



TOWARDS NET ZERO RENOS



CASE STUDY



We undertook a Towards Net Zero Renovation on our 1960's semi-detached home in the Beaverbrook Area of Kanata (Ottawa) to address comfort concerns as well as safety, resiliency and energy efficiency measures. The renovation began in July 2024 and completed December 2025.

PROJECT PRIORITIES

- Comfort
- Storage
- General Aesthetics
- Safety
- Resiliency
- Cosmetics

RENOVATOR: Tilbury Integrated Design (Design/Build)

ENERGY ADVISOR/SERVICE ORGANIZATION: Building Knowledge Canada

TARGET: Net Zero Ready Home Renovation

ENERGY REDUCTION: 27.3%

YEAR BUILT: 1968

YEAR RETROFIT COMPLETED: 2025

LOCATION: OTTAWA, ONTARIO

HOUSE TYPE: Semi-detached

SIZE: 1915 sq.ft.

CLIMATE: Zone 6, 4354 HDD

UPGRADES INCLUDE

Cooling & Heat Pumps

Floor Headers

Principle Ventilation

Above Grade Walls / Garage Wall

Airtightness

Under Basement Slab

Foundation Wall

Cathedral / Vault / Flat

Windows & Sliding Glass Doors



TOWARDS NET ZERO RENOS



NET ZERO PLAN

BEFORE

ENERGY CONSUMPTION

113 GJ/year

COMFORT

The house was hot in the summer, cool in the winter and often had musty and rodent smells.

BUILDING CONDITION

Windows, and interior finishes were dated. Electrical was aluminum and needed replacement. 8.36 ACH.

RENEWABLES

None

WALL INSULATION

2X4 With R8 Batt

CEILING INSULATION

R8 Batt

FOUNDATION INSULATION

Average R8

WINDOWS

Double Glazed / Double Hung

VENTILATION

None

HEATING

96.0% AFUE furnace

COOLING

13.00 SEER A/C

HEAT LOSS & GAIN

HL: 41951 Btu/h, HG: 19067 Btu/h

HOT WATER

0.93 EF natural gas instantaneous (condensing)

ELECTRICAL PANEL SIZE

80 A

AFTER

82 GJ/year

House is much more comfortable and HRV has provided improved indoor air quality.

Updated aesthetics, modern electrical and lighting. House is safe and comfortable.

No Change

2X4 With R18 Spray Foam

R28 Spray Foam

R12 XPS + R14 Batt

Triple Glazed / Casement

75.0% SRE HRV

No Change (Currently)

No Change (Currently)

HL: 25195 Btu/h, HG: 11602 Btu/h

No Change (Currently)

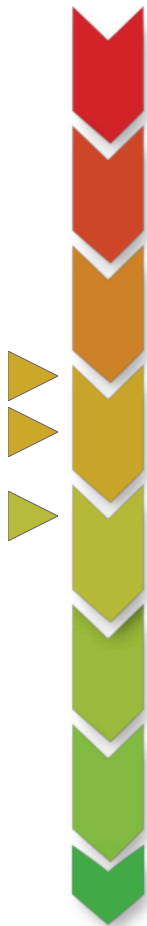
100 A



TOWARDS NET ZERO RENOS

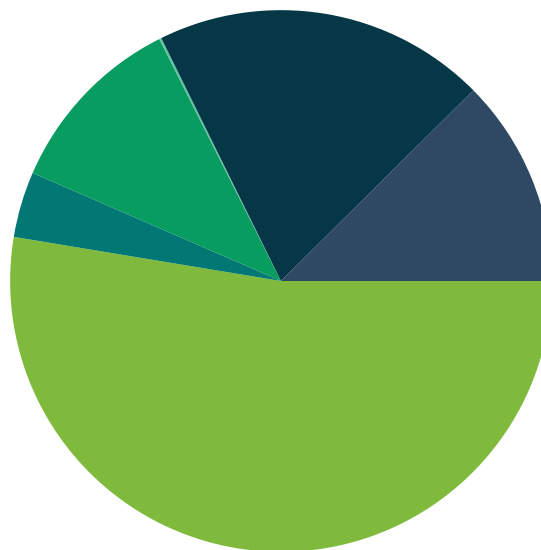
ANNUAL ENERGY USE

Before Retrofit
113 GJ/
year
Typical New Home
98 GJ/
year
After Retrofit
82 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	27.3%
GREENHOUSE GAS SAVINGS	-1.55 Tonnes
ESTIMATED COST SAVINGS	\$290.80/y
ESTIMATED UPFRONT (EMBODIED) CARBON FROM RETROFIT	7.90 Tonnes
CARBON PAYBACK* (EMBODIED INCREASE/OPERATIONAL REDUCTION)	3.50 Years



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WHY ARE WE RETROFITTING OUR HOME?

The house has served our needs but in 2019 we started to identify some areas that could be improved around comfort, storage space, safety and resiliency. Comfort was the primary driver as the house was too hot, too cold and had poor indoor air quality. We had developed many versions of renovation plans and decided on a plan that would reconfigure storage areas to increase capacity. We also addressed electrical and resiliency.

WHAT LESSONS DID WE LEARN?

Three primary lessons were learned during construction. Scheduling the project to be move in ready over the two months became extremely challenging and caused to rush some items that should have taken more care. Air tightness for semi-detached buildings with CMU shared walls is very difficult to achieve and material properties need to be considered as we've already had some of our Hemlock soffit material shrink and couple.

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

Phase 1 of the project was upgrades to the building envelope which is now complete. Phase 2 of the renovation will be to upgrade the mechanical system by installing a new Air Source Heat Pump (ASHP) with new air handler and backup heating as well as continuing to lower air tightness. We decided to delay on Phase 2 as to extend the lifespan of the current Mechanical equipment.



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PHOTO GALLERY - BEFORE



Basement Pre-Construction



Living Room Pre-Construction



Bedroom Pre-Construction



Kitchen Pre-Construction



TOWARDS NET ZERO RENOS



PHOTO GALLERY - DURING



Sliding Door Replacement & New XPS Insulation



Sub-Slab Plumbing Replacement



TOWARDS NET ZERO RENOS



PHOTO GALLERY - AFTER



Basement Post Construction



Bedroom Post Construction



Kitchen Post Construction



Living Room Post Construction