

Ontario Association of Architects Ordre des architectes de l'Ontario TEUI CalculatorBETA v3.0.15 2024.08.13			Bold Blue = User Input Cells Black = Calculated Cells							
Key Values			Target	Actual						
Lifetime Emissions Intensity kgCO2e/m²			Targeted (Design)	Actual (Utility Bills)	Reference %					
T.1 Lifetime Carbon			4.7	4.7	N/A					
Annual Operational Emissions Intensity kgCO2e/m²			Targeted (Design)	Actual (Utility Bills)						
T.2 Annual Carbon			2.2	2.2	✓ 14.8%					
Total Annual Operational Energy Use Intensity kWh/m²/yr			Targeted (Design)	Actual (Utility Bills)	% Nat. Avg**					
T.3 TEUI			55.3	55.5	✓ 27.3%					
B.1 Major Occupancy C - Residential L.1 Ontario Location Midland C.1 Carbon Tax Rate										
S.1 Reference Standard OBC SB12 3.1.1.2.C4 D.1 Reporting Period & Service Life 2035 50 yrs \$30.00 /MTCO2e										
S.2 Actual (Bills) or Targeted (Design) Use Targeted Use B.2 Project Name Tiny B-Frame Residence \$ 16.27 /yr OpEx										
S.3 Carbon Benchmarking Standard Self Reported S.4 Embodied Carbon Target 125.00 kgCO2e/m2 \$919.39 Embodied										
B.1.1 Occupants per Building 2 B.1.2 Average Daily Activity Level Normal 117 Watts/person (Sensible + Latent)										
B.1.3 Average Daily Occupied Hours 12 B.3 Conditioned Area (Net) 245.17 m²										
T.4 TEUI		ACTUAL ENERGY (Utility Bills)	ACTUAL NET EMISSIONS	TARGET ENERGY (Design)	TARGET NET EMISSIONS	EMISSIONS	EMISSION FACTORS			
T.3.1 Total Electricity Use		13,600.00 kWh/yr	13,600.00	544.00	13,557.89	542.32	40.00 gCO2e/kWh			
T.3.2 Total Fossil Gas Use		0.00 m³/yr	0.00	0.00	0.00 m³/yr	0.00	1,921.00 gCO2e/m3			
T.3.3 Total Propane Use		0.00 kg/yr	0.00	0.00	0.00 kg/yr	0.00	2,970.00 gCO2e/kg			
T.3.4 Total Oil Use		0.00 litres/yr	0.00	0.00	0.00 litres/yr	0.00	2,753.00 gCO2e/litre			
T.3.4 Total Wood Use		0.00 m³/yr	0.00	0.00	0.00 m³/yr	0.00	150.00 kgCO2e/m3			
E.2 Operational GHG (kgCO2/yr)			544.00			542.32				
T.3.4 Total Net Energy		48.96 GJ/yr		48.81 GJ/yr		542.32				
T.3.4 Annual Per capita Energy		6,800.00 kWh Actual	24.48 GJ Actual	6,778.95 kWh Target	24.40 GJ Target					
T.3.5 Primary Energy (Ontario Electricity)		13,557.89 kWh/yr	55.30 kWh/m²/yr	1.0 PER Factor			✓ 28%			
E.1 GHGI Operational/yr		0.54 MT CO2e/yr	2.21 kgCO2e/m²		110.60 kgCO2e/m² /Service Life	7%				
E.2 Embedded Carbon Intensity (A1-3)		P19 Res. Stick Frame	125.00 User-Def.	kgCO2e/m²	125.00 Calc'd Value kgCO2e/m²	100%				
E.3 Embedded Carbon Emitted (A1-3)		30.65 MT CO2e			125.00 Target Value kgCO2e/m²					
E.4 Onsite Energy Production		0.00 kWh/yr	E.9 Offsite Renewable (REC's)	0.00 kWh/yr						
E.5 Photovoltaics		0.00 kWh/yr	E.10 WWS Electricity	0.00 kWh/yr						
