BUILDING KNOWLEDGE CANADA INC.



515 Erbsville Road, City of Waterloo Energy Study

May 7, 2025

Prepared By:

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Table of Contents

.....3
A. Overview of Proposed Development 3
B. Energy and Emissions Analysis.....4
B1. Archetype Descriptions 4
B2. Model Assumptions.....4
B2.1 Base Loads 5
B2.2 Set Points 5
B3. Modeling Results 5
D1. Single Detached Archetype Discussion 10
D2. Stacked Townhome Archetype Discussion.....11
D3. Recommendations 12
References.....13
Appendix 14

Energy Study Report

DATE: May 7, 2025

TO: Robyn McMullen, City of Waterloo

FROM: Gord Cooke, Alexis Minniti, Kevin O'Donnell, Building Knowledge Canada Inc.

RE: Draft Plan of Subdivision at 515 Erbsville Road, City of Waterloo

A. Overview of Proposed Development

The proposed Draft Plan of Subdivision (DPS) lands are approximately 4.65 ha and situated between the existing subdivisions of Laurel Creek and Columbia Forest within the Columbia Hills District and has a significant grade change from west to east.

The proposed "upper neighbourhood" completes and connects to the existing internal street network to the north and south. The proposed "lower neighbourhood" has frontage on and access from Erbsville Road. Conceptual plans currently show the following residential uses:

- 96 multiple-residential units in the "lower neighbourhood" in five three-storey multi-unit residential buildings (MURBs),
- 56 multiple-residential units in the "upper neighbourhood" in three three-storey MURBs, and
- 21 single detached buildings in the "upper neighbourhood"

The DPS will also facilitate additional future lots from the Laurel Creek subdivision to the north, which are anticipated to be developed as single detached units. The draft plan of the subdivision is shown below in Figure 1.

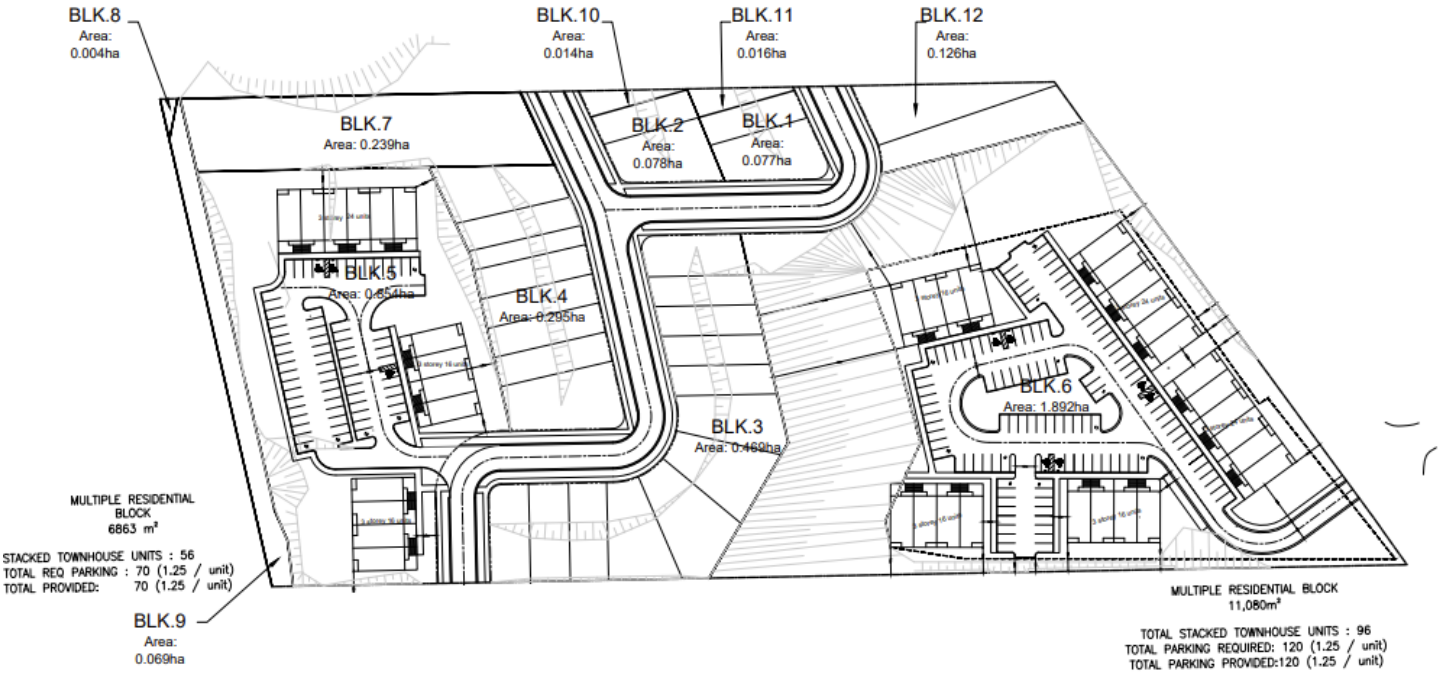

Figure 1 Draft Plan of Subdivision – Conceptual Layout

B. Energy and Emissions Analysis

Two residential housing archetypes were modeled for the energy and emissions analysis. A single detached archetype and a stacked townhome archetype were selected as representative of the product types planned for this site. Floor plans, elevations and window-to-wall ratios from previously approved construction drawing sets were referenced.

B1. Archetype Descriptions

The single detached archetype modeled has a conditioned floor area of 3,100 ft^2 (2,200 ft^2 above grade). A 12.5% window-to-wall ratio was calculated from the reference elevations. The front orientation of the home is North. This home also includes a walkout basement.

The stacked townhome archetype modeled represents one block out of the eight stacked townhomes planned. This MURB has 16 dwelling units. The stacked townhome block has a conditioned floor area of approximately 17,500 ft^2. A 24.6% window-to-wall ratio was calculated from the reference elevations.

B2. Model Assumptions

Both archetypes were modeled in version 11.13 of HOT2000, an energy modelling software developed and maintained by Natural Resources Canada to support the EnerGuide Rating System, ENERGY STAR for New Homes, and R-2000 residential energy efficiency initiatives (Natural Resources Canada, 2024).

B2.1 Base Loads

For the single detached archetype, HOT2000 assumes 2 adults and 1 child will occupy the home 50% of the time. The fraction of internal gains applied to the basement is 0.15. The baseloads applied to the model are summarized in Table 1.

