

Draft Building Carbon Pollution Standard for Part 9 buildings in British Columbia

Technical and financial data tables

Building and Safety Standards Branch

Province of British Columbia

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Preface

The following data tables for Part 9 buildings are designed to isolate and highlight some potential financial and technical implications of a tiered carbon pollution standard for buildings in British Columbia which local governments may opt-in to.

This document is meant to be an initial costing analysis by illustrating whether decarbonizing a hypothetical building is cost effective across climate zones in B.C.

This document should not be considered an exhaustive costing study to meet the carbon pollution levels in your area. This analysis is not representative of all buildings in all situations.

Local governments and the construction industry should conduct more detailed or specific costing analysis which builds on this initial analysis.

The analysis prioritizes the most commonly built archetypes and scenarios; Not all energy Steps, carbon Levels and archetypes were analyzed for all climate zones.

Document format

The following pages contain:

- A proposed table of GHGI/GHG targets that could be inserted into the BC Building Code
- An example of how several buildings would meet the levels of the proposed Building Carbon Pollution Standard

Authors and sources

The report was written by the Building and Safety Standards Branch of the Province of British Columbia, using data and analysis from the 2021 update to the BC Energy Step Code Metrics Research Report, written by Evoke Buildings and E3 Eco Group. More examples may be found in the Metrics Research Report. Thanks to Alex Blue, Einar Halbig, Donald Fast, and M'Beth Schoenfeld.

Assumptions

- *Electricity emissions factor: 0.011kg CO₂e/kWh as listed currently in the BC Building Code*
- *Natural Gas emissions factor: 0.185kg CO₂e/kWh as listed currently in the BC Building Code*
- *Renewable gas emissions factor: 0.001kg CO₂e/kWh (converted from 0.29kg CO₂e/GJ as described in the BC Best Practices Methodology for Quantifying Greenhouse Gas Emissions and rounded to the nearest thousandth)*
- *Cost of 100% conventional natural gas: \$0.042 \$/kWh*
- *Cost of 100% RNG blend: \$0.066 \$/kWh*
- *Cost of BC Hydro residential electricity: \$0.094 \$/kWh (Step 1) or \$0.141 \$/kWh (Step 2)*
- *Cost of BC Hydro commercial electricity: \$0.068 \$/kWh + 12.4 \$/kW*
- *Carbon tax rate: \$45 in 2021, \$50 in 2022, Linear increase to \$170 in 2030 Escalates to \$300 at final year of 20-year period (linear increase \$13/year)*

Other assumptions:

- *Other costing data, such as panel size or service upgrade charges, are not included in this analysis given the unique nature of those costs to each project.*
- *Electric vehicle (EV) charging is not included in energy models.*
- *All values throughout this document, as well as potential GHGI targets and compliance paths, use modeled values, which may differ from eventual metered results.*
- *Equipment efficiencies:*
 - *DHW: electric tank (0.82 EF), natural gas tank (0.67 EF), natural gas tankless (0.95 EF), ASHP integrated tank (1.90 EF)*
 - *Space Heating: natural gas furnace (95% AFUE), electric baseboard, Cold Climate ASHP for CZs 6-8 (COPs from NRCAN calculator based on NEEP data) with back up heat same as base case if needed, regular heat pump for CZs 4 and 5 (HSPF 7.1/SEER 14.5) with back up heat same as base case if needed*
- *Financial incentives were not included in this analysis as they change frequently*

Approach

Four levels of target

The GHG Levels are set as follows:

- Measure-only: Measuring GHG emissions with no reductions required
- Medium: The larger of either heating or DHW would use a low-carbon energy source.
- Low: Allows for smaller end uses such as cooking or gas dryers to use high-carbon energy, or allows use of a small portion of high-carbon energy for large end uses (e.g. backup heating) but requires low-carbon energy for most end-uses.
- Zero-carbon Ready: All energy end-uses on a low-carbon energy.

Building size

Building size is accounted for by setting an absolute base allowance and a maximum cap per unit for all buildings, then scaling the GHG targets linearly by size of dwelling between the base allowance and maximum cap for each level. The unit base allowance was set for 200 m² dwelling unit, the maximum cap based on a 400 m² dwelling unit.

The targets would be scaled by number of dwelling units in the building; e.g. a four-plex would have four times the base per-unit allowance.

Climate Zone

All Climate Zones use the same targets without scaling.

Prescriptive Option

A potential prescriptive option is considered to act as a backstop target for compliance, but is less flexible.

Modelling Guidelines Required

Modelling guidelines may be required to ensure alignment between projects, including:

- GHG emission factors.
- Modelling auxiliary loads such as cooking loads, fireplaces, dryers, etc. using the appropriate fuels.

- Modelling backup heating appropriately.
- Modelling or excluding exterior loads such as pools, fireplaces, or BBQs.

Reasoning

Target levels

- Each GHG Level was chosen to drive a technology or design choice towards lower carbon fuels.
- Targets are set using current Step 3 MEUI and TEDI targets, as well as an additional allowance for plug loads, lighting, and other base electric loads.
 - This means each GHGI target is designed to be realistic for a Step 3 home to achieve when it decarbonizes one or more systems such as domestic hot water or space conditioning
 - This also means that each GHGI target should, in theory, be even easier to achieve if a home meets Steps 4 or 5.

Building Size

- The base allowance per unit allows for fixed loads, such as domestic hot water or plug loads, that do not depend on the size of the dwelling. It assists modelling, design and construction of small, affordable housing units, while having minimal GHG impacts.
- The maximum cap per unit reflects that it is easier to achieve GHGI reductions in larger buildings.
- The GHGI variation between the minimum and maximum targets is used to drive efficient low-carbon building and mechanical design.

Climate Zone

- Using the same targets for all climates reduces complexity.
- Targets appear to be achievable in all Climate Zones for all archetypes.

- Fuel-switching causes significant reductions regardless of loads. Break points remain between the target levels that generally encourage decarbonization at the appropriate levels.
 - However, this can make more stringent targets in colder climate zones more challenging and introduce cost differentials.

Prescriptive option
- The prescriptive target levels are aligned with the intent of how each modeled target was set. The Medium Level proposes to require heating to be decarbonized regardless of whether heating or domestic hot water would be more impactful for a particular building. Heating would be more impactful for buildings with higher absolute GHG use, in particular larger homes as well as those in colder climates. Therefore, for the backstop prescriptive target, the larger total impact measure across all dwellings is proposed as the requirement.

Proposed targets

Table 9.37.1.3.
Greenhouse Gas Emissions
Forming part of Sentence 9.37.1.3.(1)

GHG Emission Level	PROPOSAL: GHG Emission Compliance Options				
	Maximum GHG Emissions by House, Expressed in kg CO _{2e} per House		Maximum GHG Emissions by House ¹		Reduction of GHG Emissions by Energy Source of Building Systems
			Maximum GHGi of the House, Expressed in kgCO _{2e} /m ² /year	Maximum GHG Emissions by House, Expressed in kgCO _{2e} per House	
Measure	Measure Only	or	Measure Only		N/A
medium	1050		6.0	2400	Decarbonize heating system energy source
low	440		2.5	800	Decarbonize heating and service water heating system energy source
zero carbon ready	265		1.5	500	Decarbonize all <i>building</i> systems energy sources

Notes to Table 9.37.1.3.:
(1) Compliance for this option is demonstrated by meeting both the GHGi and the GHG emission requirements for each house.

Renewable natural gas analysis

Using renewable natural gas (RNG) can lower the carbon emissions of a building compared to conventional natural gas. However, there is no mechanism available at the time of publishing (Sept. 2022) to ensure low-carbon energy will be used for the life of the building.

As of September 2022, a proposal from FortisBC to introduce RNG at scale is before the BC Utilities Commission (or BCUC), an independent agency of the provincial government responsible for regulating British Columbia's energy utilities. The BCUC has not issued a decision on the proposal yet.

If an agreement existed to use RNG for the life of the building, regardless of a change in owner or ratepayer, that could potentially assure the Authority Having Jurisdiction that the building would reliably meet a Level of the Building Carbon Pollution Standard.

However, to illustrate a potential future state, this document includes an analysis illustrating the potential blend of renewable gas (RNG) required to achieve the same stepped GHGI targets if all-gas equipment were used.

The annual modelled utility cost of RNG assumes an unlimited supply and is based on rates accurate at the time of publishing.

The archetype examples focus primarily on electrification decarbonization measures because the energy and cost implications for electrification measures are more complex and require significant analysis to understand.

Renewable natural gas (RNG) decarbonization measures are much simpler from an analysis perspective:

- Use of RNG does not require changes to natural gas baseline equipment and therefore do not incur incremental capital costs.

