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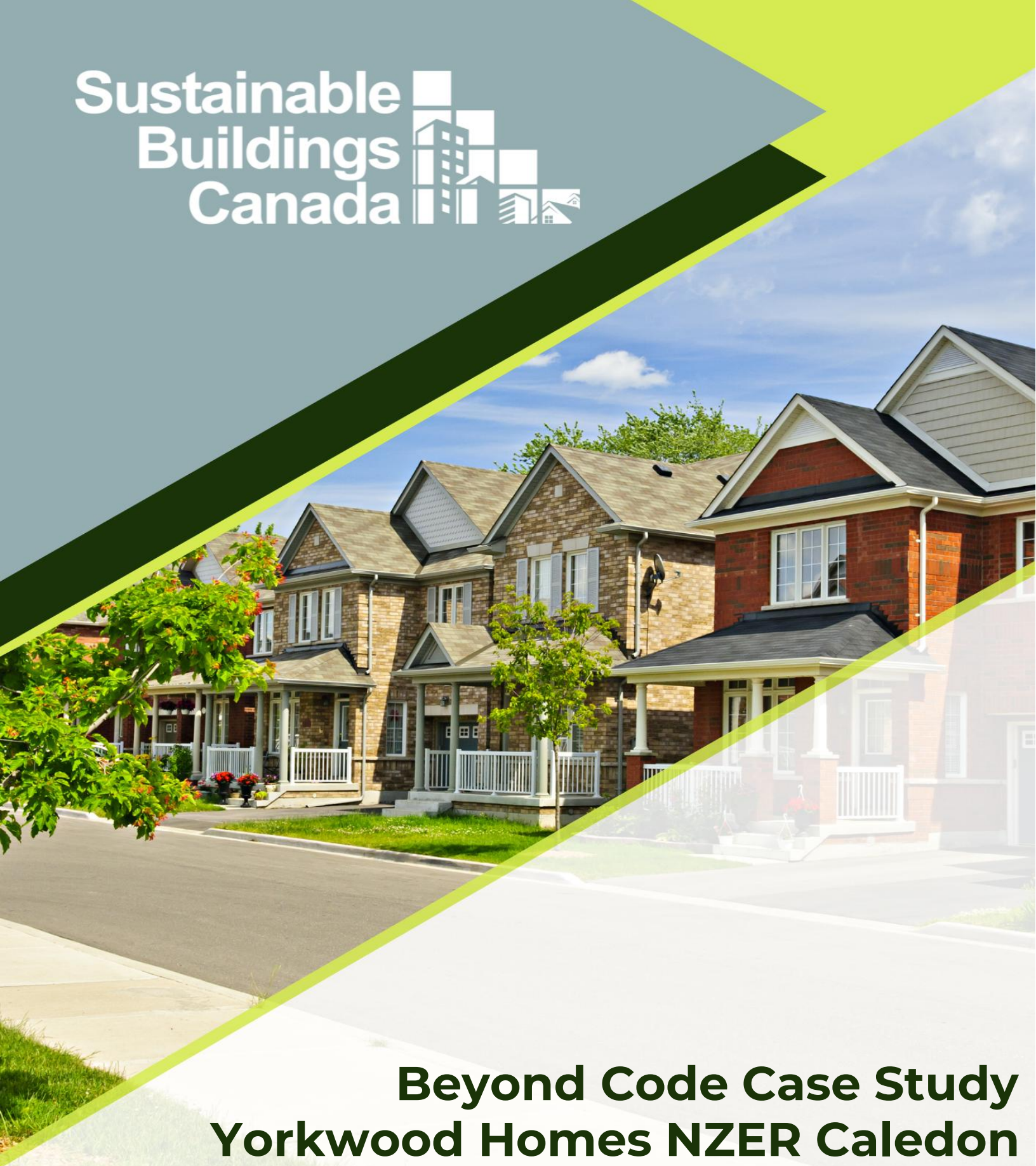

Beyond Code Case Study
Yorkwood Homes NZER Caledon

SUMMARY REPORT

DATE:
June 20, 2025

Canada

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Introduction

Sustainable Buildings Canada (SBC) is developing several Better than Code Case Studies to support the knowledge-sharing deliverables of the Natural Resources Canada Code Acceleration Fund project.

These case studies will document examples of buildings that have achieved the higher energy performance tiers of the National Building Code Section 9.36 and/or other certification systems such as net zero energy ready or net zero carbon emissions.

