



TOWARDS NET ZERO RENOS



CASE STUDY



The Apple Land Ranch project is one of the first 100 Net Zero home renovations in Canada. We added approximately 1000 Square Feet to the home footprint. Windows and doors were expanded to permit plenty of natural light, including reframing the roof to incorporate a series of clerestory windows.

PROJECT PRIORITIES

- Passive Lighting/Shading
- 100% Electrification
- Optimal Air Tightness - Achieved 0.8 ACH
- Aging in Place Designs
- Blend in with Local Setting

RENOVATOR: V & V Homes Ltd

ENERGY ADVISOR/SERVICE ORGANIZATION: Homesol Building Solutions

TARGET: Net Zero Home Renovation

ENERGY REDUCTION: 100.0%

YEAR BUILT: 1971

YEAR RETROFIT COMPLETED: 2024

LOCATION: London, ON

HOUSE TYPE: Single Detached

SIZE: 1807 sq.ft.

CLIMATE: Zone 5, 3809 HDD

UPGRADES INCLUDE

Above Grade Walls / Garage Wall

Ceiling with Attic Space

Cooling & Heat Pumps

Domestic Water Heater

Foundation Wall

On-site Generation and Storage

Principle Ventilation

Space Heating

Windows & Sliding Glass Doors



TOWARDS NET ZERO RENOS



NET ZERO PLAN

BEFORE

ENERGY CONSUMPTION

110 GJ/year

COMFORT

Damp basement, high heating and cooling costs, poor layout

BUILDING CONDITION

Built in the 1960s, 800 square feet. 6.3 ACH.

RENEWABLES

None

WALL INSULATION

R12 batt

CEILING INSULATION

R20 batt

FOUNDATION INSULATION

None

WINDOWS

Double glazed (U-val=3.14, SHGC=0.43)

VENTILATION

None

HEATING

95.0% AFUE furnace

COOLING

13.00 SEER A/C

HEAT LOSS & GAIN

HL: 31042 Btu/h, HG: 16851 Btu/h

HOT WATER

0.70 EF natural gas induced draft fan

AFTER

0 GJ/year

Spacious, natural light, open concept, passive cooling

Increased square footage, improved air quality. 0.8 ACH.

14.98 kW Solar PV

R22 batt + 2" Polyiso (Zip) R12

R35 Closed Cell Foam + 3" Polyiso R17

R-12+10

U-1.31 0.43

75.0% SRE HRV

3.60 COP air source heat pump, 100.0% afue furnace backup

3.77 COP air source heat pump

HL: 24252 Btu/h, HG: 29215 Btu/h

4.1 EF heat pump water heater



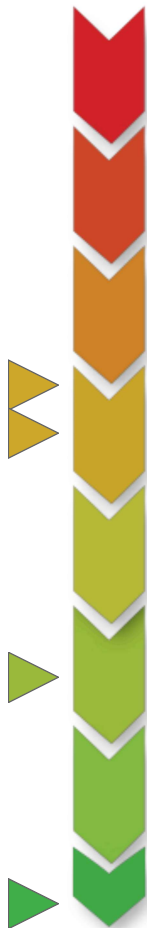
TOWARDS NET ZERO RENOS

ANNUAL ENERGY USE

Before Retrofit
110 GJ/
year
Typical New Home
98 GJ/
year

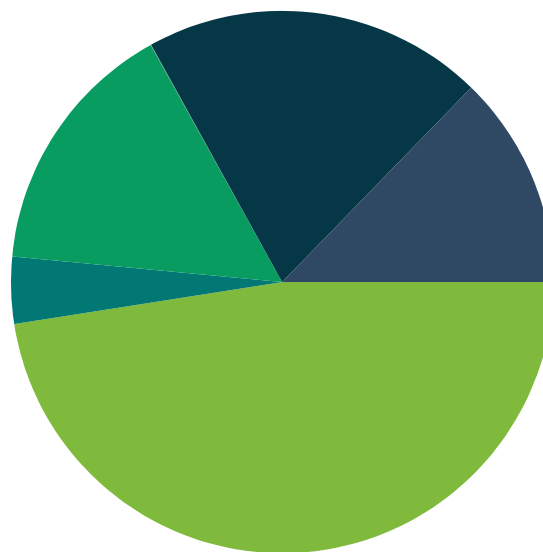
After Retrofit
49 GJ/
year

PV Production
0 GJ/
year



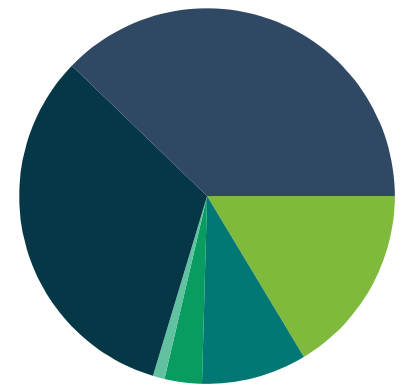
ENERGY CONSUMPTION BREAKDOWN

BEFORE RENOVATION



Space Heating
Other Electrical
Water Heating

AFTER RENOVATION



Light and appliances
Ventilation
Space Cooling

AS BUILT ENERGY PERFORMANCE

ANNUAL ENERGY SAVINGS	100.0%
GREENHOUSE GAS SAVINGS	4.30 Tonnes



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WHY ARE WE RETROFITTING OUR HOME?

The Homeowner is a builder with building science knowledge and wanted to build a home that lasts, something to pass on to future generations.

WHAT LESSONS DID WE LEARN?

For the clerestory roof, getting cantilever and sealing the roof was the hardest. It could have been solved with framing. Framing details were most impactful, as the envelope folds into the framing. We also used all exterior air barrier and had to notch the ZIP panels around rafters. Having the framing crew on-site during the blower door and smoke test was a valuable learning experience.

WHAT ELSE NEEDS TO BE DONE TO GET TO NET ZERO?

None, Net Zero achieved!



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PHOTO GALLERY - BEFORE



Kitchen - pre reno



Pre-reno



Home before reno



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PHOTO GALLERY - DURING



ZIP system panels used



Zip system used forsealing



mid-construction



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PHOTO GALLERY - AFTER



Interior finish - kitchen



V+V Homes on site with Homesol



Interior finish - living space with feature Clerestory windows above



Solar on roof



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TECHNICAL DETAIL 1



Unique clerestory roof design

chba.ca/nzrenos



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TECHNICAL DETAIL 2



Interior finish - living space with feature Clerestory windows above

chba.ca/nzrenos



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TECHNICAL DETAIL 3



A Passive design element - bringing in natural light

chba.ca/nzrenos