- Utility cost of RNG in our analysis ends up cost neutral with natural gas once escalating carbon taxes over a 20-year period are accounted for (see assumptions above for more detail.)
- Thus, RNG becomes a simple 1:1 substitution for the modeled base case, which is typically natural gas.
- Therefore, what blend of RNG, as a percentage of total natural gas, would be sufficient to meet GHG targets?

The percentage of RNG required to meet targets is shown as a range because it will depend on the size of the dwelling (50 m² to 225 m² is shown below), with smaller homes requiring less RNG to meet targets. The percentage required will also vary with project specifics and design; for example, a design that reduces natural gas heating loads would require a lower percentage of RNG. The below should be considered as a non-exhaustive example only. The below uses a Step 3 building as a base case.

Climate Zone	% RNG to meet Medium GHG Target	% RNG to meet Low GHG Target	% RNG to meet Zero Carbon Ready GHG Target
4	15% - 50%	70% - 80%	85% - 90%
5	20% - 80%	60% - 90%	70% - 90%
6	30% - 80%	65% - 90%	75% - 95%
7a	35% - 70%	75% - 90%	90% - 95%
7b	45% - 75%	80% - 90%	90% - 95%
8	50% - 80%	80% - 90%	90% - 95%

Example of archetypes

The tables below contain examples of modeled greenhouse gas emissions for a particular archetype, location, and set of design measures. The “base case” within the table uses a high-carbon fuel and varied initial Step-level design measures (envelope, heat recovery) to set an initial baseline prior to decarbonization. Decarbonization measures are then applied to heating and domestic hot water, separately and in combination. This is not an exhaustive list of options to meet targets but is meant to demonstrate a few example points, with key metrics including incremental capital cost, utility cost, and the GHG target level achieved. It should be noted that drain water heat recovery has been excluded from all options for consistency and comparability of results between different Steps but could certainly be applied on projects to reduce domestic hot water load and associated GHGs. In some cases, slightly different measures are provided at different Step levels due to available modelling runs from the Metrics Research Report modelling done.

Levels achieved are determined based on the allowance, GHGI, and maximum cap. Prescriptive compliance paths have yet to be fully developed and are not noted.

Some key points:

Targets achieved

- Each archetype in each Climate Zone shows at least one fully decarbonized, Zero Carbon Ready option.
- Each archetype shows at least one mid-range option, which will typically comply with the Medium target.
- Not all decarbonization measures have the same impact for each archetype and Climate Zone. Decarbonizing only the smaller of the two end uses may not be

sufficient. In many cases the higher impact of space heating or hot water will need to be decarbonized to meet targets.

- Most archetypes below achieve either no target, Medium, or Zero Carbon Ready. Only a few achieve the Low target. This is because the Low target is set to still require major systems to be decarbonized, but to allow some buffer for smaller end uses such as cooking, gas dryers, or some amount of backup heating. The archetypes modeled use electricity for these end uses by default and use cold climate heat pumps in Climate Zones 6 and above.

Carbon reduction impacts

A few examples of the amount of carbon reduction are below:

- Laneway home in Vancouver: **89% reduction** from Step 3 base case to Step 3 fully decarbonized.
- Large single family dwelling in Summerland: **95% reduction** from Step 3 base case to Step 3 fully decarbonized.
- Quadplex in Fort St. John: **93% reduction** from Step 3 base case to Step 3 fully decarbonized.
- Medium single family dwelling in Cranbrook: **70% reduction** from Step 3 base case to Step 3 Middle target.
- 10-unit MURB in Fort Nelson: **76% reduction** from Step 3 base case to Step 3 Middle target.

Cost impacts

- Maximum incremental capital cost for any of the below examples in all Climate Zones, including Zero-carbon ready targets, is 3.4%. Typical incremental capital cost for most archetypes is lower, generally below 1.5%.
- Utility costs typically range from approximately 30% savings to 30% increase in costs related to decarbonization. Climate Zones 7b and 8 show larger increases, ranging up to 60%. There is not a linear relationship between decarbonization and utility costs; with efficiency improvements as well as increasing carbon taxes there are a range of utility cost outcomes shown.
- Utility cost impacts tend to show:
 - Greatest increase when employing electric resistance space heating (which is less efficient than a heat pump)
 - Greatest decrease when using heat pumps for both space heating and hot water

Electric resistance heating

In general, heat pumps are used as a decarbonization measure for both heating and domestic hot water. There are a few examples that demonstrate the difference between electric resistance systems (such as electric baseboard) and heat pump for space heating. While these are somewhat less efficient, they generally can be applied as a decarbonization measure. They would typically have lower incremental cost and higher energy cost, and similar but slightly poorer GHG outcomes. The difference in GHG outcomes is likely to be negligible to most projects and electric resistance could be applied; in particular cases where

a design is right at the edge of a target it may not be useable. The same principles apply to using electric resistance for DHW.

Low target and backup heating

The “low” target is intended to allow for some backup or auxiliary high-carbon fuel use but for all major systems to be decarbonized. The modelling done for the Metrics Research Report Update used the low-carbon default fuels for auxiliary uses such as cooking, dryers, etc. Heat pumps modeled for the archetype buildings are cold-climate air-source heat pumps in Climate Zones 6 and above, and use electric resistance backup/supplemental heating where required.

The amount of backup high-carbon fuel allowed for (with the rest of the building fully decarbonized) is equivalent to approximately:

- For a large single family dwelling in Fort St. John (Climate Zone 7a)
 - 12% of Step 3 total annual heating load
 - 15% of Step 5 total annual heating load
- For a quadplex in Fort St. John (Climate Zone 7a)
 - 30% of a Step 4 total annual heating load
- For a large single family dwelling in Uranium City (Climate Zone 8)
 - Only allows for 3% of Step 3 total annual heating load.
 - These projects would likely use the prescriptive option to meet targets. Compliance is also possible if the project fully decarbonizes and does not use high-carbon backup fuel.

Laneway data tables: Climate Zone 4 (Vancouver)

	Step 3						Step 4						Step 5					
Target Level Achieved	None	Medium		Low	Zero Carbon Ready		None	Medium		Low	Zero Carbon Ready		None	Medium		Low	Zero Carbon Ready	
GHG Target (based on 70m ² unit size)	>1050 kgCO ₂ /yr	1050 kgCO ₂ e/yr		440 kgCO ₂ e/yr	265 kgCO ₂ e/yr		>1050 kgCO ₂ /yr	1050 kgCO ₂ e/yr		440 kgCO ₂ e/yr	265 kgCO ₂ e/yr		>1050 kgCO ₂ /yr	1050 kgCO ₂ e/ yr		440 kgCO ₂ e/yr	Zero Carbon Ready 265 kgCO ₂ e/yr	
		A	B		A	B		A	B		A	B		A	B			
Space heating equipment																		
Gas furnace	●		●	None modeled			All options meet targets	●		●			All options meet targets	●		None modeled		
Electric baseboard		●				●				●				●				
Air-source heat pump					●				●			●					●	
Water heating equipment																		
Tankless gas heater 95%	●	●						●	●					●	●			
Electric resistance			●			●				●		●						
ASHP					●				●			●					●	
Cost and performance data																		
Annual modelled GHG	1100	791	577		116	137		991	785	440	113	131		919	785		115	
Annual modelled GHGI	15.8	11.3	8.3		1.7	1.9		14.2	11.3	6.3	1.7	1.9		13.2	11.3		1.7	
Annual modelled utility cost (\$/m ²)	13.5	14.5	13.6		13.6	16.7		13.3	14	13.3	13.4	16.3		13.3	14		13.5	
Annual modelled utility cost increase vs. base case (%)	0%	7%	1%		1%	24%		0%	5%	0%	1%	23%		0%	5%		1.5%	
Total ICC vs. base case (\$/m ²)	0	0	11.1		56.1	0		0	0	11.1	45.0	0.0		0	44.3		56.1	
% ICC vs base case	0%	0%	0.3%		2.0%	0%		0%	0%	0.4%	2.0%	0.0%		0%	1.5%		1.9%	

Laneway data tables: Climate Zone 5 (Summerland)