Table 1 Base Load Summary for Single Detached Archetype

Base Load Types	Base Loads
Electrical Appliances	6.30 kWh/day
Lighting	2.60 kWh/day
Other Electric	9.70 kWh/day
Average Exterior Use	0.90 kWh/day
Estimated Hot Water Load	188.92 L/day

For the stacked townhome archetype, HOT2000 assumes 32 adults (2 per unit) and 0 children will occupy the multi-unit residential building (MURB) 50% of the time. The fraction of internal gains applied to the basement is 0.15. The baseloads applied to the model are summarized in Table 2.
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Table 2 Base Load Summary for Stacked Townhome Archetype (16 Units)

Base Load Types	Base Loads
Electrical Appliances	82.88 kWh/day
Lighting	27.20 kWh/day
Other Electric	70.40 kWh/day
Average Exterior Use	6.40 kWh/day
Estimated Hot Water Load	1980.69 L/day

B2.2 Set Points

The set points listed in Table 3 apply to both archetypes. It should be noted that the night time setback duration is eight hours.

Table 3 Set Point Summary

Set Point Type	Temperature
Daytime Heating Set Point	21°C
Nighttime Heating Set Point	18°C
Cooling Set Point	25°C
Basement Heating Set Point	19 °C

B3. Modeling Results

The representative homes were modeled for the following three scenarios:

i) Building Code Baseline: SB-12 Package A1,
ii) ENERGY STAR for New Homes,
iii) Canadian Home Builders' Association (CHBA) Net Zero Home Labeling Program: both a hybrid heating scenario and an all-electric scenario were modeled.

The optimizations for each archetype are shown in Figure 2 and Figure 3. They summarize the building envelope and mechanical specifications for each scenario, as well as the energy consumption, greenhouse gas emissions intensity, total energy use intensity (TEUI) and thermal energy demand Intensity (TEDI) results for each scenario.

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Energy Perfomance Optimization

515 Erbsville Road | Single Detached | 2,200 square feet archetype

	HOUSE COMPONENTS	Ontario Building Code SB12 Package A1	ENERGY STAR For New Homes	CHBA Net Zero Ready	CHBA Net Zero
Envelope	**Fuel Sources**	**Natural Gas**	**Natural Gas**	**Hybrid**	**All-Electric**
	Ceiling with Attic Space	R60 Blown Insulation	R60 Blown Insulation	R60 Blown Insulation	R60 Blown Insulation
	Above Grade Walls / Garage wall / Headers	2x6 @ 16" o/c w/ R22	**2x6 @ 16" O.C w/ R22 Batt + R5**	**2x6 @ 16" O.C w/ R22 Batt + R7.5ci**	**2x6 @ 16" O.C w/ R22 Batt + R10ci**
	Exposed Floors	R31 Nominal	R31 Nominal	R31 Nominal	**R40 Nominal**
	Foundation Wall	R20 ci	R20 ci	R20 ci	**2x6 @ 16" O.C w/ R22 Batt + R10ci**
	Under Basement Slab *(unheated/heated)*	None	None	**R10 under entire slab, w/ R10 at slab edge connecting underslab with foundation wall**	R10 under entire slab, w/ R10 at slab edge connecting underslab with foundation wall
	Windows & Sliding Glass Doors *Max. U-Value, +/-0.05 (W/m2·K) SHGC, +/- 0.05*	UV 1.6, ER 25	**ENERGY STAR Zone 2 Rated UV 1.4 and/or ER29**	**ENERGY STAR Zone 3 Rated UV 1.2 and/or ER34**	ENERGY STAR Zone 3 Rated UV 1.2 and/or ER34
	Airtightness	3.0 ACH @ 50 Pa (Assumed)	**2.5 ACH @ 50Pa (Tested)**	**1.5 ACH @ 50Pa (Tested)**	1.5 ACH @ 50Pa (Tested)
HVAC	**Principle Ventilation**	75% SRE HRV/ERV	75% SRE - w/ ECM HRV/ERV	75% SRE - w/ ECM HRV/ERV	75% SRE - w/ ECM HRV/ERV
	Fan Efficacy	N/A	**SRE ≥ 75% at 0C, ≥ 0.57 L/s/W**	SRE ≥ 75% at 0C, ≥ 0.57 L/s/W	SRE ≥ 75% at 0C, ≥ 0.57 L/s/W
	Space Heating	96% AFUE Gas Furnace	96% AFUE Gas Furnace	**HYBRID 8.70 HSPF ASHP + 96% AFUE Furnace**	**8.70 HSPF ASHP + Electric Backup**
	Space Cooling	14 SEER If Provided by Builder	14 SEER If Provided by Builder	**Air Source Heat Pump (21 SEER)**	Air Source Heat Pump (21 SEER)
DHW	**Domestic Water Heater**	0.8 EF, Gas Tank	**0.95 UEF (Instantaneous Condensing)**	0.95 UEF (Instantaneous Condensing)	**3.88 UEF, Heat Pump Water Heater**
	Drain Water Heat Recovery	42% Efficient Serving Two Showers	42% Efficient Serving Two Showers	**54.4% Efficient (Serving Two Showers)**	54.4% Efficient (Serving Two Showers)
OTHER	**Bathroom Faucets** *(max. flow rate of all fixtures)*	No requirement	N/A	**5.7 L/min or less**	5.7 L/min or less
	Shower Heads *(max. flow rate of all fixtures)*	No requirement	N/A	**7.6 L/min or 2.0 gpm**	7.6 L/min or 2.0 gpm
	Clothes Washer (1x)	No requirement	N/A	**ENERGY STAR certified**	ENERGY STAR certified
	Dishwasher (1x)	No requirement	N/A	**ENERGY STAR certified**	ENERGY STAR certified
	Refrigerator (1x)	No requirement	N/A	**ENERGY STAR certified**	ENERGY STAR certified
	Lighting	No requirement	**ENERGY STAR Rated Fixtures, 100% LED or CFL**	ENERGY STAR Rated Fixtures, 100% LED or CFL	ENERGY STAR Rated Fixtures, 100% LED or CFL