E.6 Wind		0.00 kWh/yr	E.11 Green Natural Gas	0.00 m3	0.00 ekWh/yr					
E.7 Remove EV Charging from TEUI		0.00 kWh/yr								
E.8 Reserved (other removals)		0.00 kWh/yr								
Water Use										
W.1 Daily Water Use (determines DHW load)		275.00 litres/pp/day	200,750 litres/yr			✓ 69%				
W.2 DHW Demand		1,972.11 kWh/yr	3.11 kWh/m²/yr	5000.00 kWh/yr (when Mech. Engineer Defined)						
W.3 DHW or SHW Energy Source		Heatpump	- Gas m³/yr	0.00 ekWh/yr Net						
W.4 DHW or SHW Efficiency Factor (EF)		150%	1.50 COPdhw	762.55 kWh/m²/yr Net						
W.5 Drain Water Heat Recovery Efficiency		42%		828.29 kWh/yr DWHR energy recovered		✓ 100%				
A.1 Indoor Air Quality		Targeted	Limits			% per Health Canada/NBC				
A.2 Radon (annual avg.)		50 Bq/m³	150 Bq/m³			✓ 33%				
A.3 CO2 (annual avg.)		550 ppm	1000 ppm			✓ 55%				
A.4 TVOC (annual avg.)		100 ppm	400 ppm			✓ 25%				
A.5 Rel. Indoor Humidity (annual avg.)		45% RH	30-60 %	! Important - combined w V.1.1 large effect on TEUI		45%				
A.6 Atmospheric Offsets		0 MT/yr CO2e								
Climate Calculations		Future Weather								
L.2.1 Heating Degree Days (HDD)		4200 °C	No Use 2021-2050 Value	Climate Zone 6	HDD Reference Lookup	HDD - Energy Star				
L.2.2 Cooling Degree Days (CDD)		337.1 °C	No Use 2021-2050 Value		CDD Reference Lookup	CDD - Energy Star				
L.3.1 Ground Facing GF HDD		2940 °C	Capacitance L.3.2 GF CDD	-1800 °C						
L.4 Coldest Days (Location Specific)		-24 °C	50.00% G.4.2 Transience & Capacitance Factor (Cooling, 50% default)							
L.5 Hottest Days (Location Specific)		29 °C	120 L.6 Number of Days in Cooling Season (Affected by Climate Change, 120 default)							
B.1.2 Thermostat Setpoint Heating		22 °C	74 °F							
B.1.3 Thermostat Setpoint Cooling		25 °C	80 °F							
Envelope Components (User Inputs)										
	Areas m2	Rimp ft/F·hr/Btu	RSI Km²/W	U-Value W/m2·K	% of Ae & Ag	Heatloss kWh/yr	Heatloss %	Heatgain kWh/yr	Heatgain %	Reference
B.4 Roof	184.34	41.40	7.29	0.137	42.14%	2,548.55	18.48%	204.55	455.98%	✓ 150%
B.5 Walls Above Grade (Exclude Openings!)	198.41	32.18	5.67	0.176	45.35%	3,529.16	25.59%	283.26	631.43%	✓ 135%
B.6 Floor Exposed	0.00	54.05	9.52	0.105	0.00%	0.00	0.00%	0.00	0.00%	✓ 169%
B.7 Doors	0.00	6.31	1.11	0.900	0.00%	0.00	0.00%	0.00	0.00%	✓ 178%
B.8.1 Window Area North	8.36	6.31	1.11	0.900	1.91%	758.42	5.50%	60.87	135.70%	✓ 178%
B.8.2 Window Area East	2.63	6.31	1.11	0.900	0.60%	238.59	1.73%	19.15	42.69%	✓ 178%
B.8.3 Window Area South	40.06	6.31	1.11	0.900	9.16%	3,634.24	26.35%	291.69	650.23%	✓ 178%
B.8.4 Window Area West	3.69	6.31	1.11	0.900	0.84%	334.76	2.43%	26.87	59.89%	✓ 178%
B.9 Walls Below Grade (Conditioned Space)	0.00	25.83	4.55	0.220	0.00%	0.00	0.00%	0.00	0.00%	✓ 122%