	Step 3					Step 4					Step 5						
Target Level Achieved	None	Medium	Low	Zero Carbon Ready		None	Medium		Low	Zero Carbon Ready	None	Medium		Low	Zero Carbon Ready		
GHG Target (based on 70m ² unit size)	>1050 kgCO ₂ /yr	1050 kgCO ₂ /yr	440 kgCO ₂ /yr	265 kgCO ₂ /yr		>1050 kgCO ₂ /yr	1050 kgCO ₂ /yr		440 kgCO ₂ /yr	265 kgCO ₂ /yr	>1050 kgCO ₂ /yr	1050 kgCO ₂ /yr		440 kgCO ₂ /yr	265 kgCO ₂ /yr		
				A	B		A	B		A		A	B		A	B	
Space heating equipment																	
Gas furnace	●					●		●			All options meet targets	●					
Electric baseboard		●	None modeled	●			●		None modeled					●		●	
Air-source heat pump					●					●						●	
Water heating equipment																	
Tankless gas heater 95%	●	●				●	●					●	●				
Electric resistance				●											●		
ASHP					●			●		●						●	
Cost and performance data																	
Annual modelled GHG	1204	801		146	130	1156	792	491		126		952	793		132	123	
Annual modelled GHGI	17.3	11.5		2.1	1.9	16.6	11.4	7		1.8		13.7	11.4		1.9	1.8	
Annual modelled utility cost (\$/m ²)	14.1	15.4		17.5	14.9	13.6	14.6	Not calculated		14.5		13.3	14.7		16.8	14.3	
Annual modelled utility cost increase vs. base case (%)	0%	9%		24%	6%	0	7%	Not calculated		7%		0%	11%		26.3%	7.5%	
Total ICC vs. base case (\$/m ²)	0	0		0.0	60.2	0	9.2	57.5		69.9		0.0	48.9		0.0	60.8	
% ICC vs base case	0%	0%		0.0%	1.9%	0	0%	1.9%		2.3%		0.0%	1.6%		0.0%	2.0%	

Laneway data tables: Climate Zone 6 (Cranbrook)

	Step 3						Step 4						Step 5					
Target Level Achieved	None	Medium		Low	Zero Carbon Ready		None	Medium	Low	Zero Carbon Ready		None	Medium	Low	Zero Carbon Ready			
GHG Target (based on 70m ² unit size)	>1050 kgCO ₂ /yr	1050 kgCO ₂ e/yr		440 kgCO ₂ e/yr	265 kgCO ₂ e/yr		>1050 kgCO ₂ /yr	1050 kgCO ₂ e/yr	440 kgCO ₂ e/yr	265 kgCO ₂ e/yr		>1050 kgCO ₂ /yr	1050 kgCO ₂ e/yr	440 kgCO ₂ e/yr	265 kgCO ₂ e/ yr			
		A	B		A	B				A	B				A	B		
Space heating equipment																		
Gas furnace	●		●				●					●						
Electric baseboard				None modeled		●		●	None modeled		●		●	None modeled		●		
Air-source heat pump		●			●					●					●			
Water heating equipment																		
Tankless gas heater 95%	●	●					●	●				●	●					
Electric resistance						●					●					●		
ASHP			●		●					●					●			
Cost and performance data																		
Annual modelled GHG	1479	835	773		129	161	1269	840		128	149	1091	830		124	139		
Annual modelled GHGI	21.2	12	11.1		1.9	2.3	17.9	12.1		1.8	2.1	15.6	11.9		1.8	2		
Annual modelled utility cost (\$/m ²)	Not Calculated	15	Not Calculated		14.8	18	14.2	15.4		14.7	17.8	14.2	14.6		14.3	17.8		
Annual modelled utility cost increase vs. base case (%)	0%	Not Calculated	Not Calculated		Not Calculated	Not Calculated	0%	8%		3.5%	25.4%	0%	3%		0.7%	25.4%		
Total ICC vs. base case (\$/m ²)	0	38.2	12.4		50.7	-8.6	0	0		63.1	0.0	0	51.8		64.2	0.0		
% ICC vs base case	0%	1.2%	0.4%		1.6%	-0.3%	0%	0%		2.0%	0.0%	0%	3.0%		3.4%	1.4%		

Laneway data tables: Climate Zone 7a (Fort St. John)

	Step 3				Step 4				Step 5			
Target Level Achieved	None	Medium	Low	Zero Carbon Ready	None	Medium	Low	Zero Carbon Ready	None	Medium	Low	Zero Carbon Ready
GHG Target (based on 70m ² unit size)	>1050 kgCO ₂ /yr	1050 kgCO ₂ /yr	440 kgCO ₂ /yr	265 kgCO ₂ /yr	>1050 kgCO ₂ /yr	1050 kgCO ₂ /yr	440 kgCO ₂ /yr	265 kgCO ₂ /yr	>1050 kgCO ₂ /yr	1050 kgCO ₂ /yr	440 kgCO ₂ /yr	265 kgCO ₂ /yr
				A B								
Space heating equipment												
Gas furnace	●				●				●			
Electric baseboard		●	None modeled	● ●			None modeled	●		●	None modeled	●
Air-source heat pump						●						
Water heating equipment												
Tankless gas heater 95%	●	●			●	●			●	●		
Electric resistance				●								●
ASHP				●				●				
Cost and performance data												
Annual modelled GHG	1811	941		168 175	1565	921		159	1528	920		164
Annual modelled GHGI	26	13.5		2.4 2.5	22.4	13.2		2.3	21.9	13.2		2.4
Annual modelled utility cost (\$/m ²)	15.1	17.6		18.4 20.1	Not calculated	15.8		17.5	15.6	15.7		20.9
Annual modelled utility cost increase vs. base case (%)	0	17%		21.9% 33.1%	0%	Not calculated		Not calculated	0%	1%		34.0%
Total ICC vs. base case (\$/m ²)	0	12.5		28.8 0.0	0	71.0		20.1	0	70.7		0.0
% ICC vs base case	0%	0%		0.70% 0.0%	0%	2%		0.6%	0%	1.7%		0.0%

Laneway data tables: Climate Zone 7b (Fort Nelson)

	Step 3						Step 4				Step 5				
Target Level Achieved	None		Medium	Low	Zero Carbon Ready		None	Medium	Low	Zero Carbon Ready		None	Medium	Low	Zero Carbon Ready
GHG Target (based on 70m ² unit size)	>1050 kgCO ₂ /yr		1050 kgCO ₂ /yr	440 kgCO ₂ /yr	265 kgCO ₂ /yr		>1050 kgCO ₂ /yr	1050 kgCO ₂ /yr	440 kgCO ₂ /yr	265 kgCO ₂ /yr		>1050 kgCO ₂ /yr	1050 kgCO ₂ /yr	440 kgCO ₂ /yr	265 kgCO ₂ /yr
	A	B			A	B				A	B				
Space heating equipment															
Gas furnace	●	●					●					●			
Electric baseboard			●	None modeled	●				None modeled	●				None modeled	●
Air-source heat pump						●		●			●		●		
Water heating equipment															
Tankless gas heater 95%	●		●				●	●				●	●		
Electric resistance										●					●
ASHP		●			●	●					●				
Cost and performance data															
Annual modelled GHG	2137	1318	980		188	160	1986	958		190	158	1733	949		175
Annual modelled GHGI	30.7	18.9	14.1		2.7	2.3	28.5	13.7		2.7	2.3	24.9	13.6		2.5
Annual modelled utility cost (\$/m ²)	Not calculated	Not calculated	19.4		20.2	17.7	16.3	17.4		21.8	17.5	16.2	16.6		22.2
Annual modelled utility cost increase vs. base case (%)	0	19.4	Not calculated		Not calculated	Not calculated	0%	Not calculated		Not calculated	Not calculated	0%	2%		37.0%
Total ICC vs. base case (\$/m ²)	0	16.6	0		16.6	84.2	0	71.9		0.0	88.5	0	71.9		0.0
% ICC vs base case	0%	0.4%	0%		0.4%	2.0%	0%	1.7%		0.0%	2.1%	0%	1.7%		0.0%

Laneway data tables: Climate Zone 8 (Uranium City)

	Step 3					Step 4				Step 5				
Target Level Achieved	None	Medium	Low	Zero Carbon Ready		None	Medium	Low	Zero Carbon Ready	None	Medium	Low	Zero Carbon Ready	
GHG Target (based on 70m ² unit size)	>1050 kgCO ₂ /yr	1050 kgCO ₂ /yr	440 kgCO ₂ /yr	265 kgCO ₂ /yr		>1050 kgCO ₂ /yr	1050 kgCO ₂ /yr	440 kgCO ₂ /yr	265 kgCO ₂ /yr	>1050 kgCO ₂ /yr	1050 kgCO ₂ /yr	440 kgCO ₂ /yr	265 kgCO ₂ / yr	
				A	B								A	B
Space heating equipment														
Gas furnace	●					●				●				
Electric baseboard		●	None modeled	●	●			None modeled				None modeled		●
Air-source heat pump							●		●		●		●	
Water heating equipment														
Tankless gas heater 95%	●	●				●	●			●	●			
Electric resistance					●									●
ASHP				●					●				●	
Cost and performance data														
Annual modelled GHG	2724	1026		221	227	2227	987		173	1950	976		163	187
Annual modelled GHGI	39.1	14.7		3.2	3.3	31.9	14.2		2.5	28	14		2.3	2.7
Annual modelled utility cost (\$/m ²)	17.8	22.2		23.2	24.6	17.1	18.6		18.9	16.3	17.6		17.9	23.7
Annual modelled utility cost increase vs. base case (%)	0	24.7%		30.3%	38.2%	0	8.8%		10.5%	0%	8%		9.8%	45.4%
Total ICC vs. base case (\$/m ²)	0	0.0		16.6	0.0	0	80		97.1	0	71.9		88.5	0.0
% ICC vs base case	0%	0.0%		0.4%	0.0%	0%	2%		2.2%	0%	1.7%		2.1%	0.0%