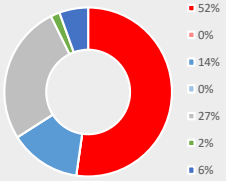
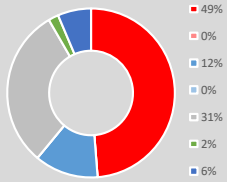
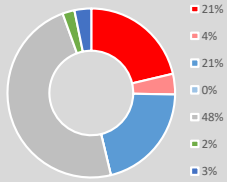
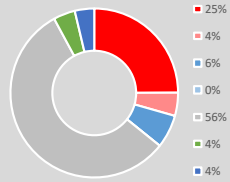
Design Heat Loss @ -20°C (Btu/h)		37,919	32,514	26,458	25,523
Design Heat Gain @ 31°C (Btu/h)		18,944	17,716	17,463	17,347
A	Primary Space Heating				
B	Secondary Space Heating				
C	Primary DHW Heating				
D	Secondary DHW Heating				
E	Lights & Appliances				
F	HRV and Fans				
G	Air Conditioner				
Energy Metrics	**Total Energy Consumption (GJ)**	96.1	83.8	47.7	40.8
	Estimated Operational GHG Emissions (tCO_2e)	3.6	3.0	1.0	0.4
	Performance Improvement Over Baseline	N/A	13%	50%	58%
Program Metrics	**TEDI** - Thermal Energy Demand Intensity (kWh / m^2 / year)	48.7	39.7	11.7	11.6
	TEUI - Total Energy Use Intensity (kWh / m^2 / year)	93.2	81.4	46.3	39.6
	GHGI - Greenhouse Gas Intensity (kg eCO2 / m^2 / year)	12.7	10.5	3.5	1.5
Est. Natural Gas Consumpton (m3)		1702.0	1373.5	318.7	0.0
Est. Electricity Consumption (kWh)		9071.9	9070.7	9951.1	11339.2
Est. Natural Gas Cost (annual)		$515	$421	$120	$0
Est. Electricity Cost (annual, time of use)		$950	$952	$1,063	$1,236

Figure 2 Single Detached Energy Optimization

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Energy Perfomance Optimization

515 Erbsville Road | Stacked Townhouse, MURB | 17,500 square feet archetype

	HOUSE COMPONENTS	Ontario Building Code SB12 Package A1	ENERGY STAR For New Homes	CHBA Net Zero Ready	CHBA Net Zero
Envelope	**Fuel Sources**	**Natural Gas**	**Natural Gas**	**Hybrid**	**All-Electric**
	Ceiling with Attic Space	R60 Blown Insulation	R60 Blown Insulation	R60 Blown Insulation	R60 Blown Insulation
	Above Grade Walls / Garage wall / Headers	2x6 @ 16" o/c w/ R22	**2x6 @ 16" O.C w/ R22 Batt + R5**	**2x6 @ 16" O.C w/ R22 Batt + R7.5ci**	**2x6 @ 16" O.C w/ R22 Batt + R10ci**
	Exposed Floors	R31 Nominal	R31 Nominal	R31 Nominal	**R40 Nominal**
	Foundation Wall	R20 ci	R20 ci	R20 ci	**2x6 @ 16" O.C w/ R22 Batt + R10ci**
	Under Basement Slab *(unheated/heated)*	None	None	**R10 under entire slab, w/ R10 at slab edge connecting underslab with foundation wall**	R10 under entire slab, w/ R10 at slab edge connecting underslab with foundation wall
	Windows & Sliding Glass Doors *Max. U-Value, +/-0.05 (W/m2·K) SHGC, +/- 0.05*	UV 1.6, ER 25	**ENERGY STAR Zone 2 Rated UV 1.4 and/or ER29**	**ENERGY STAR Zone 3 Rated UV 1.2 and/or ER34**	ENERGY STAR Zone 3 Rated UV 1.2 and/or ER34
	Airtightness	3.5 ACH @ 50 Pa (Assumed)	**3.0 ACH @ 50Pa (Tested)**	**2.0 ACH @ 50Pa (Tested)**	2.0 ACH @ 50Pa (Tested)
HVAC	**Principle Ventilation**	75% SRE HRV/ERV	75% SRE - w/ ECM HRV/ERV	75% SRE - w/ ECM HRV/ERV	75% SRE - w/ ECM HRV/ERV
	Fan Efficacy	N/A	**SRE ≥ 75% at 0C, ≥ 0.57 L/s/W**	SRE ≥ 75% at 0C, ≥ 0.57 L/s/W	SRE ≥ 75% at 0C, ≥ 0.57 L/s/W
	Space Heating	96% AFUE Gas Furnace	96% AFUE Gas Furnace	**HYBRID 8.70 HSPF ASHP + 96% AFUE Furnace**	**8.70 HSPF ASHP + Electric Backup**
	Space Cooling	14 SEER If Provided by Builder	14 SEER If Provided by Builder	**Air Source Heat Pump (21 SEER)**	Air Source Heat Pump (21 SEER)
DHW	**Domestic Water Heater**	0.8 EF, Gas Tank	**0.95 UEF (Instantaneous Condensing)**	0.95 UEF (Instantaneous Condensing)	**3.88 UEF, Heat Pump Water Heater**
	Drain Water Heat Recovery	42% Efficient Serving Two Showers	42% Efficient Serving Two Showers	**54.4% Efficient (Serving Two Showers)**	54.4% Efficient (Serving Two Showers)
OTHER	**Bathroom Faucets** *(max. flow rate of all fixtures)*	No requirement	N/A	**5.7 L/min or less**	5.7 L/min or less
	Shower Heads *(max. flow rate of all fixtures)*	No requirement	N/A	**7.6 L/min or 2.0 gpm**	7.6 L/min or 2.0 gpm
	Clothes Washer (1x)	No requirement	N/A	**ENERGY STAR certified**	ENERGY STAR certified
	Dishwasher (1x)	No requirement	N/A	**ENERGY STAR certified**	ENERGY STAR certified
	Refrigerator (1x)	No requirement	N/A	**ENERGY STAR certified**	ENERGY STAR certified
	Lighting	No requirement	**ENERGY STAR Rated Fixtures, 100% LED or CFL**	ENERGY STAR Rated Fixtures, 100% LED or CFL	ENERGY STAR Rated Fixtures, 100% LED or CFL
	Design Heat Loss @ -20°C (Btu/h)	206,544	176,957	138,625	135,752
	Design Heat Gain @ 31°C (Btu/h)	114,699	107,871	103,821	103,726
A	Primary Space Heating	29%	24%	7%	9%
B	Secondary Space Heating	0%	0%	4%	5%
C	Primary DHW Heating	19%	19%	24%	7%
D	Secondary DHW Heating	0%	0%	0%	0%
E	Lights & Appliances	40%	44%	57%	68%
F	HRV and Fans	3%	4%	5%	6%
G	Air Conditioner	9%	10%	3%	4%
Energy Metrics	**Total Energy Consumption (GJ)**	617.3	560.4	370.3	308.8
	Estimated Operational GHG Emissions (tCO_2e)	18.9	15.9	8.2	3.3
	Performance Improvement Over Baseline	N/A	9%	40%	50%
Program Metrics	**TEDI** - Thermal Energy Demand Intensity (kWh / m^2 / year)	30.6	22.8	6.8	7.8
	TEUI - Total Energy Use Intensity (kWh / m^2 / year)	105.5	95.7	63.3	52.7
	GHGI - Greenhouse Gas Intensity (kg eCO2 / m^2 / year)	11.6	9.8	5.0	2.0
	Est. Natural Gas Consumpton (m3)	7996.5	6458.9	2747.6	0.0
	Est. Electricity Consumption (kWh)	88716.3	88831.8	74427.0	85764.9
	Est. Natural Gas Cost (annual)	$0	$0	$0	$0
	Est. Electricity Cost (annual)	$0	$0	$0	$0

