

Caledon GDS Case Study - Single Family Detached		Single Family Detached in Town of The Blue Mountains			
Created on:	2023-11-28				
OBC 2017 - A1 Package OBC Climate Zone 1	Upgrades against NBC 2015	NBC 2015 - Reference NBC Climate Zone 5	GDS 2024 - NBC Tier 3, Dual Fuel 20% Improvement	GDS 2027 - NBC Tier 4, Dual Fuel 40% Improvement	GDS 2030 - NBC Tier 4, Full Electric 40% Improvement
	Downgrades against NBC 2015				
BUILDING ENVELOPES ¹					
RSI 10.56 / R60 [Effective RSI 10.43 / R59.2]		Ceiling with Attic Space Effective RSI 6.91 / R39.2	RSI 10.56 / R60 [Effective RSI 10.43 / R59.2]	RSI 10.56 / R60 [Effective RSI 10.43 / R59.2]	RSI 10.56 / R60 [Effective RSI 10.43 / R59.2]
RSI 5.46 / R31 [Effective RSI 4.87 / R27.7]		Ceiling without Attic Space Effective RSI 4.67 / R26.5	RSI 5.46 / R31 [Effective RSI 4.87 / R27.7]	RSI 7.04 / R40 [Effective RSI 6.69 / R38.0]	RSI 7.04 / R40 [Effective RSI 6.69 / R38.0]
RSI 5.46 / R31 [Effective RSI 5.25 / R29.8]		Exposed Floor Effective RSI 4.67 / R26.5	RSI 5.46 / R31 [Effective RSI 5.25 / R29.8]	RSI 7.04 / R40 [Effective RSI 6.69 / R38.0]	RSI 7.04 / R40 [Effective RSI 6.69 / R38.0]
RSI 3.87 / R22 [Effective RSI 3.00 / R17.0]		Above Grade Walls Effective RSI 2.97 / R16.9	RSI 3.87 / R22 [Effective RSI 3.08 / R17.5]	R19 + R10 C.I. [Effective RSI 4.56 / R25.9]	R19 + R10 C.I. [Effective RSI 4.56 / R25.9]
RSI 3.52 / R20 [Effective RSI 3.72 / R21.1]		Basement Walls Below Grade (B.G.) Effective RSI 2.98 / R16.9	RSI 3.52 / R20 [Effective RSI 3.72 / R21.1]	RSI 3.52 / R20 [Effective RSI 3.72 / R21.1]	RSI 3.52 / R20 [Effective RSI 3.72 / R21.1]
-		Below Grade Slab Entire Surface > 600 mm B.G.	-	-	-
RSI 1.76 / R10 [Effective RSI 1.96 / R11.1]		Heated Slab On Ground Effective RSI 2.32 / R13.2 ²	R12.5 C.I. [Effective RSI 2.32 / R13.2] ²	R12.5 C.I. [Effective RSI 2.32 / R13.2] ²	R12.5 C.I. [Effective RSI 2.32 / R13.2] ²
		Slab ≤ 600 mm Below Grade Effective RSI 1.96 / R11.1	RSI 1.76 / R10 [Effective RSI 1.96 / R11.1]	RSI 1.76 / R10 [Effective RSI 1.96 / R11.1]	RSI 1.76 / R10 [Effective RSI 1.96 / R11.1]
		Edge of Below Grade Slab ≤ 600 mm B.G.			
WINDOWS & DOORS (Window to Wall Ratio = 26.2%)					
U _{ip} 0.25 (U _{si} 1.4) / ER 29 (SHGC-0.26)		Windows/Sliding Glass Doors U _{ip} 0.32 (U _{si} 1.8) / ER 21 (SHGC-0.26)	Energy Star Zone 2 Windows: U _{ip} 0.25 (U _{si} 1.4) / ER 29 (SHGC-0.26)	Energy Star Zone 3 Windows: U _{ip} 0.21 (U _{si} 1.2) / ER 34 (SHGC-0.26)	Energy Star Zone 3 Windows: U _{ip} 0.21 (U _{si} 1.2) / ER 34 (SHGC-0.26)
U _{ip} 0.50 (U _{si} 2.8)		Skylights U _{ip} 0.51 (U _{si} 2.9)	N/A	N/A	N/A
As Per OBC (RSI 0.70 / R3.97)		Doors (1 Door can be non-ENERGY STAR Certified) As Per NBC (RSI 1.10 / R6.25)	Steel Polystyrene (RSI 0.98 / R5.56)	Steel Polystyrene (RSI 0.98 / R5.56)	Steel Polystyrene (RSI 0.98 / R5.56)
MECHANICALS					
96% AFUE		Space Heating Equipment 92% AFUE	ASHP (8.2 HSPF _{iv} , 14 SEER) w/ 96% AFUE Furnace Backup	ASHP (8.2 HSPF _{iv} , 14 SEER) w/ 96% AFUE Furnace Backup	ASHP (10 HSPF _{iv} , 20 SEER) w/ Electric Backup
13 SEER		Space Cooling Equipment 14.5 SEER			
75% SRE		HRV/ERV Efficiency 60% SRE	75% SRE	75% SRE	75% SRE
0.80 EF		Domestic HWH (Thermal Eff. Or EF) 0.67 EF	Electric Conventional Tank 0.82 EF	Hybrid Heat Pump Water Heater (3.0 EF)	Hybrid Heat Pump Water Heater (3.0 EF)
N/A		Combined Space and Water N/A	N/A	N/A	N/A
As Per OBC		Fireplace As Per NBC	As Per OBC	As Per OBC	As Per NBC
As Per OBC		Duct Work As Per NBC	As Per OBC	As Per OBC	As Per NBC
Programmable		Thermostat Programmable	Programmable	Programmable	Programmable
ELECTRICAL					
As Per OBC		Lighting (1 Bulb can be non-ENERGY STAR Certified) As Per NBC	As Per OBC ³	As Per OBC	As Per OBC
As Per OBC		Exhaust Fans As Per NBC	As Per OBC	As Per OBC	As Per OBC
As Per OBC		Electrical Savings As Per NBC	As Per OBC	As Per OBC	As Per OBC
OTHER					
42% Efficiency — 2 showers		Drain Water Heat Recovery N/A	N/A	N/A	N/A
3.0 ACH - Detached ; 3.5 - Attached		Air Tightness Target (ACH@50Pa) 2.5 ACH	Assumed 2.5 ACH ⁴	Assumed 2.5 ACH	Assumed 2.5 ACH