Small Single Family Dwelling data tables: Climate Zone 4 (Vancouver)

	Step 3					Step 4					Step 5					
Target Level Achieved	None	Medium		Low	Zero Carbon Ready	None	Medium		Low	Zero Carbon Ready	None	Medium		Low	Zero Carbon Ready	
GHG Target (based on 102m ² unit size)	>1050 kgCO ₂ /yr	1050 kgCO ₂ e/yr		440 kgCO ₂ e/yr	265 kgCO ₂ e/yr	>1050 kgCO ₂ /yr	1050 kgCO ₂ e/yr		440 kgCO ₂ e/yr	265 kgCO ₂ e/yr	>1050 kgCO ₂ /yr	1050 kgCO ₂ e/yr		440 kgCO ₂ e/yr	265 kgCO ₂ e/yr	
		A	B				A	B				A	B			
Space heating equipment																
Gas furnace	●	●				●	●				All modeled options meet	●				
Electric baseboard				None modeled					None modeled						None modeled	
Air-source heat pump		●			●		●			●		●				●
Water heating equipment																
Tankless gas heater 95%	●	●				●	●					●				
Electric resistance																
ASHP		●			●		●			●					●	
Cost and performance data																
Annual modelled GHG	1278	809	794		126	1095	799	595		129		972	796		125	
Annual modelled GHGI	12.5	7.9	7.8		1.2	10.7	7.8	5.8		1.3		9.5	7.8		1.2	
Annual modelled utility cost (\$/m ²)	9.4	10.3	10.1		9.9	9.3	10.4	10.2		10.1		9.5	10.2		9.9	
Annual modelled utility cost increase vs. base case (%)	0	9.6%	7%		5.3%	0.0%	11.8%	9.7%		8.6%		0.0%	7.4%		4.2%	
Total ICC vs. base case (\$/m ²)	0	7.6	30.8		38.4	0.0	30.8	7.6		38.4		0.0	30.8		38.4	
% ICC vs base case	0%	0.4%	1.4%		0.6%	0%	1.4%	0.3%		0.6%		0.0%	1.4%		1.7%	

Small Single Family Dwelling data tables: Climate Zone 5 (Summerland)

	Step 3				Step 4				Step 5			
Target Level Achieved	None	Medium	Low	Zero Carbon Ready	None	Medium	Low	Zero Carbon Ready	None	Medium	Low	Zero Carbon Ready
GHG Target (based on 102m ² unit size)	>1050 kgCO ₂ /yr	1050 kgCO ₂ /yr	440 kgCO ₂ /yr	265 kgCO ₂ /yr	>1050 kgCO ₂ /yr	1050 kgCO ₂ /yr	440 kgCO ₂ /yr	265 kgCO ₂ /yr	>1050 kgCO ₂ /yr	1050 kgCO ₂ /yr	440 kgCO ₂ /yr	265 kgCO ₂ /yr
						A	B			A	B	
Space heating equipment												
Gas furnace	●	●			●	●			●	●		
Electric baseboard			None modeled				None modeled				None modeled	
Air-source heat pump				●		●		●		●		●
Water heating equipment												
Tankless gas heater 95%	●				●	●			●			
Electric resistance												
ASHP		●		●		●		●		●	●	●
Cost and performance data												
Annual modelled GHG	1385	921		145	1222	808	744	139	1104	806	602	137
Annual modelled GHGI	13.6	9		1.4	12	7.9	7.3	1.4	10.8	7.9	5.9	1.3
Annual modelled utility cost (\$/m ²)	9.7	10.6		11.1	9.5	10.9	10.4	10.8	9.4	10.8	10.2	10.6
Annual modelled utility cost increase vs. base case (%)	0	9.3%		14.4%	0	14.7%	9.5%	13.7%	0.0%	14.9%	8.5%	12.8%
Total ICC vs. base case (\$/m ²)	0	8.1		41.2	0	33.1	8.1	41.2	0.0	33.1	8.1	41.2
% ICC vs base case	0%	0.3%		1.7%	0%	1%	0%	1.8%	0.0%	1.4%	0.3%	1.7%

Small Single Family Dwelling data tables: Climate Zone 6 (Cranbrook)

	Step 3					Step 4				Step 5			
Target Level Achieved	None		Medium	Low	Zero Carbon Ready	None	Medium	Low	Zero Carbon Ready	None	Medium	Low	Zero Carbon Ready
GHG Target (based on 102m ² unit size)	>1050 kgCO ₂ /yr		1050 kgCO ₂ /yr	440 kgCO ₂ /yr	265 kgCO ₂ /yr	>1050 kgCO ₂ /yr	1050 kgCO ₂ /yr	440 kgCO ₂ /yr	265 kgCO ₂ /yr	>1050 kgCO ₂ /yr	1050 kgCO ₂ /yr	440 kgCO ₂ /yr	265 kgCO ₂ /yr
	A	B											
Space heating equipment													
Gas furnace	●	●				●	●			●	●		
Electric baseboard			None modeled	None modeled				None modeled				None modeled	
Air-source heat pump					●				●				●
Water heating equipment													
Tankless gas heater 95%	●					●				●			
Electric resistance													
ASHP		●			●		●		●		●		●
Cost and performance data													
Annual modelled GHG	1642	1189			147	1411	936		142	1340	855		138
Annual modelled GHGI	16.1	11.6			1.4	13.8	9.2		1.4	13.1	8.4		1.4
Annual modelled utility cost (\$/m ²)	10	11			11.2	9.7	10.7		10.9	9.6	10.6		10.7
Annual modelled utility cost increase vs. base case (%)	0	10.0%			12.0%	0	10.3%		12.4%	0.0%	10.4%		11.5%
Total ICC vs. base case (\$/m ²)	0	8.5			43.2	0	8.5		43.2	0.0	8.5		43.2
% ICC vs base case	0%	0.3%			1.7%	0%	0%		1.8%	0.0%	0.3%		1.7%

Small Single Family Dwelling data tables: Climate Zone 7a (Fort St. John)

	Step 3					Step 4				Step 5			
Target Level Achieved	None		Medium	Low	Zero Carbon Ready	None	Medium	Low	Zero Carbon Ready	None	Medium	Low	Zero Carbon Ready
GHG Target (based on 102m ² unit size)	>1050 kgCO ₂ /yr		1050 kgCO ₂ /yr	440 kgCO ₂ /yr	265 kgCO ₂ /yr	>1050 kgCO ₂ /yr	1050 kgCO ₂ /yr	440 kgCO ₂ /yr	265 kgCO ₂ /yr	>1050 kgCO ₂ /yr	1050 kgCO ₂ /yr	440 kgCO ₂ /yr	265 kgCO ₂ /yr
	A	B											
Space heating equipment													
Gas furnace	●	●				●	●			●			
Electric baseboard				None modeled				None modeled				None modeled	
Air-source heat pump			●		●				●		●		●
Water heating equipment													
Tankless gas heater 95%	●		●			●				●	●		
Electric resistance													
ASHP		●			●		●		●				●
Cost and performance data													
Annual modelled GHG	2124	1677	896		161	1939	936		158	1882	932		154
Annual modelled GHGI	20.8	16.4	8.8		1.6	19	9.2		1.5	18.4	9.1		1.5
Annual modelled utility cost (\$/m ²)	10.6	11.7	Not calculated		12.1	11.1	11.7		11.9	11	11.4		11.6
Annual modelled utility cost increase vs. base case (%)	0	10.4%	Not calculated		14.2%	0	5.4%		7.2%	0.0%	3.6%		5.5%
Total ICC vs. base case (\$/m ²)	0	11.4	47.0		58.4	0	49.1		60.4	0.0	49.5		61.3
% ICC vs base case	0%	0%	1.4%		1.8%	0%	1.5%		1.8%	0.0%	1.4%		1.8%