Figure 3 Stacked Townhome Energy Optimization

C. Envelope Analysis

This section includes a review of the above grade wall details typical in both archetypes, for OBC A1 compliance package, ENERGY STAR for New Homes and the CHBA Net Zero Home Labelling Program scenarios.

The proposed above grade wall insulation values for the ENERGY STAR for New Homes and the CHBA Net Zero Home Labelling Program scenarios are the same for both archetypes. Tables 4a, 4b and 4c summarize the effective R-values of each layer, as well as the overall effective R-value of each assembly, based on the construction notes provided.

Table 4a Effective R-Value Calculation for A1 Scenario

Layer	RSI (mm)	Thickness (mm)	Total RSI
Exterior Air Film	-	-	0.03
Brick / Stone	0.0007	88.9	0.06
Air Space	-	25.4	0.18
Building Paper	0	0	0
OSB Sheathing	0.0098	11.1125	0.11
2x6 Wood Framing @ 16" c/c	-	-	2.55
R-22 Batt Insulation	-	-	
Polyethylene (6 mil)	0	0	0
Drywall	0.0063	12.7	0.08
Interior Wall Air Film	-	-	0.12
Total			**3.13**

Table 4b Effective R-Value Calculation for the ENERGY STAR for New Homes Scenario

Layer	RSI (mm)	Thickness (mm)	Total RSI
Exterior Air Film	-	-	0.03
Brick / Stone	0.0007	88.9	0.06
Air Space	-	25.4	0.18
Building Paper	0	0	0
Extruded Polystyrene	0.035	25.4	0.89
2x6 Wood Framing @ 16" c/c	-	-	2.55
R-22 Batt Insulation	-	-	
Polyethylene (6 mil)	0	0	0
Drywall	0.0063	12.7	0.08
Interior Wall Air Film	-	-	0.12
Total			**3.91**

Table 4c Effective R-Value Calculation for the Net Zero Ready Scenario

Layer	RSI (mm)	Thickness (mm)	Total RSI
Exterior Air Film	-	-	0.03
Brick/Stone	0.0007	88.9	0.06
Air Space	-	25.4	0.18
Building Paper	0	0	0
Extruded Polystyrene	0.035	38.1	1.33
2x6 Wood Studs @ 16" c/c	-	-	2.55
R-22 Batt Insulation	-	-	
Polyethylene (6 mil)	0	0	0
Gypsum Board	0.0063	12.7	0.08
Interior Wall Air Film	-	-	0.12
Total			**4.35**

It should be noted that thermal bridging was excluded from Part 9 of the National Building Code and the National Energy Code for Buildings due to its limited impact on buildings using wood framing. The effective R-values were used in Tables 4a, 4b and 4c, not the nominal R-values and the parallel path method was used to calculate the R-value of the framing and batt insulation layer. The ENERGY STAR for New Homes and the Net Zero Ready scenarios both include a continuous layer of extruded polystyrene which significantly reduce thermal bridging.

Thermal bridges can be found when walls meet at the corners of the archetype homes. This is due to additional framing and related to the geometry (increased exterior surface area) (Morrison Hershfield Limited, 2021). The single detached archetype has 9 corners, and the stacked townhome archetype has 20 corners. The stacked townhome archetype has balconies which introduces additional thermal bridging. Other common locations for thermal bridging are intersections of different assemblies (e.g. wall-to-roof, wall-to-floor, etc.) and around windows.

D. Discussion and Recommendations

This section will summarize the findings of sections A through C and provide recommendations for the 515 Erbsville development.

D1. Single Detached Archetype Discussion

The energy and emissions analysis for the single detached archetype showed that the ENERGY STAR for New Homes scenario reduced the energy consumption and operational carbon emissions of the home by 13% and 17% respectively, relative to the A1 scenario. The Net Zero Ready hybrid scenario reduced the energy consumption and operational carbon emissions by 50% and 72% respectively, relative to the A1 scenario. The Net Zero Ready all-electric scenario reduced the energy consumption and operational carbon emissions by 58% and 89% respectively, relative to the A1 scenario.

Upgrading from the A1 scenario to the ENERGY STAR for New Homes scenario also results in a 18% reduction in TEDI. Upgrading from the A1 scenario to the Net Zero Ready hybrid scenario

results in a 76% reduction in TEDI and the Net Zero Ready all-electric scenario also results in a 76% reduction in TEDI.

Table 5 summarizes the annual natural gas and electricity costs for each scenario and Table 6 summarizes the utility data results for each scenario. As the building envelope and mechanical systems are improved to achieve ENERGY Star for New Homes and Net Zero Ready (NZR) performance, the load on the electrical system decreases. The Net Zero Ready Dual Fuel package has the lowest cost.Hourly electrical loads charts for each scenario are shown in the Appendix.

Table 5 Annual Natural Gas and Electricity Costs – Single Detached

Scenario	Annual Natural Gas Cost	Annual Electricity Cost
SB-12 A1	$511	$1,451
ENERGY STAR for New Homes	$412	$1,451
NZR Dual Fuel	$95	$1693
NZR All-Electric	$0	$1912

Table 6 Utility Data Results – Single Detached

Scenario	Natural Gas Consumption (m^3)	Electricity Consumption (kWh)	Winter Peak Load (kW)	Summer Peak Load (kW)
SB-12 A1	1702.0	9071.9	1.41	3.95
ENERGY STAR for New Homes	1373.5	9070.7	1.41	3.93
NZR Dual Fuel	318.7	9951.1	3.25	2.43
NZR All-Electric	-	11339.2	9.64	2.42

D2. Stacked Townhome Archetype Discussion

The energy and emissions analysis for the stacked townhome archetype showed that the ENERGY STAR for New Homes scenario reduced the energy consumption and operational carbon emissions of the home by 9% and 16% respectively, relative to the A1 scenario. The Net Zero Ready hybrid scenario reduced the energy consumption and operational carbon emissions by 40% and 57% respectively, relative to the A1 scenario. The Net Zero Ready all-electric scenario reduced the energy consumption and operational carbon emissions by 50% and 83% respectively, relative to the A1 scenario.