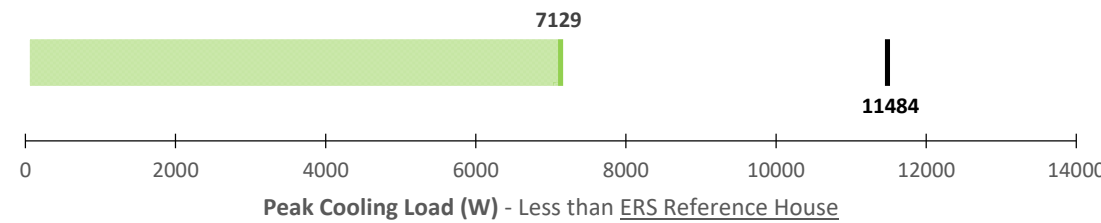
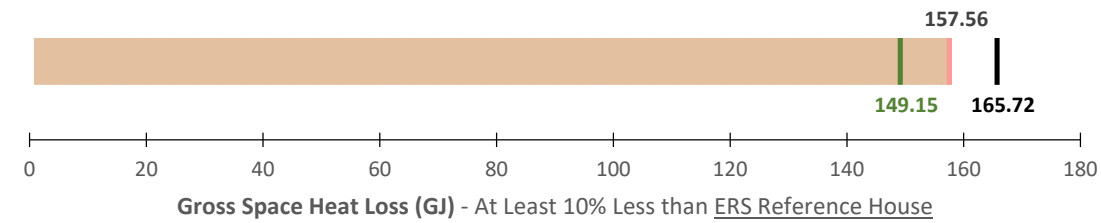
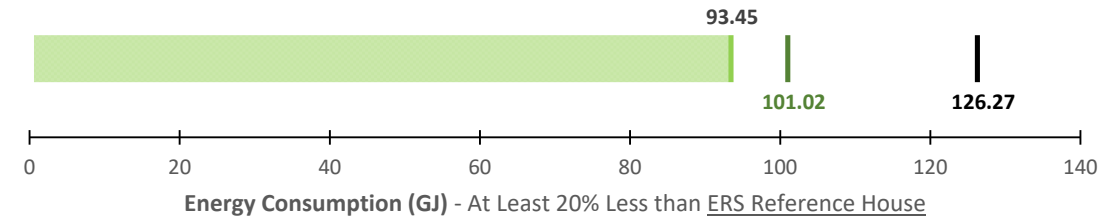
Results For NBC Compliance	NBC Compliance Requirement		GDS 2024 - NBC Tier 3, Dual Fuel		Not Compliant (X)	GDS 2027 - NBC Tier 4, Dual Fuel		Compliant (✓)	GDS 2030 - NBC Tier 4, Full Electric		Compliant (✓)
	Tier 3	Tier 4	Reference ⁵	Proposed		Reference ⁵	Proposed		Reference ⁵	Proposed	
Energy Consumption (GJ)	≥ 20%	≥ 40%	126.27	93.5	26.0% ✓	126.27	69.6	44.9% ✓	126.3	65.4	48.2% ✓
Gross Space Heat Loss (GJ)	≥ 10%	≥ 20%	165.72	157.6	4.9% ✗	165.72	132.4	20.1% ✓	165.7	132.4	20.1% ✓
Peak Cooling Load (W)	Lower Than Reference House		11484	7129	Pass ✓	11484	6731	Pass ✓	11484.0	6731.0	Pass ✓
Fuel Consumption - Natural Gas (m ³ /year)	-	-	2666.1	1519.0	-	2666.1	1197.0	-	2666.1	0.0	-
Fuel Consumption - Propane (L/year)	-	-	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-
Fuel Consumption - Electricity (kWh/year)	-	-	14598.4	17358.0	-	14598.4	14045.0	-	14598.4	25291.0	-
GHG Emissions (kgCO ₂ eq/year) ⁶	-	-	5.6	3.4	38.1%	5.6	2.7	51.1%	5.6	0.8	86.4%