Small Single Family Dwelling data tables: Climate Zone 7b (Fort Nelson)

	Step 3					Step 4					Step 5			
Target Level Achieved	None		Medium	Low	Zero Carbon Ready	None		Medium	Low	Zero Carbon Ready	None	Medium	Low	Zero Carbon Ready
GHG Target (based on 102m ² unit size)	>1050 kgCO ₂ /yr		1050 kgCO ₂ e/yr	440 kgCO ₂ e/yr	265 kgCO ₂ e/yr	>1050 kgCO ₂ /yr		1050 kgCO ₂ e/yr	440 kgCO ₂ e/yr	265 kgCO ₂ e/yr	>1050 kgCO ₂ /yr	1050 kgCO ₂ e/yr	440 kgCO ₂ e/yr	265 kgCO ₂ e/yr
	A	B				A	B							
Space heating equipment														
Gas furnace	●	●				●	●				No simulated options meet Step 5			
Electric baseboard				None modeled					None modeled					
Air-source heat pump			●		●			●		●				
Water heating equipment														
Tankless gas heater 95%	●		●			●		●						
Electric resistance														
ASHP		●			●		●			●				
Cost and performance data														
Annual modelled GHG	2573	2138	1004		191	2258	1817	975		179				
Annual modelled GHGI	25.2	20.9	9.8		1.9	22.1	17.8	9.5		1.8				
Annual modelled utility cost (\$/m ²)	11.1	12.3	Not calculated		14	10.7	11.9	12.9		13.2				
Annual modelled utility cost increase vs. base case (%)	0	10.8%	Not calculated		26.1%	0	11.2%	20.6%		23.4%				
Total ICC vs. base case (\$/m ²)	0	11.4	46.3		57.7	0	11.4	46.3		57.7				
% ICC vs base case	0%	0%	1.4%		1.8%	0%	0%	1.4%		1.7%				

Small Single Family Dwelling data tables: Climate Zone 8 (Uranium City)

	Step 3					Step 4					Step 5				
Target Level Achieved	None		Medium	Low	Zero Carbon Ready	None		Medium	Low	Zero Carbon Ready	None	Medium	Low	Zero Carbon Ready	
GHG Target (based on 102m ² unit size)	>1050 kgCO ₂ /yr		1050 kgCO ₂ e/yr	440 kgCO ₂ e/yr	265 kgCO ₂ e/yr	>1050 kgCO ₂ /yr		1050 kgCO ₂ e/yr	440 kgCO ₂ e/yr	265 kgCO ₂ e/yr	>1050 kgCO ₂ /yr	1050 kgCO ₂ e/yr	440 kgCO ₂ e/yr	265 kgCO ₂ e/yr	
	A	B				A	B								
Space heating equipment															
Gas furnace	●	●				●	●				No simulated options meet Step 5				
Electric baseboard				None modeled					None modeled						
Air-source heat pump			●		●			●		●					
Water heating equipment															
Tankless gas heater 95%	●		●			●		●							
Electric resistance															
ASHP		●			●		●			●					
Cost and performance data															
Annual modelled GHG	2887	2480	1037		207	2394	1955	996		188					
Annual modelled GHGI	28.2	24.3	10.1		2	23.4	19.1	9.7		1.8					
Annual modelled utility cost (\$/m ²)	11.4	12.7	Not calculated		15	10.9	12.1	13.3		13.8					
Annual modelled utility cost increase vs. base case (%)	0	11.4%	Not calculated		31.6%	0	11.0%	22.0%		26.6%					
Total ICC vs. base case (\$/m ²)	0	11.4	46.3		57.6	0	11.4	46.3		57.7					
% ICC vs base case	0%	0%	1.4%		1.8%	0%	0%	1.4%		1.7%					

Medium Single Family Dwelling data tables: Climate Zone 4 (Vancouver)

	Step 3					Step 4					Step 5					
Target Level Achieved	None		Medium	Low	Zero Carbon Ready	None		Medium	Low	Zero Carbon Ready	None		Medium	Low	Zero Carbon Ready	
GHG Target (based on 237m ² unit size)	>1422 kgCO ₂ /yr		1422 kgCO ₂ /yr	592 kgCO ₂ /yr	355 kgCO ₂ /yr	>1422 kgCO ₂ /yr		1422 kgCO ₂ /yr	592 kgCO ₂ /yr	355 kgCO ₂ /yr	>1422 kgCO ₂ /yr		1422 kgCO ₂ /yr	592 kgCO ₂ /yr	355 kgCO ₂ /yr	
	A	B					A	B				A	B			
Space heating equipment																
Gas furnace	●	●				●	●				All modeled options meet	●				
Electric baseboard				None modeled					None modeled						None modeled	
Air-source heat pump			●		●		●		●				●			●
Water heating equipment																
Tankless gas heater 95%	●		●			●	●					●	●			
Electric resistance																
ASHP		●			●		●		●						●	
Cost and performance data																
Annual modelled GHG	2119	1631	803		138	1712	1206	800		134		1374	793		127	
Annual modelled GHGI	8.9	6.9	3.4		0.6	7.2	5.1	3.4		0.6		5.8	3.3		0.5	
Annual modelled utility cost (\$/m ²)	4.5	4.9	4.6		4.6	4.4	4.8	4.5		4.5		Not calculated	4.3		4.3	
Annual modelled utility cost increase vs. base case (%)	0	8.9%	2.2%		2.2%	0	9.1%	2.3%		2.3%		0%	Not calculated		Not calculated	
Total ICC vs. base case (\$/m ²)	0	1.4	10.0		13.2	0	2.3	11		2.3		0.0	13.2		16.3	
% ICC vs base case	0%	0.1%	0.4%		0.6%	0%	0.1%	1%		0.6%		0.0%	0.6%		0.8%	

Medium Single Family Dwelling data tables: Climate Zone 5 (Summerland)

	Step 3					Step 4					Step 5				
Target Level Achieved	None		Medium	Low	Zero Carbon Ready	None		Medium	Low	Zero Carbon Ready	None	Medium	Low	Zero Carbon Ready	
GHG Target (based on 237m ² unit size)	>1422 kgCO ₂ /yr		1422 kgCO ₂ e/yr	592 kgCO ₂ e/yr	355 kgCO ₂ e/yr	>1422 kgCO ₂ /yr		1422 kgCO ₂ e/yr	592 kgCO ₂ e/yr	355 kgCO ₂ e/yr	>1422 kgCO ₂ /yr	1422 kgCO ₂ e/yr	592 kgCO ₂ e/yr	355 kgCO ₂ e/yr	
	A	B				A	B								
Space heating equipment															
Gas furnace	●	●				●	●				●				
Electric baseboard				None modeled					None modeled				None modeled		
Air-source heat pump			●		●			●		●		●		●	
Water heating equipment															
Tankless gas heater 95%	●		●			●		●			●	●			
Electric resistance															
ASHP		●			●		●			●				●	
Cost and performance data															
Annual modelled GHG	2372	1884	822		156	1958	1463	816		150	1611	807		141	
Annual modelled GHGI	10	8	3.5		0.7	8.3	6.2	3.4		0.6	6.8	3.4		0.6	
Annual modelled utility cost (\$/m ²)	4.6	5	5.1		5.1	4.5	4.9	4.9		4.9	4.4	4.7		4.7	
Annual modelled utility cost increase vs. base case (%)	0	8.7%	10.9%		10.9%	0	8.9%	8.9%		8.9%	0%	6.8%		6.8%	
Total ICC vs. base case (\$/m ²)	0	3.5	14.3		17.8	0	3.5	14		17.8	0	14.4		18.0	
% ICC vs base case	0%	0.2%	0.6%		0.8%	0%	0.2%	0.6%		0.8%	0%	0.6%		0.7%	

Medium Single Family Dwelling data tables: Climate Zone 6 (Cranbrook)