Upgrading from the A1 scenario to the ENERGY STAR for New Homes scenario also results in a 25% reduction in TEDI. Upgrading from the A1 scenario to the Net Zero Ready hybrid scenario results in a 78% reduction in TEDI and the Net Zero Ready all-electric scenario results in a 75% reduction in TEDI. The reason why the TEDI is slightly higher for the Net Zero Ready all-electric scenario is because heat pump water heaters cool down the air so there is a higher space heating demand. This impact is more pronounced for the stacked townhome archetype because there are multiple systems.

Table 7 summarizes the annual natural gas and electricity costs for each scenario and Table 8 summarizes the utility data results for each scenario. As the building envelope and mechanical systems are improved to achieve ENERGY Star for New Homes and Net Zero Ready (NZR) performance, the load on the electrical system decreases. The Net Zero Ready Dual Fuel package has the lowest cost. Hourly electrical loads charts for each scenario are shown in the Appendix.

Table 7 Annual Natural Gas and Electricity Costs – Stacked Townhome (16 Units)

Scenario	Annual Natural Gas Cost	Annual Electricity Cost
SB-12 A1	$2,311	$9,268
ENERGY STAR for New Homes	$1,872	$9,304
NZR Dual Fuel	$813	$8,486
NZR All-Electric	$0	$9,981

Table 8 Utility Data Results – Stacked Townhome (16 Units)

Scenario	Natural Gas Consumption (m^3)	Electricity Consumption (kWh)	Winter Peak Load (kW)	Summer Peak Load (kW)
SB-12 A1	7996.5	88716.3	13.58	39.58
ENERGY STAR for New Homes	6458.9	88831.8	13.58	39.72
NZR Dual Fuel	2747.6	74427.0	20.15	20.68
NZR All-Electric	-	85764.9	45.45	21.24

D3. Recommendations

The discussion above and the optimizations show that the ENERGY STAR for New Homes and the Net Zero Ready scenarios result in significant reductions in energy consumption, operational carbon emissions and TEDI, relative to the A1 scenario. A cost analysis is recommended to determine if it is feasible to build Net Zero Ready homes in the development. If not, the ENERGY STAR for New Homes package would be recommended as it achieves a 17% reduction in operational carbon emissions for the single detached archetype and a 16% reduction in operational carbon emissions for the stacked townhome archetype. Further reductions are possible by moving to the Net Zero hybrid heating scenario and the Net Zero all-electric scenario.

Gord Cooke, P.Eng
President, Building Knowledge Canada

Alexis Minniti, EIT
Sustainability Specialist, Building Knowledge Canada

References

Morrison Hershfield Limited. (2021). *Building Envelope Thermal Bridging Guide.* BC Hydro Power Smart.

Natural Resources Canada. (2024, December 23). *Tools for industry professionals*.