B.10 Floor Slab (Conditioned Space)	155.80	22.71	4.00	0.250	100.00%	2,749.00	19.93%	-841.53	1875.93%	✓ 204%
B.11 Interior Floors (incl. garages)	89.37	-	-	-	-	-	-	-	-	-
Envelope Totals	593.29	21.63			100%	13,792.72	100%	44.86	100%	
T.5.1 Building U-Value Combined Total		0.263 W/m2·K								✗ 95%
T.5.2 Building U-Value Avg for Ae		0.263 W/m2·K								
T.5.3 Building U-Value Avg for Ag		0.263 W/m2·K								
B.12 Window:Wall Ratio (WWR)		21.62%								✓ 102%
B.13.1 Thermal Bridge Penalty (min. 5-70%)		5%	689.64 kWh/yr	B.13.2 TB Penalty Impact kWh (-Heating, Cooling->)				2.24 kWh/yr		
B.14 Total Conditioned Volume		869.11 m³								
B.3.1 Total Floor Area		245.17 hsm								
B.15 Total Area Exposed to Ground (Ag)		155.80 m²								
B.16 Total Area Exposed to Air (Ae)		437.49 m²								
B.17 Total Cond. Area to Vol. Ratio		0.28								
B.18 Surf. to Vol. Ratio (V/A) or SV Ratio		0.50								
B.19.1 Air-Leakage Target per NBC		PH Classic								
B.19.2 NRL50 Target per NBC 2025		0.33 L/s·m²						NBC 2020 9.36.6.4.-A		✓ 162%
B.19.3 ACH 50 Target		0.60 ACH 50Pa								✓ 250%
B.19.4 ACH 50 if Measured		0.60		9% Total Ae Envelope Heatloss due to Air Leakage						
B.19.5 Heating Natural Air Leakage Heatloss		992.54 kWh	4.05 kWh/m²/yr	Zone 2	Stories	2		Shielding	Shielded	
B.19.6 Cooling Natural Air Leakage Heatgain		79.66 kWh	0.32 kWh/m²/yr							
B.19.7 Ae10 or ELA10		0.145 m²	17.8 B.19.5.1 n-Factor					*Naturalizes" air leakage from pressure test results		
Gains less Losses (Calculated)		Subtotals	Intensity							OBC/NBC/NECB
G.1.0 Annual Occupant Gains		1,026.92 kWh/yr	4.19 kWh/m²/yr							
G.1.1 Occupant Gains (Heating Season)		689.30 kWh/yr	2.81 kWh/m²/yr							
G.1.2 Occupant Gains (Cooling Season)		337.62 kWh/yr	1.38 kWh/m²/yr							
G.2.1 Solar Gains Heating Season Intensity		0.50 SHGC (0.5 is default)	50.00 kWh/m²/yr					Mid-wall placement self-shading and 40% DST and 52% TST Assumed		
G.2.2 Solar Gains Cooling Season Intensity			65.00 kWh/m²/yr					Mid-wall placement self-shading and 40% DST and 52% TST Assumed		
G.2.3 Solar Gains Heating Season Avg. Method		2,737.00 kWh/yr	11.16 kWh/m²/yr							
G.2.4 Solar Gains Heating Season by NESW		3,102.06 kWh/yr	12.65 kWh/m²/yr							
G.2.5 Solar Gains Cooling Seas. Avg. Method		711.62 kWh/yr	2.90 kWh/m²/yr							
G.2.6 Solar Gains Cooling Season By NESW		916.18 kWh/yr	3.74 kWh/m²/yr					For Comparison only - NOT used in Calculations		
G.2.7 Shading Cooling Season		80.00%	G.2.7 Shading Heating Season	0.00%				Can also be used when SHGC < 40% DST and 52% TST		
G.3.1 Plug, Light, Equipment Gains (Heating)		6,847.60 kWh/yr	27.93 kWh/m²/yr							
G.3.2 Plug, Light, Equipment Gains (Cooling)		3,353.93 kWh/yr	13.68 kWh/m²/yr							