In this first case study, a two-storey single family attached home achieved the Canadian Home Builders' Association Net Zero Energy Ready certification label. Although the home is in Ontario, which has not adopted the National Building Energy Codes at this time, a comparative analysis has determined that this home achieves Tier 4 of the National Building Code Section 9.36. It also details additional measures that would have allowed the home to meet Tier 5 in the summary.

Additional Better than Code Case studies are being developed over the course of SBC's Codes Acceleration Fund project and will be made available on the Sustainable Buildings Canada website in the future.

Archetype Details

Building Overview

The Yorkwood Homes Model 3603 is a detached stone/brick façade, two storey detached single-family dwelling in Sharon Village which is part of the Town of East Gwillimbury, Ontario.

Key features include:

- A full height basement
- 10.5% window to wall ratio
- 403.56 ft² (37.49 m²) window Area
- Interior floor area: 3,895.3 ft² (361.88 m²)
- Below grade: 1,203.2 ft² (111.78 m²)
- Above grade: 2,692.1 ft² (250.10 m²)

Yorkwood & Laurier Homes – "Caledon Trails", Hunt Design Associates Inc

Performance Level Comparison

Table 1 showcases the energy consumption and performance of the (1) Reference Building (2) Baseline Building and (3) Net Zero Energy Ready Building. This latter is built to National Building Code Tier 4, which is the highest level of energy performance or "net-zero energy ready" (NZER).

Table 1. Reference, Baseline, and NZER Model Simulation Results

Overall Energy Performance (Estimated Solar PV Generation Potential, 62 GJ)					
Modeled Area: 3,895.3 ft² 361.88 m²	**Total Annual Projected Energy Consumption**	**Energy Utilization Intensity**	**Annual Electricity Consumption**	**Annual Natural Gas Consumption**	**Annual GHG Emissions**
Solar PV Potential 61.79 GJ	**ekWh/yr and (GJ/yr)**	**ekWh/ft²-yr (ekWh/m²-yr)**	**kWh**	**m^3**	**kg CO^2e**
Reference Building	33,693 (121)	9 (93)	9,463	2,341	4,919
Baseline/Proposed Building	28,086 (101)	7 (78)	8,949	1,849	3,959
NZER Building	17,165 (62)	4 (47)	9,943	698	1,822

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Figure 1, below, illustrates the significant reduction in energy consumption and associated greenhouse gas (GHG) emissions with the NZER Building, in comparison to the Reference Building.