Appendix

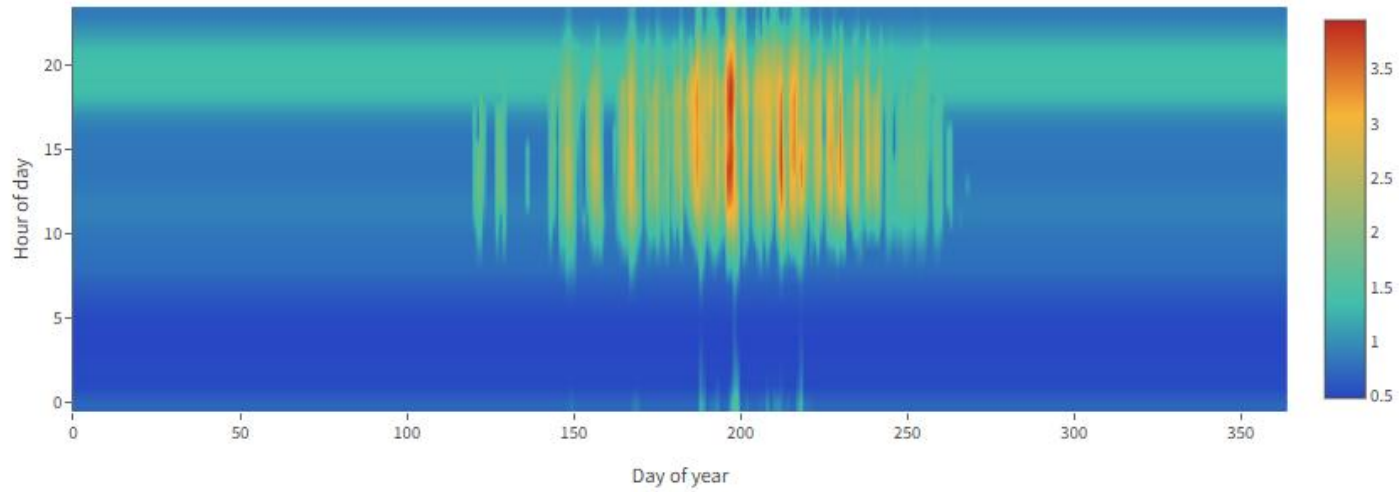

Figure 4 Hourly Electrical Load (kW) – Single Detached – A1

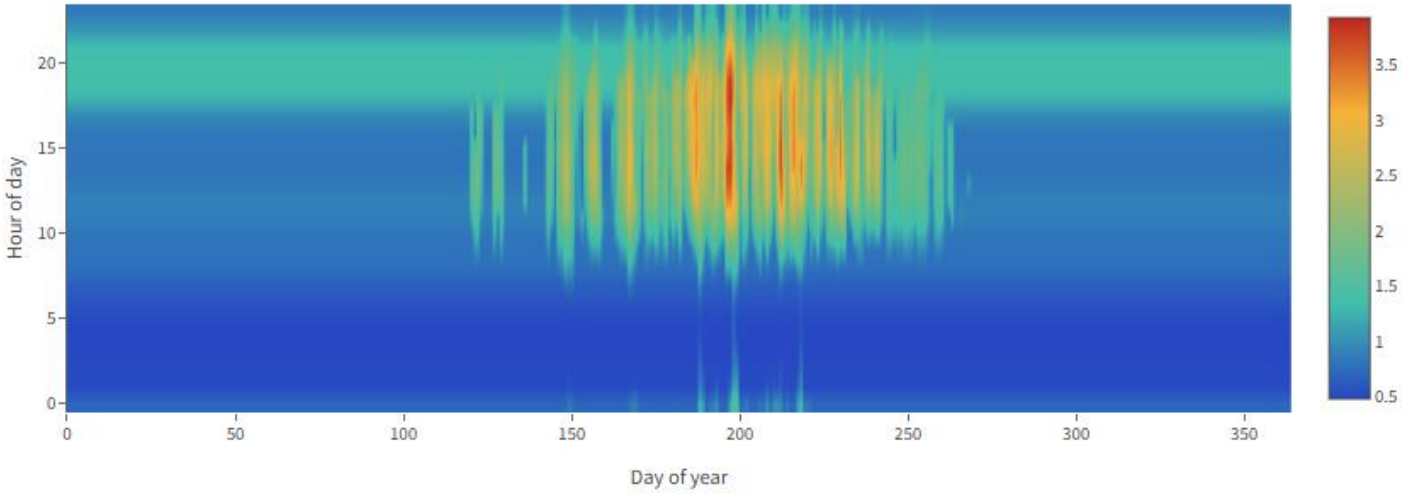

Figure 5 Hourly Electrical Load (kW) – Single Detached – ENERGY STAR for New Homes

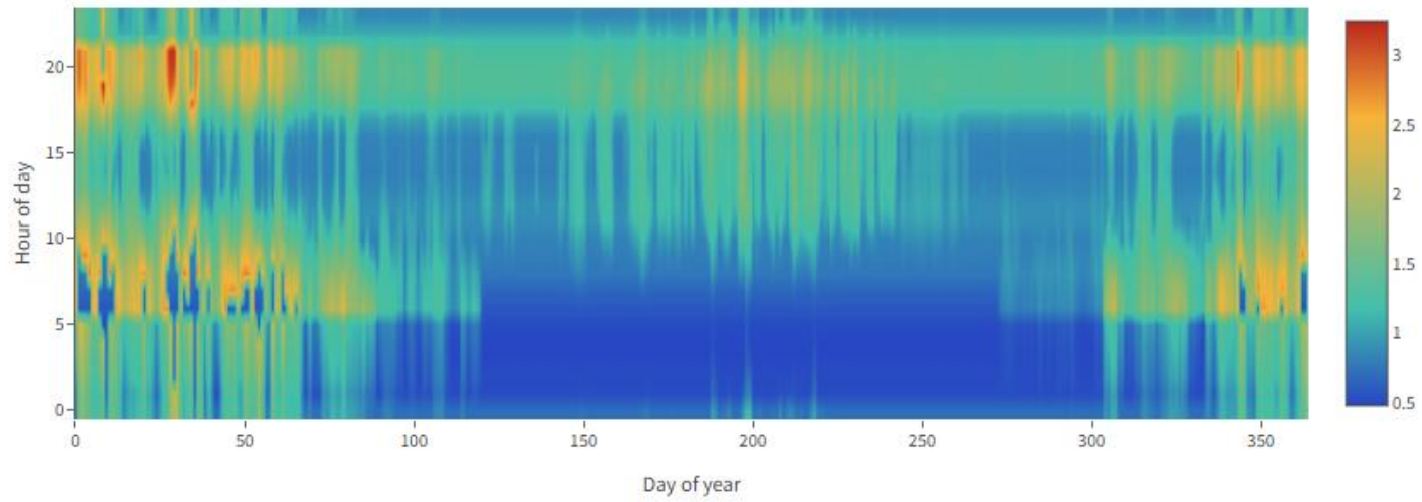

Figure 6 Hourly Electrical Load (kW) – Single Detached – Net Zero Ready Dual Fuel

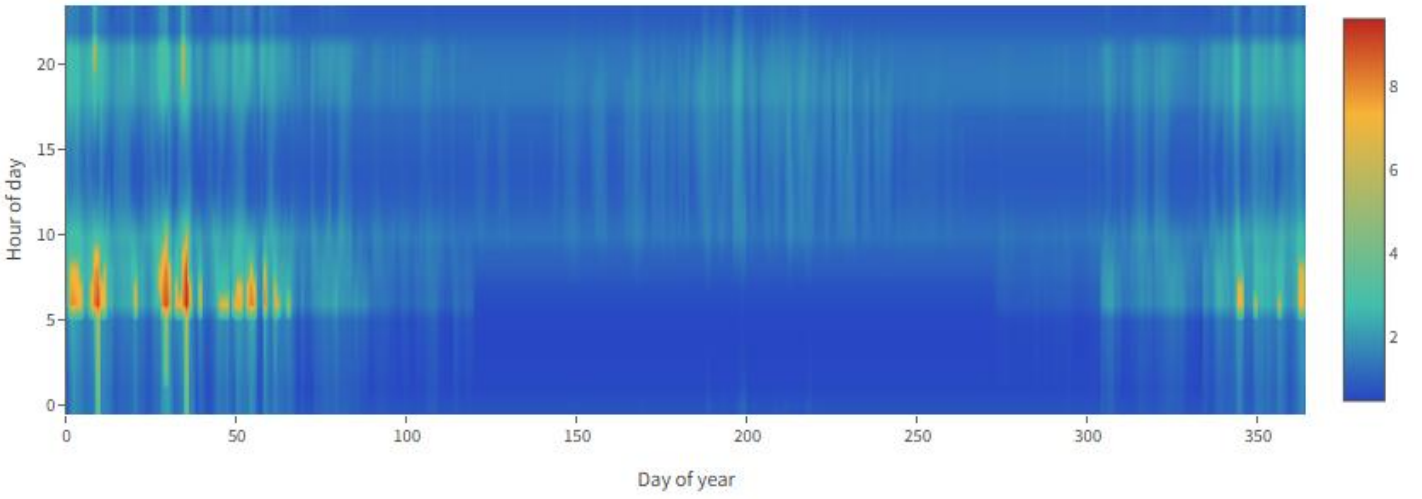

Figure 7 Hourly Electrical Load (kW) – Single Detached – Net Zero Ready All-Electric