OR

Results For Energy Star v17.1 Revision 2 Performance Compliance	GDS 2024 - Energy Star v17.1 Rev. 2		Compliant (✓)	
	Reference ⁷	Proposed		
Energy Consumption (GJ)	At least 15.0% lower than Reference ⁷	146.9	119.29	18.8% ✓

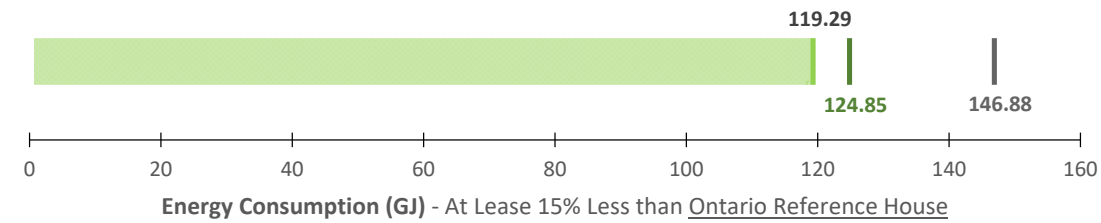
NOTES
¹ All GDS 2024, 2027 and 2030 building envelope meets or exceeds the minimum thermal resistance requirements of Energy Star v17.1 Revision 2.
² In the context of this case study, radiant floor heating was not included in the modeling.
³ Minimum 75% ENERGY STAR Lighting Required for the Energy Star Compliance.
⁴ For the purpose of calculating Energy Star Compliance, the Air Tightness Target for Detached is 2.5 ACH@50 Pa ; for Attached is 3.0 ACH@50 Pa
⁵ EnerGuide Rating System (ERS) Reference House
⁶ GHG Emission Factors - Values obtained from the NRCan Emission Factors and Reference Values Website (Link) :
Natural Gas = 1.921 kgCO ₂ /m ³ Propane = 1.515 kgCO ₂ /L Electricity = 0.030 kgCO ₂ /kWh