G.4.1 Gains Utilization Factor (n-Factor)		50.00% NRC 50%	91.10% PHPP Method							
G.4.5 Net Usable Heating Season Gains		5,136.95 kWh/yr	9,359.59 kWh/yr							
G.4.6 Net Usable Htg. Gains Intensity		20.95 kWh/m²/yr	38.18 kWh/m²/yr							
G.5 Net Unusable Htg. Gains (PHPP Method)		5,136.95 kWh/m²/yr	20.95 kWh/m²/yr							
Mechanical Loads (Calculated)		Subtotals	Intensity							
M.2.1 Primary Heating System		Heatpump 14 HSPF	4.10 COPheat	0.98 AFUE if Gas						✓ 200%
M.2.2 Heating System Demand		2,593.82 kWh/yr	10.58 kWh/m²/yr	8,049.05 kWh/yr from Sink						
M.2.3 Heating System Gas Impact		0.00 ekWh/yr	0.00 kWh/m²/yr	0.00 m³/yr						
M.3.1 Heatpump for Cooling		No	3.10 COPcool	10.59 CEER						✓ 94%
M.3.2 Heatpump Cool Elect. Load		0.00 kWh/yr	0.00 kWh/m²/yr	- kWh/yr from Sink						! 0%
M.4 HRV/ERV/MVHR Efficiency (SRE)		90%	No M.4.1 Demand-based Ventilation (per P.1.2.)							✓ 164%
V.1.1 Constant Ventil. Rate (12.5/s pp rec.)		12.50 l/s	26.49 cfm	45.00 m³/hr	V.1.2 Summer Boost Rate	None				
V.2 Ventilation * Occupants		25.00 l/s	52.97 cfm	90.00 m³/hr						
V.3.1 Heating Season Ventil. Energy		3,049.20 kWh/yr								
V.3.4 Heating Season Ventil. Recovered		2,744.28 kWh/yr								
V.3.5 Net Heating Season Ventilation Losses		304.92 kWh/yr	1.24 kWh/m²/yr							
V.4.1 Incoming Cooling Season Ventil. Energy		452.77 kWh/yr	185% V.4.2 Latent Load Factor (Calculated on Cooling Worksheet)							
V.4.3 Outgoing Cooling Season Ventil. Energy		407.49 kWh/yr	0.18 kWh/m²/yr added to cooling load M.3.2							
V.5 Ventilation Free Cooling/Venting Capacity		10%	V.5 FC Limit	518.37 kWh/yr	✓	2 Days Active Cooling is Required				
Enclosure TEDI (component surfaces)		Subtotals	Intensity							
T.6.1 HEDI Ae		11,595.90 kWh/yr	26.51 kWh/m²					Rate at which Ae surfaces transmit energy to Air		
T.6.2 HEDI Ag		2,886.45 kWh/yr	18.53 kWh/m²/yr					Rate at which Ag surfaces transmit energy to Ground		
T.6.3 TEDI (Ae + Ag)		14,482.35 kWh/yr						T.6.1 + T.6.2		
T.7.1 CEDI Ae		930.71 kWh/yr	2.13 kWh/m²					Rate at which Ae surfaces transmit energy to Air		
T.7.2 CEDI Ag		-1,767.21 kWh/yr	-11.34 kWh/m²					Does not participate in cooling calcs		
T.6.4 TEDI Enclosure/B.3 Cond. Area			59.07 kWh/m²/yr					Enclosure TEDI divided by Conditioned Area		
T.7.3 CEDI (Ae + Ag) Capacitance Method		44.86 kWh/yr	-3.41 kWh/m²/yr					Enclosure TEDI divided by Conditioned Area		
T.10 TEDI Targeted (whole Building)		10,642.87 kWh/yr	43.41 kWh/m²/yr					Includes V.5 Net Ventilation Losses, Excludes T.7.3 CEDI Ae		N/A
T.10.1 TEDI Envelope Only (No Ventilation)		930.81 kWh/yr	3.80 kWh/m²/yr							
T.10.2 CEDI Unmitigated Cooling Load		4,982.70 kWh/yr	20.32 kWh/m²/yr							