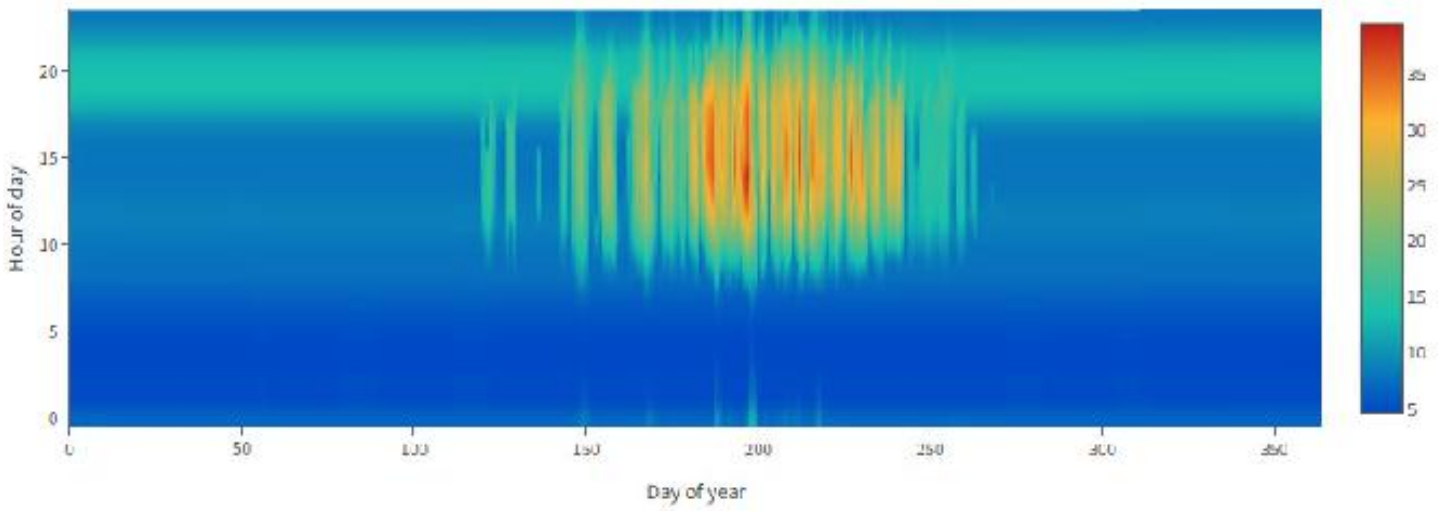

Figure 8 Hourly Electrical Load (kW) – Stacked Townhome – A1

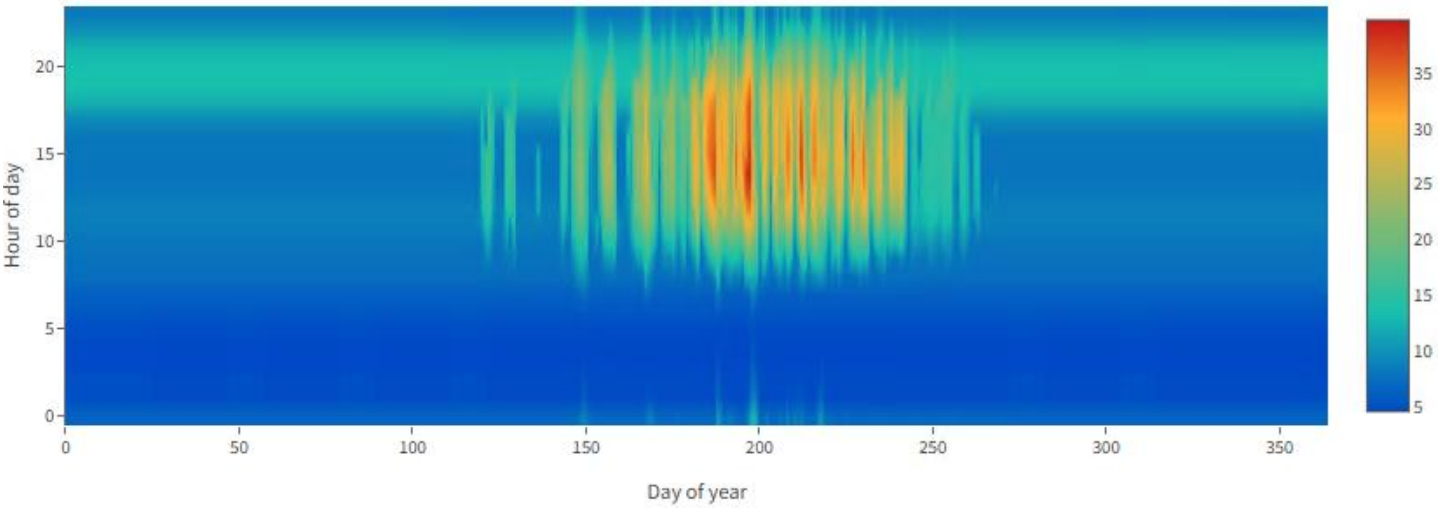

Figure 9 Hourly Electrical Load (kW) – Stacked Townhome – ENERGY STAR for New Homes

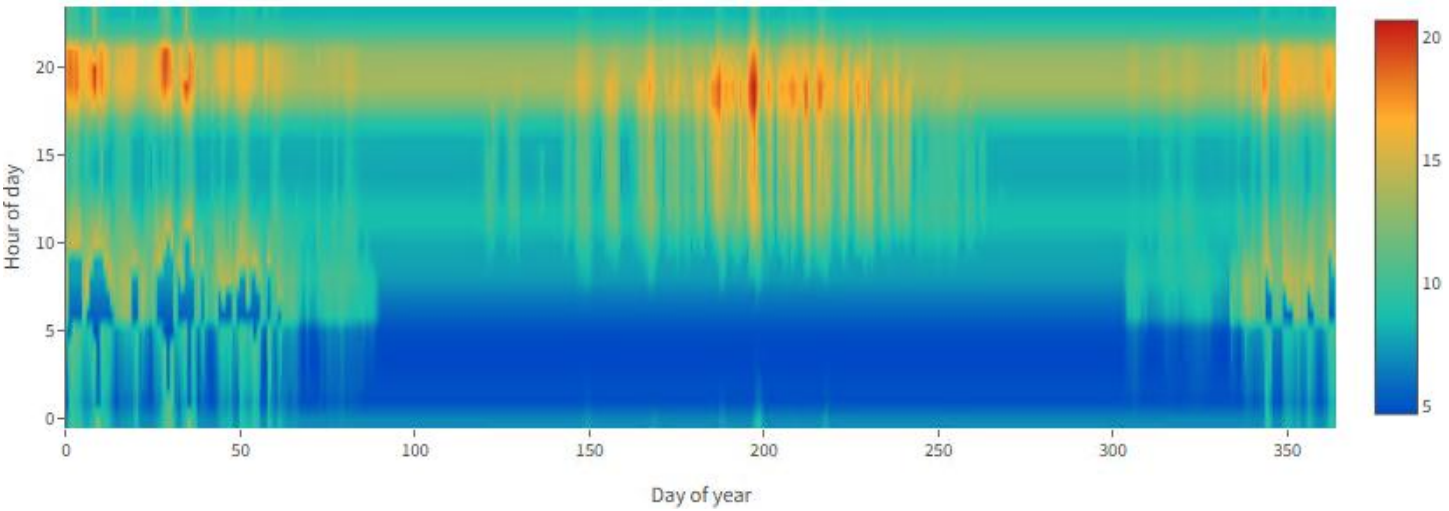

Figure 10 Hourly Electrical Load (kW) – Stacked Townhome – Net Zero Ready Dual Fuel