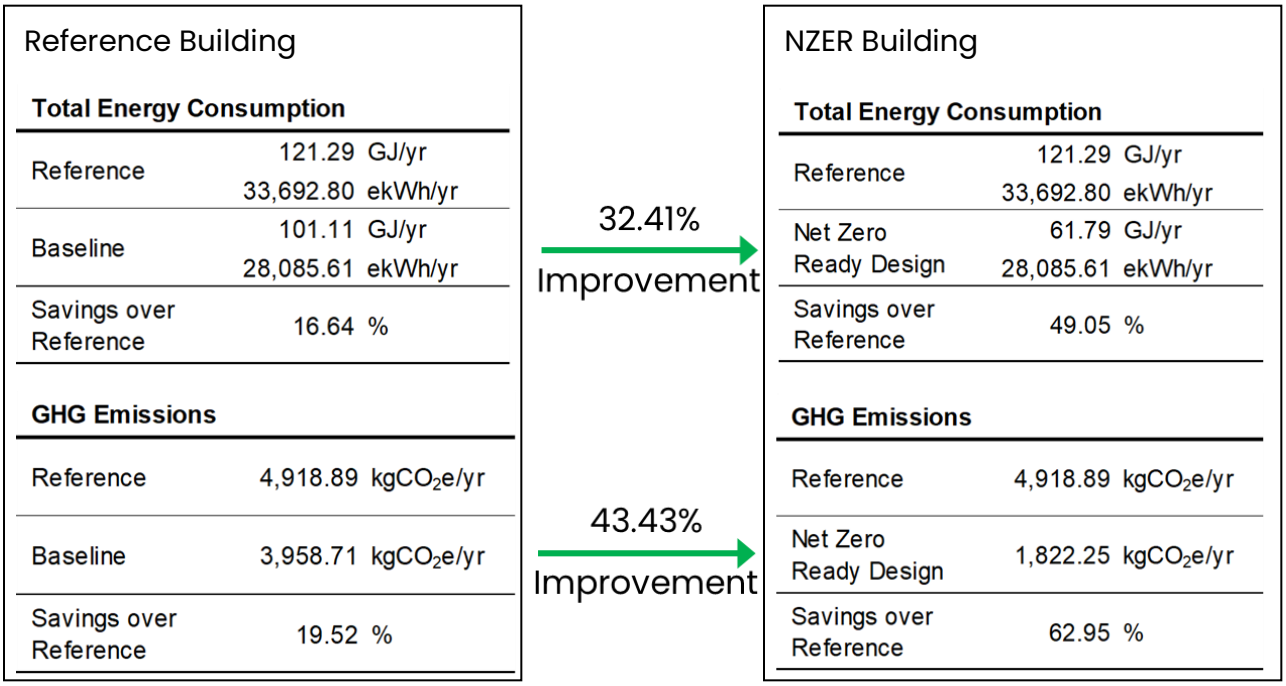

Figure 1. Summary of Energy Consumption and GHG Emissions Improvement

Performance Achievement

Three distinct models were generated for the HOT2000 v11.11 whole building energy simulation: the Reference, Baseline, and NZER Model.

The reference model was designed in accordance with the SB12 2017 Ontario Building Code A1 Package. Modelling in accordance with SB12 2017 OBC enables an effective comparison between the baseline and NZER models, and easy to understand improvements achieved.

The baseline model was developed from current drawings and input from builder on as-built design choices to represent the baseline energy performance. This model serves as the initial reference point in the incremental measure study, which allows for the exploration and identification of additional measures to improve energy efficiency.

Subsequently, NZER Model is determined through the selection and

implementation of various energy efficient measures. The Canadian Home Builders' Association NZER label requires the building achieve net energy reductions of up to 80% while envelope performance improvements of 33% are required and solar ready trusses are required to be incorporated into the building's design. This model exceeds both the baseline energy performance and the reference energy performance.

Additional measures incorporated into the baseline model to create the NZER Model include: Improve Above Grade Wall Insulation: 2x6 @ 16" O.C. R22 Batt + R8 C.I. (2" EPS)

- Add Foundation Slab Insulation: R10 (2-1/8" GPS) Full Under-Slab + Thermal Break
- Improve Windows: U1.2 / ER34 (SHGC-0.35)
- Improve Heating / Cooling System: ASHP (9.2 HSPFIV / 16 SEER) w/ 96% AFUE Furnace Backup
- Optimize Domestic Hot Water Heater: 0.9 EF Natural Gas Condensing Tank
- Remove Drain Water Heat Recovery
- Apply 100% Energy Efficient Lighting
- Achieve Air Tightness Target: 1.0 ACH @ 50 Pa

Summary of Upgrade Measures:

1. Above Grade Walls: R22 + R8 C.I. (2" EPS)
2. Under-slab: R10 (2 1/8" GPS)
3. Fenestrations: U1.2 / ER34 (SHGC-0.35)
4. ASHP (8.7 HSPF, 21.5 SEER) w/ 98% AFUE Furnace Backup
5. 0.9 EF NG Condensing Tank
6. Lighting: 100% Energy Star Certified Lighting
7. Air Tightness: 1.0 ACH @ 50 Pa

Building Performance Details

Table 2 details Yorkwood Homes' building envelope performance. This includes the performance of the above-ground assemblies, below-grade assemblies, fenestrations and door.