	Step 3					Step 4					Step 5			
Target Level Achieved	None		Medium	Low	Zero Carbon Ready	None		Medium	Low	Zero Carbon Ready	None	Medium	Low	Zero Carbon Ready
GHG Target (based on 237m ² unit size)	>1422 kgCO ₂ /yr		1422 kgCO ₂ e/yr	592 kgCO ₂ e/yr	355 kgCO ₂ e/yr	>1422 kgCO ₂ /yr		1422 kgCO ₂ e/yr	592 kgCO ₂ e/yr	355 kgCO ₂ e/yr	>1422 kgCO ₂ /yr	1422 kgCO ₂ e/yr	592 kgCO ₂ e/yr	355 kgCO ₂ e/yr
	A	B				A	B							
Space heating equipment														
Gas furnace	●	●				●	●				●			
Electric baseboard				None modeled					None modeled				None modeled	
Air-source heat pump			●		●			●		●		●		●
Water heating equipment														
Tankless gas heater 95%	●		●			●		●			●	●		
Electric resistance														
ASHP		●			●		●			●				●
Cost and performance data														
Annual modelled GHG	2958	2479	873		170	2395	1904	858		154	1852	849		146
Annual modelled GHGI	12.5	10.5	3.7		0.7	10.1	8	3.6		0.7	7.8	3.6		0.6
Annual modelled utility cost (\$/m ²)	5	5.4	5.4		5.5	4.6	5.1	5		5	4.7	4.8		4.8
Annual modelled utility cost increase vs. base case (%)	0	8.0%	8.0%		10.0%	0	10.9%	8.7%		8.7%	0%	2.1%		2.1%
Total ICC vs. base case (\$/m ²)	0	3.8	15.0		18.6	0	3.7	15		18.6	0	15.3		19.0
% ICC vs base case	0%	0.1%	0.6%		0.7%	0%	0.2%	0.6%		0.8%	0%	0.7%		0.8%

Medium Single Family Dwelling data tables: Climate Zone 7a (Fort St. John)

	Step 3					Step 4					Step 5			
Target Level Achieved	None		Medium	Low	Zero Carbon Ready	None		Medium	Low	Zero Carbon Ready	None	Medium	Low	Zero Carbon Ready
GHG Target (based on 237m ² unit size)	>1422 kgCO ₂ /yr		1422 kgCO ₂ e/yr	592 kgCO ₂ e/yr	355 kgCO ₂ e/yr	>1422 kgCO ₂ /yr		1422 kgCO ₂ e/yr	592 kgCO ₂ e/yr	355 kgCO ₂ e/yr	>1422 kgCO ₂ /yr	1422 kgCO ₂ e/yr	592 kgCO ₂ e/yr	355 kgCO ₂ e/yr
	A	B				A	B							
Space heating equipment														
Gas furnace	●	●				●	●				●			
Electric baseboard				None modeled					None modeled				None modeled	
Air-source heat pump			●		●			●		●		●		●
Water heating equipment														
Tankless gas heater 95%	●		●			●		●			●	●		
Electric resistance														
ASHP		●			●		●			●				●
Cost and performance data														
Annual modelled GHG	3567	3078	687		197	3005	2505	962		185	2583	951		174
Annual modelled GHGI	15.1	13	2.9		0.8	12.7	10.6	4.1		0.8	10.9	4		0.7
Annual modelled utility cost (\$/m ²)	5.2	5.7	Not calculated		6.2	5.2	5.5	5.7		5.9	5	5.4		5.6
Annual modelled utility cost increase vs. base case (%)	0	9.6%	Not calculated		19.2%	0	5.8%	9.6%		13.5%	0%	8.0%		12.0%
Total ICC vs. base case (\$/m ²)	0	4.7	19.7		24.4	0	6.1	21		26.0	0	20.8		25.7
% ICC vs base case	0%	0.1%	0.6%		0.7%	0%	0.1%	0.6%		0.7%	0%	0.6%		0.7%

Medium Single Family Dwelling data tables: Climate Zone 7b (Fort Nelson)

		Step 3				Step 4				Step 5			
Target Level Achieved	None		Medium	Low	Zero Carbon Ready	None	Medium	Low	Zero Carbon Ready	None	Medium	Low	Zero Carbon Ready
GHG Target (based on 237m ² unit size)	>1422 kgCO ₂ /yr		1422 kgCO ₂ /yr	592 kgCO ₂ /yr	355 kgCO ₂ /yr	>1422 kgCO ₂ /yr	1422 kgCO ₂ /yr	592 kgCO ₂ /yr	355 kgCO ₂ /yr	>1422 kgCO ₂ /yr	1422 kgCO ₂ /yr	592 kgCO ₂ /yr	355 kgCO ₂ /yr
	A	B											
Space heating equipment													
Gas furnace	●	●				●				●			
Electric baseboard				None modeled				None modeled				None modeled	
Air-source heat pump			●		●		●		●		●		●
Water heating equipment													
Tankless gas heater 95%	●		●			●	●			●	●		
Electric resistance													
ASHP		●			●				●				●
Cost and performance data													
Annual modelled GHG	4592	4119	1039		245	3787	1015		222	3169	995		201
Annual modelled GHGI	19.4	17.4	4.4		1	16	4.3		0.9	13.4	4.2		0.8
Annual modelled utility cost (\$/m ²)	5.8	6.3	7.3		7.5	5.5	6.7		6.9	5.2	6.1		6.3
Annual modelled utility cost increase vs. base case (%)	0	8.6%	25.9%		29.3%	0	21.8%		25.5%	0%	17.3%		21.2%
Total ICC vs. base case (\$/m ²)	0	4.9	20.0		24.9	0	21		26.1	0	21.2		26.1
% ICC vs base case	0%	0.2%	0.6%		0.8%	0%	0.6%		0.8%	0%	0.6%		0.8%

Medium Single Family Dwelling data tables: Climate Zone 8 (Uranium City)

	Step 3					Step 4					Step 5			
Target Level Achieved	None		Medium	Low	Zero Carbon Ready	None		Medium	Low	Zero Carbon Ready	None	Medium	Low	Zero Carbon Ready
GHG Target (based on 237m ² unit size)	>1422 kgCO ₂ /yr		1422 kgCO ₂ e/yr	592 kgCO ₂ e/yr	355 kgCO ₂ e/yr	>1422 kgCO ₂ /yr		1422 kgCO ₂ e/yr	592 kgCO ₂ e/yr	355 kgCO ₂ e/yr	>1422 kgCO ₂ /yr	1422 kgCO ₂ e/yr	592 kgCO ₂ e/yr	355 kgCO ₂ e/yr
	A	B	A		A	A	B							
Space heating equipment														
Gas furnace	●	●				●	●				●			
Electric baseboard				None modeled					None modeled				None modeled	
Air-source heat pump			●		●			●		●		●		●
Water heating equipment														
Tankless gas heater 95%	●		●			●		●			●	●		
Electric resistance														
ASHP		●			●		●			●				●
Cost and performance data														
Annual modelled GHG	4929	4482	1085		278	4126	3671	1058		251	3499	1035		227
Annual modelled GHGI	20.8	18.9	4.6		1.2	17.4	15.5	4.5		1.1	14.8	4.4		1
Annual modelled utility cost (\$/m ²)	6	6.5	8.1		8.4	5.6	6.1	7.4		7.6	5.4	6.8		7
Annual modelled utility cost increase vs. base case (%)	0	8.3%	35.0%		40.0%	0	8.9%	32.1%		35.7%	0%	25.9%		29.6%
Total ICC vs. base case (\$/m ²)	0	4.9	20.0		24.9	0	4.9	20.0		24.9	0	21.2		26.1
% ICC vs base case	0%	0.2%	0.6%		0.8%	0%	0%	0.6%		0.8%	0%	0.7%		0.8%

Large Single Family Dwelling data tables: Climate Zone 4 (Vancouver)

	Step 3					Step 4					Step 5				
Target Level Achieved	None		Medium	Low	Zero Carbon Ready	None		Medium	Low	Zero Carbon Ready	None	Medium		Low	Zero Carbon Ready
GHG Target (based on 511m ² unit size)	>2400 kgCO ₂ /yr		2400 kgCO ₂ /yr	800 kgCO ₂ /yr	500 kgCO ₂ /yr	>2400 kgCO ₂ /yr		2400 kgCO ₂ /yr	800 kgCO ₂ /yr	500 kgCO ₂ /yr	>2400 kgCO ₂ /yr	2400 kgCO ₂ /yr		800 kgCO ₂ /yr	500 kgCO ₂ /yr
	A	B	A		A	A	B					A	B		
Space heating equipment															
Gas furnace	●	●				●	●				●	●			
Electric baseboard				None modeled					None modeled						
Air-source heat pump			●		●			●		●			●		●
Water heating equipment															
Tankless gas heater 95%	●		●			●		●			●		●		
Electric resistance															
ASHP		●			●		●			●		●			●
Cost and performance data															
Annual modelled GHG	3637	3156	838		172	2906	2413	823		157	2442	1898	812		146
Annual modelled GHGI	7.1	6.2	1.6		0.3	5.7	4.7	1.6		0.3	4.8	3.7	1.6		0.3
Annual modelled utility cost (\$/m ²)	2.5	2.7	2.6		2.6	2.3	2.5	2.4		2.4	2.3	2.4	2.2		2.2
Annual modelled utility cost increase vs. base case (%)	0	8.0%	4%		4.0%	0	8.7%	4.3%		4.3%	0%	4.3%	-4.3%		-4.3%
Total ICC vs. base case (\$/m ²)	0	1.5	6.2		7.7	0	1.5	6		7.7	0	1.5	6.2		7.7
% ICC vs base case	0%	0.1%	0.3%		0.4%	0%	0%	0.2%		0.3%	0%	0.1%	0.3%		0.4%

