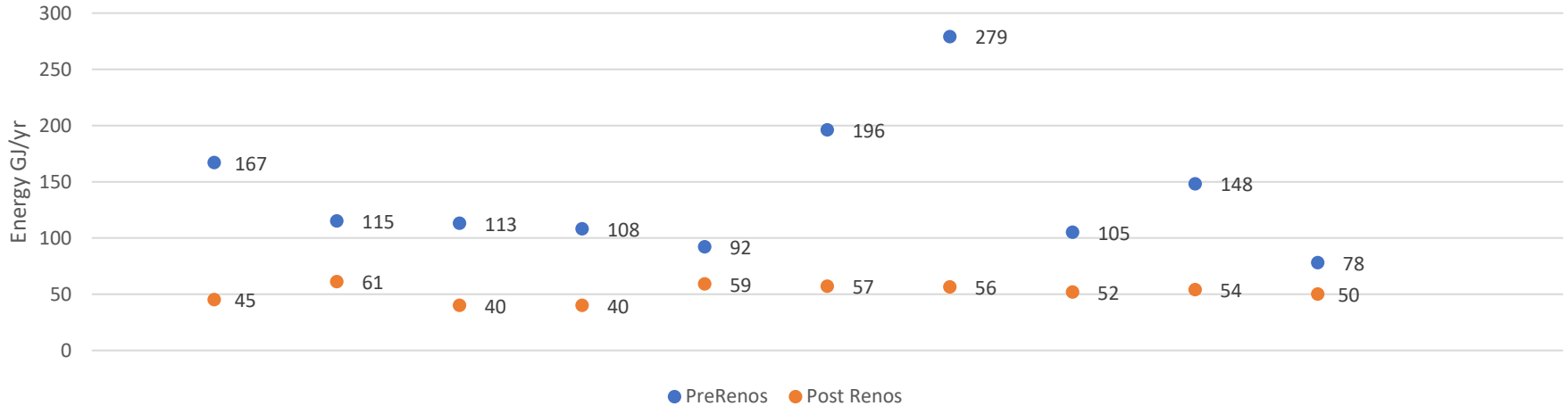
BC, AB, ON well represented.

Missing prairies  
& Atlantic  
Canada

**Climate Zones:**  
4, 5, 6, 7a

# HOME GJ \* (not Net GJ)

Home Energy Comparison

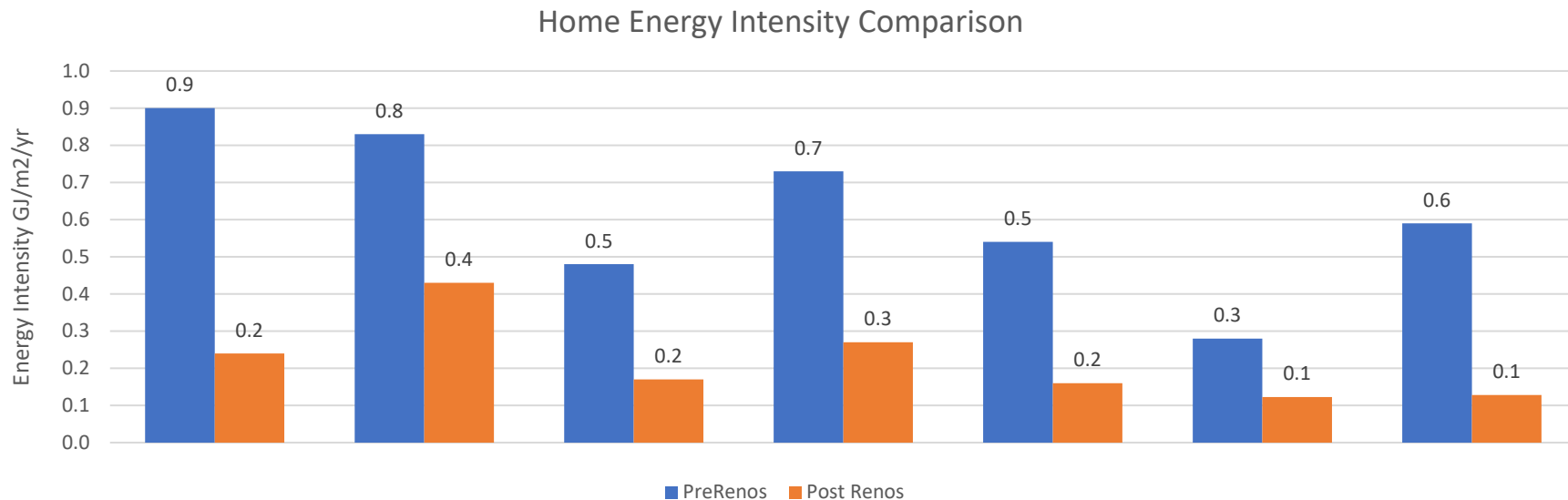


36% - 80% improvement in building & mechanicals energy consumption!!!