Table 2. Summary of Building Envelope

BUILDING ENVELOPE				
Above-Ground Opaque Assemblies				
Assembly	**Description**		**Effective RSI (m^2-K)/W**	**Area (m^2)**
Overall Walls			5.04	311.46
Wall - Main Brick	(2x6@16) R20 + 9.4 Brk		5.06	153.6
Wall - OS Brick	(2x6@16) R20 + 9.4 Brk		4.99	1.95
Wall - Second Brick	(2x6@16) R20 + 9.4 Brk		5.01	155.92
Overall Headers			5.14	30.57
Floor Header - Second	R20+R9.4ci Brk		5.14	13.66
Floor Header - Main Brick	R20+R9.4ci Brk		5.14	16.92
Overall Floors			6.4	29.53
Exposed Floor EUS	R31 Exposed Floor		6.4	29.53
Overall Ceilings			9.24	137.19
Ceiling - Attic	Attic/hip - R60 Blown Cellulose Attic		9.24	137.19
Below-Grade Opaque Assemblies				
Assembly	**Description**		**Effective RSI (m^2-K)/W**	**Area (m^2)**
Overall Foundation Walls			3.76	123.26
Foundation Unfin.	Exterior: User specified; Interior: R20 Blanket		Exterior: 0; Interior: 3.52	123.26
Overall Slab			1.76	104.67
Foundation Unfin.	Unheated slab below frost line		1.76	104.67
Fenestration and Doors				
Component	**Type**	**U-value W/(m^2-K)**	**SHGC**	**Area (m^2)**
Wall - Main Brick	Wall	-	-	-
Back01 - N01	1 x U1.40-ER29-(SHGC@0.35)	1.43	0.38	4.21
Back01 - N02	1 x U1.40-ER29-(SHGC@0.35)	1.45	0.39	8.92
Left01 - W01	1 x U1.40-ER29-(SHGC@0.35)	1.43	0.37	4.05
Right01 - E01	1 x U1.40-ER29-(SHGC@0.35)	1.34	0.3	0.74
Door - Front	Fibreglass polystyrene core	0.85	-	4.12
Front01 - S00 DW	2 x U1.40-ER29-(SHGC@0.35)	1.34	0.3	0.65
Front01 - S00 TRS	1 x U1.40-ER29-(SHGC@0.35)	1.25	0.23	0.53
Door - Garage	Fibreglass polystyrene core	0.85	-	1.9
Wall - Second Brick	Wall	-	-	-
Back02 - N01	1 x U1.40-ER29-(SHGC@0.35)	1.4	0.35	1.73
Back02 - N02	1 x U1.40-ER29-(SHGC@0.35)	1.42	0.37	3.47
Front02 - S01	1 x U1.40-ER29-(SHGC@0.35)	1.43	0.37	3.9
Front02 - S02	2 x U1.40-ER29-(SHGC@0.35)	1.35	0.31	0.93
Front02 - S03	1 x U1.40-ER29-(SHGC@0.35)	1.42	0.36	2.79
Left02 - W01	1 x U1.40-ER29-(SHGC@0.35)	1.39	0.34	1.49
Left02 - W02	1 x U1.40-ER29-(SHGC@0.35)	1.34	0.3	0.62
Left02 - W03	1 x U1.40-ER29-(SHGC@0.35)	1.38	0.34	1.3
Right02 - E01	1 x U1.40-ER29-(SHGC@0.35)	1.35	0.31	0.81
Foundation Unfin.	Wall	-	-	-
Back00 - N01	1 x U1.40-ER29-(SHGC@0.35)	1.28	0.24	0.31
Left00 - W01	3 x U1.40-ER29-(SHGC@0.35)	1.28	0.24	0.31

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Table 3 details Yorkwood Homes' mechanical system performance. This design includes both natural gas and air-source heat pump equipment.

Table 3. Summary of Mechanical Systems

MECHANICAL SYSTEMS				
Component	**Type**	**Energy Source**	**Performance Rating**	**Capacity of Equipment**
Space Heating System 1	Furnace - Condensing	Natural gas	98.1 (Efficiency)	9 kW
Space Heating System 2	Air Source Heat Pump - Central split system	Electric	8.5 (HSPF)	10.4919 kW
Air Conditioning	Air Source Heat Pump - Central split system	Electric	22.78 (SEER)	-
Domestic Hot Water	Integrated heat pump	Electricity	3.501 (UEF)	246.0999 L
DWHR	N/A	Electricity	42.1	Heat Recovery Efficiency
Ventilation	HRV/ERV	Electric	@0°: 77%, @-25°: 63% (SRE)	90 L/s (Exhaust Flow Rate)

Achieving NBCC 2020 Tiers

Yorkwood Homes has currently achieved a 74.85% reduction in energy consumption and a 38.11% reduction in heat loss, meeting NBC 2020 Tier 4 compliance (which requires a 40% reduction in energy consumption and a 20% reduction in heat loss).

To achieve Tier 5 compliance, the building is required to achieve a 70% reduction in energy consumption and a 40% reduction in heat loss. Yorkwood Homes has already exceeded the energy consumption reduction requirement. However, to meet the heat loss reduction target, an additional 1.89% reduction is needed.

To bridge the remaining gap, and achieve NBC 2020 Tier 5, the design could include either or both of these enhancements:

- **Improving fenestration:** Upgrading window performance from U 1.4 to U 1.2
- **Enhancing air sealing measures:** Improving airtightness from 1.45 ACH @ 50 Pa (89.2 in² ELA) to 1.2 ACH @ 50 Pa (71.5 in² ELA)