GDS 2024 - NBC Tier 3, Dual Fuel Compliance

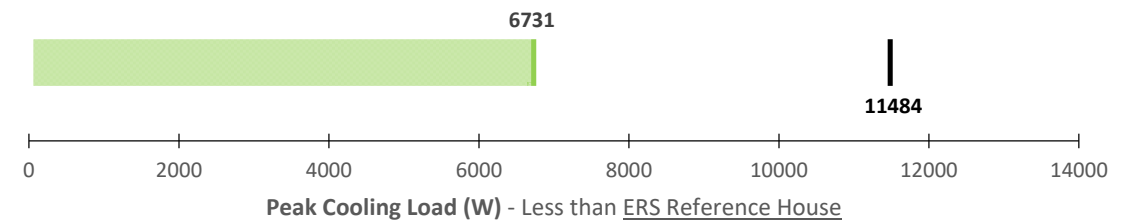
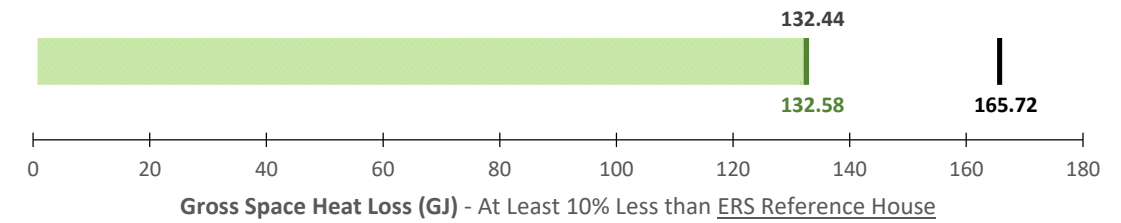
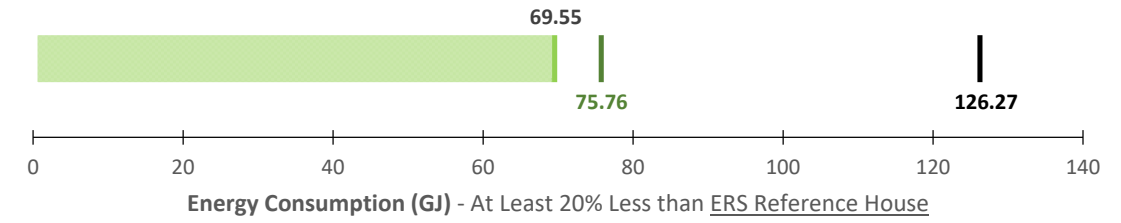


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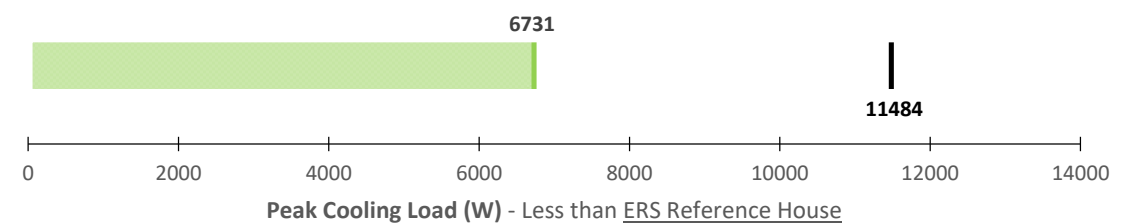
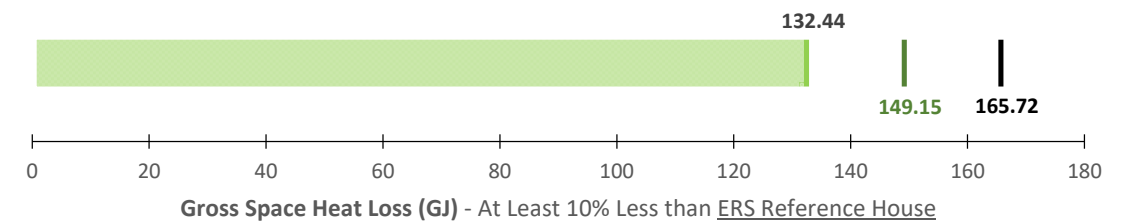
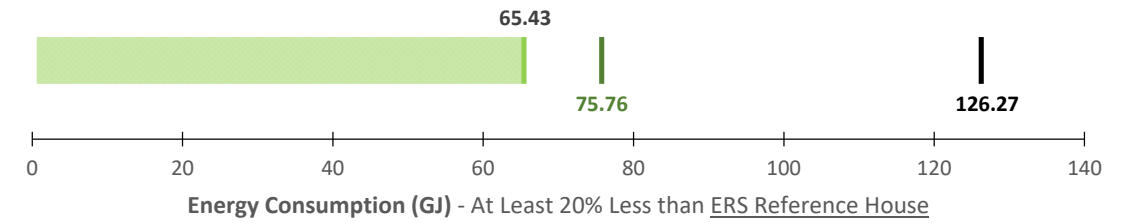
GDS 2024 - Energy Star v17.1 Revision 2 Performance Compliance



GDS 2027 - NBC Tier 4 (Dual Fuel) Compliance



GDS 2030 - NBC Tier 4 (Full Electric) Compliance



- EnerGuide Rating System Reference House
- Ontario Reference House
- Compliance Target
- Proposed Design - Meet the Requirement
- Proposed Design - Does Not Meet the Requirement

* All three categories (Energy Consumption, Gross Space Heat Loss, Peak Cooling Load) need to meet the requirement to be compliant for NBC Tier Compliance Path.