Some renos with home additions incorporated.

NOTE: When incorporating PV; 3 homes overproducing (All Alberta)

# HOME Energy INTENSITY \* (not net GJ)



EUI improvements of 47% to 80%



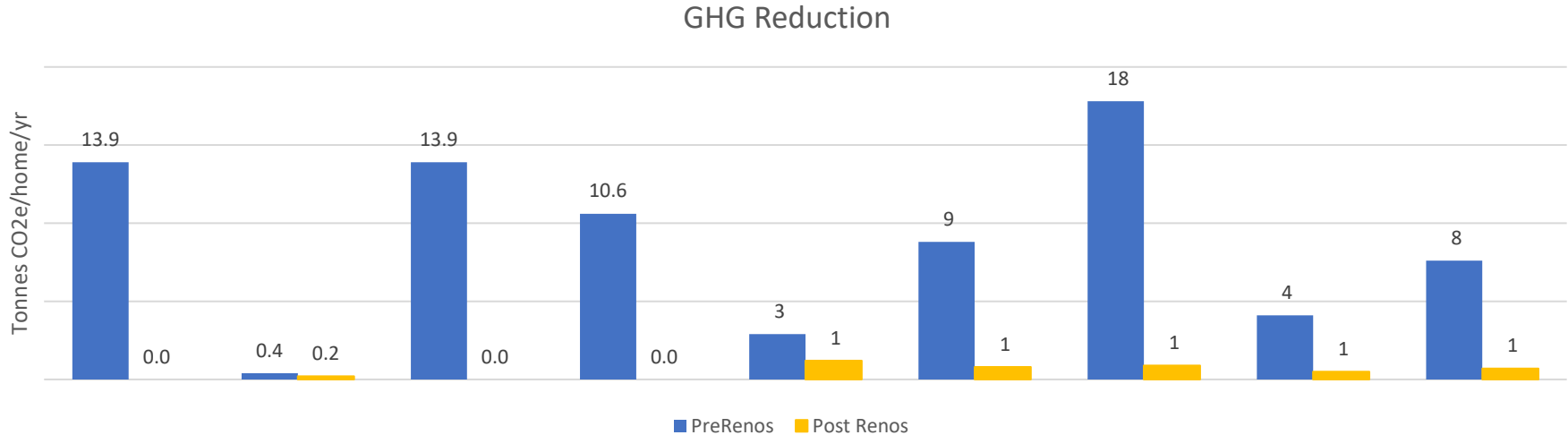


# Fuel Choice Commentary

- 6 of 10 NZ/NZ ready renovations were **all-electric**. Of these:
  - 2 were all electric prior to the renovation
  - 4 transitioned from natural gas/oil completely
- 1 home kept 1GJ of **natural gas as a backup** heating source out of precaution
- 2 homes had been using **oil** → transitioned to **all-electric, electric & propane**
- 1 home kept NG/electric in renovation



# GHG in NZ/NZr renos



Annual GHG reduction ranged from **0.2 tonnes/yr** to **17 tonnes/yr per home**. (H2K/ERS)

**Why?!**

- Fuel choices
- Utility grid emission factors (how clean is it?)



# Energy Costs\*\*\*

Energy Costs calculations continue to be reviewed for the latest projects that came in (MONDAY March 21<sup>st</sup>) but...

- Often around **\$2K/yr**
- 1 project was **no change** energy cost pre & post reno energy costs
- Largest reduction was almost **\$7K/yr**

Details with full assumptions on rates & charges on each NZ Reno Profile at [netzerorenos.ca](http://netzerorenos.ca)

↓ in energy (GJ) DOES NOT necessarily equal ↓ energy cost or ↓ GHG emissions



# What's next for NZ Renos...

- Gather remaining details for a summary report for NRCan.
  - Appraisal pilot results & changes
  - Actual pre/post energy data
  - Homeowner comfort survey responses
- Adaptation of the program **and implementation of version 1!**
- **Training** where municipalities have requested it.
- Best practice in working with Trades on NZ Renovations
- Online quiz for homeowners to self-identify as being an ideal candidate for a NZ Renovation
- Potentially ongoing support of “**Ask the expert**” for new to Net Zero Renovators