Large Single Family Dwelling data tables: Climate Zone 5 (Summerland)

	Step 3					Step 4					Step 5				
Target Level Achieved	None		Medium	Low	Zero Carbon Ready	None		Medium	Low	Zero Carbon Ready	None	Medium	Low	Zero Carbon Ready	
GHG Target (based on 511m ² unit size)	>2400 kgCO ₂ /yr		2400 kgCO ₂ e/yr	800 kgCO ₂ e/yr	500 kgCO ₂ e/yr	>2400 kgCO ₂ /yr		2400 kgCO ₂ e/yr	800 kgCO ₂ e/yr	500 kgCO ₂ e/yr	>2400 kgCO ₂ /yr	2400 kgCO ₂ e/yr	800 kgCO ₂ e/yr	500 kgCO ₂ e/yr	
	A	B				A	B								
Space heating equipment															
Gas furnace	●	●				●	●				●	●			
Electric baseboard				None modeled					None modeled				None modeled		
Air-source heat pump			●		●			●		●				●	
Water heating equipment															
Tankless gas heater 95%	●		●			●		●			●				
Electric resistance															
ASHP		●			●		●			●		●		●	
Cost and performance data															
Annual modelled GHG	4288	3815	876		208	3214	2731	850		185	2849	2356		176	
Annual modelled GHGI	8.4	7.5	1.7		0.4	6.3	5.3	1.7		0.4	5.6	4.6		0.3	
Annual modelled utility cost (\$/m ²)	2.6	2.8	3		3	2.4	2.6	2.7		2.7	2.3	2.5		2.6	
Annual modelled utility cost increase vs. base case (%)	0	7.7%	15%		15.4%	0	8.3%	12.5%		12.5%	0%	8.7%		13.0%	
Total ICC vs. base case (\$/m ²)	0	1.6	6.6		8.2	0	1.6	7		8.2	0	1.6		8.2	
% ICC vs base case	0%	0.1%	0.3%		0.3%	0%	0.1%	0.3%		0.4%	0%	0.0%		0.3%	

Large Single Family Dwelling data tables: Climate Zone 6 (Cranbrook)

	Step 3					Step 4					Step 5				
Target Level Achieved	None		Medium	Low	Zero Carbon Ready	None		Medium	Low	Zero Carbon Ready	None		Medium	Low	Zero Carbon Ready
GHG Target (based on 511m ² unit size)	>2400 kgCO ₂ /yr		2400 kgCO ₂ /yr	800 kgCO ₂ /yr	500 kgCO ₂ /yr	>2400 kgCO ₂ /yr		2400 kgCO ₂ /yr	800 kgCO ₂ /yr	500 kgCO ₂ /yr	>2400 kgCO ₂ /yr		2400 kgCO ₂ /yr	800 kgCO ₂ /yr	500 kgCO ₂ /yr
	A	B				A	B	B		A	A	B			
Space heating equipment															
Gas furnace	●	●				●	●				●	●			
Electric baseboard				None modeled					None modeled					None modeled	
Air-source heat pump			●		●			●		●			●		●
Water heating equipment															
Tankless gas heater 95%	●		●			●		●			●		●		
Electric resistance															
ASHP	●				●	●				●	●				●
Cost and performance data															
Annual modelled GHG	5453	5001	925		223	4461	3988	909		206	3755	3280	890		188
Annual modelled GHGI	10.7	9.8	1.8		0.4	8.7	7.8	1.8		0.4	7.3	6.4	1.7		0.4
Annual modelled utility cost (\$/m ²)	2.9	3.1	3.2		3.2	2.7	2.9	3		3	2.5	2.7	2.7		2.8
Annual modelled utility cost increase vs. base case (%)	0	6.9%	10%		10.3%	0	7.4%	11.1%		11.1%	0%	8.0%	8.0%		12.0%
Total ICC vs. base case (\$/m ²)	0	1.7	6.9		8.6	0	1.7	7		8.6	0	1.7	6.9		8.6
% ICC vs base case	0%	0.1%	0.3%		0.4%	0%	0.1%	0.3%		0.4%	0%	0.1%	0.3%		0.4%

Large Single Family Dwelling data tables: Climate Zone 7a (Fort St. John)

		Step 3				Step 4				Step 5					
Target Level Achieved	None		Medium	Low	Zero Carbon Ready	None		Medium	Low	Zero Carbon Ready	None		Medium	Low	Zero Carbon Ready
GHG Target (based on 511m ² unit size)	>2400 kgCO ₂ /yr		2400 kgCO ₂ /yr	800 kgCO ₂ /yr	500 kgCO ₂ /yr	>2400 kgCO ₂ /yr		2400 kgCO ₂ /yr	800 kgCO ₂ /yr	500 kgCO ₂ /yr	>2400 kgCO ₂ /yr		2400 kgCO ₂ /yr	800 kgCO ₂ /yr	500 kgCO ₂ /yr
	A	B				A	B				A	B			
Space heating equipment															
Gas furnace	●	●				●	●				●	●			
Electric baseboard				None modeled					None modeled					None modeled	
Air-source heat pump			●		●			●		●			●		●
Water heating equipment															
Tankless gas heater 95%	●		●			●		●			●		●		
Electric resistance															
ASHP	●				●	●				●	●				●
Cost and performance data															
Annual modelled GHG	7412	6961	1079		303	5975	5504	1044		268	5069	4600	1016		240
Annual modelled GHGI	14.5	13.6	2.1		0.6	11.7	10.8	2		0.5	9.9	9	2		0.5
Annual modelled utility cost (\$/m ²)	3.3	3.6	4.1		4.2	3	3.3	3.7		3.8	2.8	3	3.3		3.4
Annual modelled utility cost increase vs. base case (%)	0	9.1%	24.2%		27.3%	0	10.0%	23.3%		26.7%	0%	7%	17.9%		21.4%
Total ICC vs. base case (\$/m ²)	0	13.4	55.0		57.9	0	2.3	9.3		11.5	0	2.3	9.3		11.5
% ICC vs base case	0%	0.4%	1.7%		1.8%	0%	0.1%	0.3%		0.4%	0%	0.1%	0.3%		0.4%

Large Single Family Dwelling data tables: Climate Zone 7b (Fort Nelson)

	Step 3					Step 4					Step 5					
Target Level Achieved	None		Medium	Low	Zero Carbon Ready	None		Medium	Low	Zero Carbon Ready	None		Medium	Low	Zero Carbon Ready	
GHG Target (based on 511m ² unit size)	>2400 kgCO ₂ /yr		2400 kgCO ₂ e/yr	800 kgCO ₂ e/yr	500 kgCO ₂ e/yr	>2400 kgCO ₂ /yr		2400 kgCO ₂ e/yr	800 kgCO ₂ e/yr	500 kgCO ₂ e/yr	>2400 kgCO ₂ /yr		2400 kgCO ₂ e/yr	800 kgCO ₂ e/yr	500 kgCO ₂ e/yr	
	A	B				A	B				A	B				
Space heating equipment																
Gas furnace	●	●				●	●				●	●				
Electric baseboard				None modeled					None modeled							
Air-source heat pump			●		●			●		●			●		●	
Water heating equipment																
Tankless gas heater 95%	●		●			●		●			●		●			
Electric resistance																
ASHP		●			●		●			●		●			●	
Cost and performance data																
Annual modelled GHG	8629	8181	1164		371	6960	6513	1109		316	6754	6303	1102		309	
Annual modelled GHGI	16.9	16	2.3		0.7	13.6	12.7	2.2		0.6	13.2	12.3	2.2		0.6	
Annual modelled utility cost (\$/m ²)	3.6	3.9	4.9		5	3.2	3.5	4.3		4.4	3.2	3.4	4.2		4.3	
Annual modelled utility cost increase vs. base case (%)	0	8.3%	36.1%		38.9%	0	9.4%	34.4%		37.5%	0%	6%	31.3%		34.4%	
Total ICC vs. base case (\$/m ²)	0	2.3	9.3		11.5	0	2.3	9.3		11.5	0	2.3	9.3		11.5	
% ICC vs base case	0%	0.1%	0.3%		0.4%	0%	0.0%	0.2%		0.3%	0%	0.1%	0.3%		0.3%	