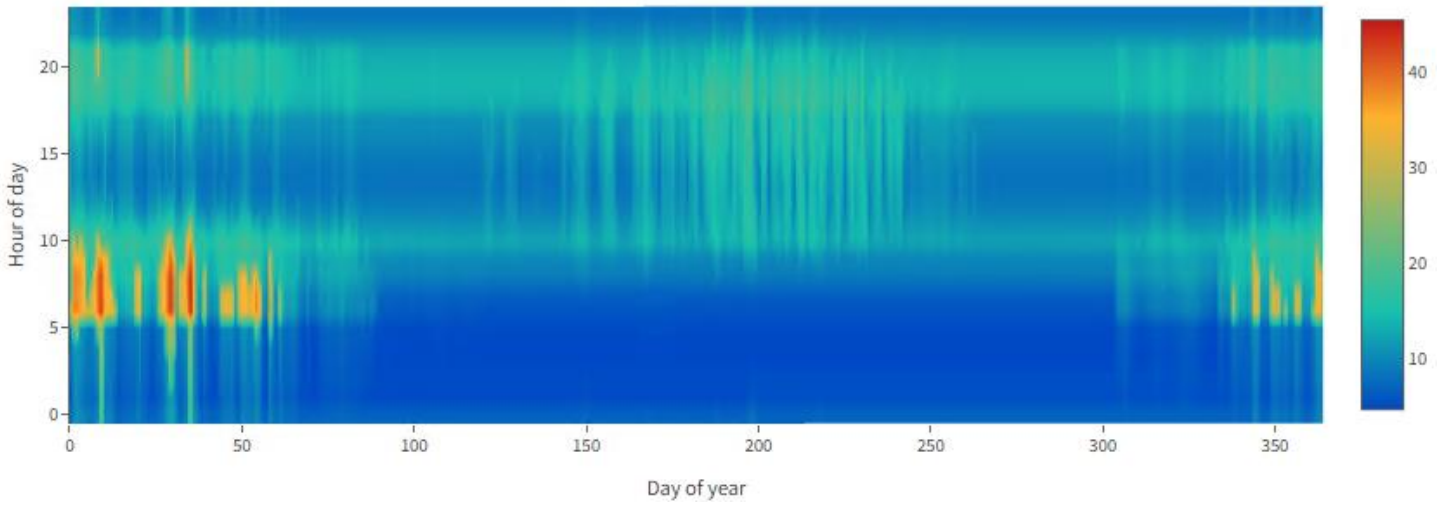

Figure 11 Hourly Electrical Load (kW) – Stacked Townhome – Net Zero Ready All-Electric

ABOUT

BUILDING KNOWLEDGE CANADA INC.

Building Knowledge Canada (BKC) originally began in 1986 as a division of Air Solutions, then incorporated interdependently in 2009. BKC is the largest residential energy evaluation/home performance company in Canada with over 90,000+ high performance home evaluations/ratings completed across Canada since it's creation.

The firm specializes in practical building sciences for residential buildings/homes including energy modeling, enclosure and HVAC design and forensics, indoor air quality & thermal comfort design, air tightness testing & air barrier design and forensics, HVAC residential commissioning, enclosure water management detailing & forensics; All with the clear goal of achieving energy efficiency, envelope durability and occupant health and comfort.

Building Knowledge Canada is a leader in building performance strategies working with Canadian Homebuilders across all Provinces and Territories. BKC supports well over 300 developers/builders with the following services

- Recognized Building Science Trainers: Natural Resources Canada
- High Performance Building Science Training For Builders, Trade Contractors, Architects, Sales/Marketing Teams, Real Estate Industry, Building Officials
- Building Science/Building Envelope Diagnostics & Testing
- Energy Software Modeling and Design Analysis Including Hot 2000 EkoTrope, and Retscreen
- Building Code Compliance – NBC 9.36 / OBC / IECC Energy Compliance: Performance/Prescriptive/Comparative
- Home Labelling Programs such as EnerGuide , R2000, Energy Star for New Homes, Net Zero Ready Homes, LEED, Passive House, Built Green and more
- Air Barrier/Tightness Detailing, Diagnostics and Evaluations
- CMHC Trained Indoor Air Quality Investigators: Training and Audits
- HVAC Design ,Review, System Diagnostics (HRAI Accredited

BKC contributes its expertise in Building Science Training and Building Code Analysis for several industry partners including both Federal & Provincial public institutions and private developer, manufacturers of construction material and HVAC equipment. Currently BKC is providing Building Science/Energy Efficiency Training and Consultation for the following clients:

- CMHC Canadian Mortgage & Housing Corp
- CHBA Canadian Home Builders Assoc
- Natural Resources Canada
- Mattamy Homes
- Quallico Group
- Brookfield Properties
- Minto Properties
- Great Gulf Properties
- ENBRIDGE
- EnerQuality Corporation
- Dupont / Dow
- Owens Corning
- Jeld-Wen
- EEBA Energy & Env Building Alliance
- New Brunswick Power
- BC British Columbia Housing
- ACBOA Association of Candian Building Officials Association

BKC team members have been instrumental in the development of numerous industry standards (NRC, CSA, etc.) and participate on various building code and advanced housing program committees:

- CHBA Net Zero Home Council and Program Management Committee
- National Building Code -Standing Comm Energy and Buildings
- ASHRAE 90.2 Residential low rise Energy Efficiency Standing committee
- ENERGY STAR® for New Homes Advisory Committee and TAC Committee Chair
- CSA F280 -2012 Development and Committee Chair
- CSA TC 424: Energy Systems in buildings and homes
- Ontario Building Code Part 9 2012 Advisory Committee, Part 7, 3 and 12 Review committees
- LEED for Homes Canadian Technical Review Committee

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