Contact Marie Hanchet, Project Manager Net Zero Energy Housing

# Gary Sharp - Technical and Training

- CHBA Net Zero Renovator Requirements
- Why RenoMark ?
- Why Training?
- Differences in Technical Requirements NZ & NZ Renos
- Pilot Training – How was it received?
- Status of Builders' and Renovators' Manuals



# Net Zero Panelists Introductions

Download the NZ Reno Profiles for Solar Homes (there are two!), Steve Snider Construction (1 posted; 1 pending), CCR (to be posted soon) from NetZeroRenos.ca



**Angela Bustamante**  
Dir. of Technical & Builder Services  
Building Knowledge Canada



**Peter Darlington**  
Owner  
Solar Homes Inc.



**Peder Madsen**  
Owner  
CCR Build + Remodel Inc.



**Steve Snider**  
Owner  
Steve Snider Construction Inc.

# PROFILES: Peter Darlington, Solar Homes

NET ZERO RENOVATION PILOT HOME  
SOLARHOMES INC.

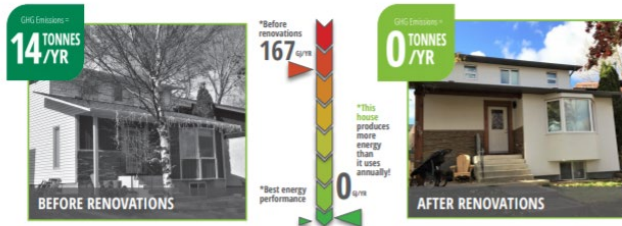


**Renovator** Peter Darlington, Solar Homes Inc.

**Service Organization** Envision

**Energy Advisor** Cooper Lee, 4 Elements Integrated Design LTD.

**Net Zero Pilot Home** Calgary, AB (Climate Zone 6)



## NET ZERO RENOVATIONS PILOT HOME POST-RENOVATION DETAILS

### BUILDING ENCLOSURE

**Windows:**  
Lux Windows & Glass, Triple Glazed Low-E

**Walls:**  
R16 EPS, R12 Batt

**Ceiling:**  
R60 Blown

**Foundation:**  
R20 Batt

**Envelope:**  
35% better than NRCan reference house

**Airtightness (ACH @ 50 Pa):**  
Pre-reno 4.55 → Post-Reno 1.27

### MECHANICALS

**Fuel Source:**  
All-Electric

**Heating & Cooling:**  
Mitsubishi ASHP & Electric Furnace

**Water Heating:**  
Electric heat pump

**Ventilation:**  
Nu-Air HRV

### RENEWABLE ENERGY

**PV System:**  
15.6 kW Hanwha & CanSolar array

**Energy Monitor:**  
Neurio

### Testimonial

"I started planning a fairly typical renovation and stumbled across an article that was talking about net zero. It was like a lightbulb went off. I realized... I could generate all my own energy for the rest of my life. Not only is it cost-effective, but the home is more comfortable year-round spring fresh air, consistent temperatures everywhere, no bugs, no outside noises, and virtually no energy bills for the home and [electric] car!"

\*(Estimated)  
**\$2,500 /yr  
SAVED**  
On energy bills\*

NET ZERO RENOVATION PILOT HOME



SOLARHOMES INC.

**Renovator** Peter Darlington, Solar Homes Inc.

**Service Organization** 4 Elements Integrated Design

**Energy Advisor** Cooper Lee, 4 Elements Integrated Design

**Net Zero Pilot Home** Calgary, AB (Climate Zone 6)



## NET ZERO RENOVATIONS PILOT HOME POST-RENOVATION DETAILS

### BUILDING ENCLOSURE

**Windows:**  
Lux Windows & Glass, Triple Glazed Low-E

**Walls:**  
R24 EPS added to exterior

**Ceiling:**  
1.5" 2lbs spray foam, R60 Blown in

**Foundation:**  
R20 XPS added to exterior (to 12" below grade)

**Envelope:**  
34% better than NRCan reference house

**Airtightness (ACH @ 50 Pa):**  
Pre-reno 5.22 → Post-Reno 1.79

### MECHANICALS

**Fuel Source:**  
All-Electric

**Heating & Cooling:**  
Daikin ASHP & Electric Furnace

**Water Heating:**  
Electric heat pump

**Ventilation**  
Greentek PH7.15ES

### RENEWABLE ENERGY

**PV System:**  
12.7 kW Canadian Solar PV array

**Energy Monitor:**  
Sense

### Homeowner Testimonial

"As a scientist, I had become very uncomfortable with my carbon footprint, and had decided it was important to me to get my home to net-zero. Solar Homes was easy to work with, straightforward with their advice and approach to the problems we encountered, and I am happy and excited to have achieved my goal (and the house looks great)."

\*(Estimated)  
**\$2,800 /yr  
SAVED**  
On energy bills\*

## 2 NZ Renos in Calgary, AB



# PROFILES: Steve Snider

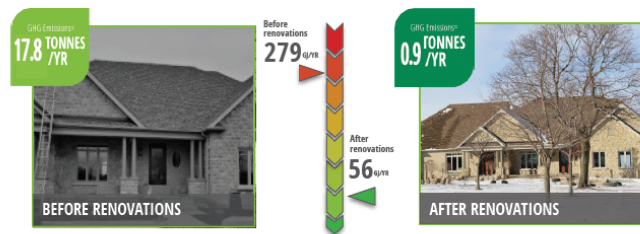
NET ZERO RENOVATION PILOT HOME

The ultimate in comfort and efficiency

STEVE SNIDER CONSTRUCTION INC.

Renovator Steve Snider Construction
Service Organization EnerQuality Inc.

Energy Advisor Angela Bustamante, Building Knowledge Canada
Net Zero Pilot Home Nestleton Station, ON (Climate Zone 6)



## NET ZERO RENOVATIONS PILOT HOME POST-RENOVATION DETAILS

### BUILDING ENCLOSURE

**Windows:**  
Triple Glazed, low SHGC

**Walls:**  
R30, closed cell spray foam

**Ceiling:**  
R70, closed cell spray foam + cellulose

**Envelope:**  
35% better than NRCan reference house

**Airtightness (ACH @ 50 Pa):**  
Pre-reno 3.00 → Post-Reno 0.7

### MECHANICALS

**Fuel Source:**  
Dual Fuel

**Heating & Cooling:**  
Ground Source Heat Pump, Hydronic radiant floor heating

**Water Heating:**  
NTI Propane Boiler

**Ventilation:**  
VanEE ERV G2400 ECM

### RENEWABLE ENERGY

**PV System:**  
10 kW PV array

### Homeowner Testimonial

"We decided to completely renovate our existing house as it was drafty, cold in the winter, hot in the summer, and the finished basement felt cold and damp. We also liked the idea of having a net zero home but thought we would have to start with a new build to achieve this. We didn't want to move, or completely demolish our house. We met with Stephen Snider and he identified the areas that needed to be addressed to help us achieve a Net Zero home. His knowledge and attention to detail far exceeded our expectations and he combined the renovation with many energy efficient upgrades. Our home is now comfortable year-round, our basement is enjoyable to spend time in, our energy bills have been reduced by two-thirds, and the airtightness now exceeds R-2000 levels. Our only regret is that we did not have Steve Snider Construction build our house originally!"

Owner  
**\$6,800/m<sup>2</sup>**  
SAVED  
on energy bills\*

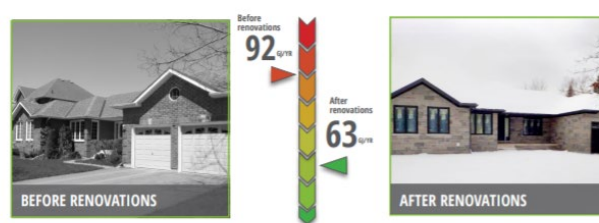
NET ZERO RENOVATION PILOT HOME

The climate in comfort and efficiency

STEVE SNIDER CONSTRUCTION INC.

Renovator Steve Snider Construction
Service Organization EnerQuality Inc.

Energy Advisor Angela Bustamante, Building Knowledge Canada
Net Zero Pilot Home Uxbridge, ON (Climate Zone 6)



## NET ZERO RENOVATIONS PILOT HOME POST-RENOVATION DETAILS

### BUILDING ENCLOSURE

**Windows:**  
PELLA Windows Triple Glazed, UVI 2, SHGC 0.23

**Walls:**  
2x6 @ 16" R24 BIBS + R5 EPS

**Ceiling:**  
R70 blown-in attic

**Foundation:**  
Offset framing, 5" closed cell spray foam

**Envelope:**  
34% better than NRCan reference house

**Airtightness (ACH @ 50 Pa):**  
Pre-reno 2.96 → Post-Reno 0.8

### MECHANICALS

**Fuel Source:**  
Dual Fuel

**Heating & Cooling:**  
Temprostar ASHP & Keeprite Natural Gas Furnace

**Water Heating:**  
Natural gas boiler / radiant infloor

**Ventilation:**  
Lifebreath 130ERVD

### RENEWABLE ENERGY

**PV System:**  
16.3 kW modelled PV array

**Energy Monitor:**  
Blue Line Innovations

### Testimonial

"Our clients discovered a re-sale bungalow on a desired property that we agreed would be suitable for their renovation. Their official request was, 'We want this home to be as comfortable as the Net Zero ready home you built for our friends.' Challenge accepted! Armed with the knowledge of good building science, proper HVAC selections and an efficient airtight building envelope, we were able to increase the living space by 1276 sqft while lowering the energy consumption substantially and improving the home's comfort level. When asked how they liked their new home the response was, 'It just feels good.'" - Stephen Snider

Owner  
**\$310/m<sup>2</sup>**  
SAVED  
on energy bills\*

2 NZr Renos  
East of GTA, ON



# PROFILES: Peder Madsen, CCR Build + Remodel

NET ZERO  
RENOVATION  
PILOT HOME



CCR BUILD+REMODEL  
CREATING HOME

Renovator Peder Madsen, CCR Build + Remodel

Service Organization Envirocentre

Energy Advisor Toby Smith, Building Knowledge Canada

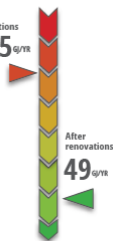
Net Zero Pilot Home Denfield, ON (Climate Zone 5)

GHG Emissions:  
4.1 TONNES /YR



BEFORE RENOVATIONS

Before renovations  
105 g/YR



After renovations  
49 g/YR

GHG Emissions:  
0.5 TONNES /YR



AFTER RENOVATIONS

## NET ZERO RENOVATIONS PILOT HOME POST-RENOVATION DETAILS

### BUILDING ENCLOSURE

#### Windows:

Strassberger triple glazed

#### Walls:

R20 spray foam,  
R12 rockwool comfort batt

#### Ceiling:

R40 spray foam

#### Foundation:

R10 XPS + R14 Rockwool Comfort batt

#### Envelope:

58% better than NRCan reference house

#### Airtightness (ACH @ 50 Pa):

Pre-reno 1.76 → Post-Reno 0.42

### MECHANICALS

#### Fuel Source:

Dual Fuel

#### Heating & Cooling:

Carrier ASHP + Natural Gas Furnace

#### Water Heating:

AO Smith Heat Pump

#### Ventilation:

Carrier ERV

### RENEWABLE ENERGY

#### PV System:

12 kW modelled PV array

#### Energy Monitor:

Wiser Energy Square D

1 NZr → NZ Southern ON

1 more in progress (no profile yet)







# POLL

- **POLL: What do you think motivates homeowners to go through deep energy renovations?**
  - GHG reductions
  - Energy cost savings
  - Incentive programs
  - Comfort
  - Climate resilience
  - Add-on while doing other renovations
  - Other (put it in the chat)



# Panelists

1. Tell us a little the Homeowner Motivations / Goals
2. Tell us a about the approach & wall systems/envelope used
3. Tell us a about the mechanical selected and fuel selection
4. Tell us a about your experience working with an energy advisor
5. Tell us when a renovator should engage an EA for a project & why
6. Tell us the value of working with an energy advisor
7. Tell us a about solar PV decisions made & battery storage
8. AIR TIGHTNESS: Was 1.5 ACH a challenge?
9. What did the homeowner or neighbours say about the renovation PROCESS or feedback at the end of the reno?



# POLL

- **POLL: What do you think prevents homeowners from deep energy renovations?**
  - The value isn't clearly communicated
  - Too costly / not enough financing available
  - Confusing
  - Concerned about return on investment
  - Chasing incentives only
  - Other (put it in the chat)



# POLL

- **Renovators**: do you think your team has the education and experience to deliver Net Zero Renovations to a customer today?
  - Yes
  - No
  - Not yet, but they will!
  - Other (put it in the chat)



# Q&A

Do you have questions?

We might have answers.



# Thank you

Thanks for your interest in building up capacity for safe, affordable Net Zero Renovations for Canadian homes.

Thank you to our Net Zero webinar sponsor, Owens Corning

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