Large Single Family Dwelling data tables: Climate Zone 8 (Uranium City)

		Step 3				Step 4				Step 5						
Target Level Achieved	None		Medium	Low	Zero Carbon Ready	None		Medium	Low	Zero Carbon Ready	None		Medium	Low	Zero Carbon Ready	
GHG Target (based on 511m ² unit size)	>2400 kgCO ₂ /yr		2400 kgCO ₂ e/yr	800 kgCO ₂ e/yr	500 kgCO ₂ e/yr	>2400 kgCO ₂ /yr		2400 kgCO ₂ e/yr	800 kgCO ₂ e/yr	500 kgCO ₂ e/yr	>2400 kgCO ₂ /yr		2400 kgCO ₂ e/yr	800 kgCO ₂ e/yr	500 kgCO ₂ e/yr	
	A	B				A	B				A	B				
Space heating equipment																
Gas furnace	●	●				●	●				●	●				
Electric baseboard				None modeled					None modeled					None modeled		
Air-source heat pump			●		●			●		●			●		●	
Water heating equipment																
Tankless gas heater 95%	●		●			●		●			●		●			
Electric resistance																
ASHP	●				●	●				●	●				●	
Cost and performance data																
Annual modelled GHG	10686	10288	1282		477	8316	7900	1199		394	7244	6817	1307		357	
Annual modelled GHGI	20.9	20.1	2.5		0.9	16.3	15.5	2.3		0.8	14.2	13.3	2.6		0.7	
Annual modelled utility cost (\$/m ²)	4.1	4.4	6.2		6.4	3.6	3.8	5.2		5.3	3.3	3.6	Not calculated		4.9	
Annual modelled utility cost increase vs. base case (%)	0	7.3%	51.2%		56.1%	0	5.6%	44.4%		47.2%	0%	9%	Not calculated		48.5%	
Total ICC vs. base case (\$/m ²)	0	2.3	9.3		11.5	0	2.3	9.3		11.5	0	2.3	9.3		11.5	
% ICC vs base case	0%	0.1%	0.3%		0.4%	0%	0.1%	0.3%		0.4%	0%	0.1%	0.3%		0.4%	

Row Home data tables: Climate Zone 4 (Vancouver)

	Step 3				Step 4				Step 5							
Target Level Achieved	None	Medium		Low	Zero Carbon Ready	None	Medium		Low	Zero Carbon Ready	None	Medium			Low	Zero Carbon Ready
GHG Target (based on 169m ² unit size x 6 units = 1016m ² total size)	>6300 kgCO ₂ /yr	6300 kgCO ₂ e/yr		2640 kgCO ₂ e/yr	1590 kgCO ₂ e/yr	>6300 kgCO ₂ /yr	6300 kgCO ₂ e/yr		2640 kgCO ₂ e/yr	1590 kgCO ₂ e/yr	>6300 kgCO ₂ /yr	6300 kgCO ₂ e/yr			2640 kgCO ₂ e/yr	1590 kgCO ₂ e/yr
		A	B				A	B		A		A	B	C		
Space heating equipment																
Gas furnace	●	●				●	●				All modeled options meet	●		●		
Electric baseboard				None modeled					None modeled						None modeled	
Air-source heat pump		●			●		●			●		●				●
Water heating equipment																
Tankless gas heater 95%	●	●				●	●					●		●		
Electric resistance																
ASHP		●			●		●			●		●				●
Cost and performance data																
Annual modelled GHG	8298	6195	4732		721	7075	4102	4699		682		5892	4676	2808		656
Annual modelled GHGI	8.8	6.1	4.7		0.7	7	4	4.6		0.7		5.8	4.6	2.8		0.6
Annual modelled utility cost (\$/m ²)	5.7	5.7	5.1		4.7	5.1	5.1	4.9		4.5		4.9	4.7	4.8		4.3
Annual modelled utility cost increase vs. base case (%)	0	0.0%	0.8%		-17.5%	0.0%	0.0%	-3.9%		-11.8%		0%	-4.1%	-2.0%		-12.2%
Total ICC vs. base case (\$/m ²)	0	0.8	3.1		3.3	0.0	0.7	3.1		3.8		0.0	1.5	-0.2		2.2
% ICC vs base case	0%	0.0%	0.1%		0.2%	0.0%	0.0%	0.1%		0.1%		0.0%	0.1%	0.0%		0.1%

Row Home data tables: Climate Zone 5 (Summerland)

	Step 3				Step 4				Step 5			
Target Level Achieved	None	Medium	Low	Zero Carbon Ready	None	Medium	Low	Zero Carbon Ready	None	Medium	Low	Zero Carbon Ready
GHG Target (based on 169m ² unit size x 6 units = 1016m ² total size)	>6300 kgCO ₂ /yr	6300 kgCO ₂ /yr	2640 kgCO ₂ /yr	1590 kgCO ₂ /yr	>6300 kgCO ₂ /yr	6300 kgCO ₂ /yr	2640 kgCO ₂ /yr	1590 kgCO ₂ /yr	>6300 kgCO ₂ /yr	6300 kgCO ₂ /yr	2640 kgCO ₂ /yr	1590 kgCO ₂ /yr
						A B				A B		
Space heating equipment												
Gas furnace	● ●				●	●			●	●		
Electric baseboard			None modeled				None modeled				None modeled	
Air-source heat pump		●		●		●		●		●		●
Water heating equipment												
Tankless gas heater 95%	●	●			●	●			●	●		
Electric resistance												
ASHP		●		●		●		●		●		●
Cost and performance data												
Annual modelled GHG	10806	8064	4765	830	8690	5781	4781	769	6540	4733	3487	713
Annual modelled GHGI	10.6	7.9	4.7	0.8	8.6	5.7	4.7	0.8	6.4	4.7	3.4	0.7
Annual modelled utility cost (\$/m ²)	6.3	6.3	Not calculated	5.4	5.6	5.6	5.4	5	5.4	5.1	4.9	4.7
Annual modelled utility cost increase vs. base case (%)	0	0	Not calculated	-14.3%	0	0.0%	-3.6%	-10.7%	0%	-5.6%	-9.3%	-13.0%
Total ICC vs. base case (\$/m ²)	0	0.8	3.3	4.1	0	0.8	3.3	4.1	0.0	3.4	0.9	4.2
% ICC vs base case	0%	0%	0.1%	0.2%	0%	0.0%	0.1%	0.1%	0.0%	0.2%	0.1%	0.2%

Row Home data tables: Climate Zone 6 (Cranbrook)

	Step 3					Step 4					Step 5				
Target Level Achieved	None		Medium	Low	Zero Carbon Ready	None		Medium	Low	Zero Carbon Ready	None	Medium		Low	Zero Carbon Ready
GHG Target (based on 169m ² unit size x 6 units = 1016m ² total size)	>6300 kgCO ₂ /yr		6300 kgCO ₂ /yr	2640 kgCO ₂ /yr	1590 kgCO ₂ /yr	>6300 kgCO ₂ /yr		6300 kgCO ₂ /yr	2640 kgCO ₂ /yr	1590 kgCO ₂ /yr	>6300 kgCO ₂ /yr	6300 kgCO ₂ /yr		2640 kgCO ₂ /yr	1590 kgCO ₂ /yr
	A	B				A	B					A	B		
Space heating equipment															
Gas furnace	●	●				●	●				●	●			
Electric baseboard				None modeled					None modeled					None modeled	
Air-source heat pump			●		●			●		●		●			●
Water heating equipment															
Tankless gas heater 95%	●		●			●		●			●	●			
Electric resistance															
ASHP		●			●		●			●		●			●
Cost and performance data															
Annual modelled GHG	13595	10919	5011		859	10418	7494	4986		792	7867	4839	4931		733
Annual modelled GHGI	13.4	10.7	4.9		0.8	10.3	7.4	4.9		0.8	7.7	4.8	4.9		0.7
Annual modelled utility cost (\$/m ²)	6.9	7	Not calculated		5.6	6.1	6.1	5.5		5.2	5.6	5.4	5.2		4.8
Annual modelled utility cost increase vs. base case (%)	0	1.4%	Not calculated		-18.8%	0	0	-9.8%		-14.8%	0%	-3.6%	-7.1%		-14.3%
Total ICC vs. base case (\$/m ²)	0	0.9	3.5		4.4	0	0.9	3.5		4.3	0	0.9	3.6		4.4
% ICC vs base case	0%	0%	0.2%		0.2%	0%	0%	0.1%		0.2%	0%	0.1%	0.2%		0.2%

Row Home data tables: Climate Zone 7a (Fort St. John)

	Step 3					Step 4					Step 5					
Target Level Achieved	None		Medium	Low	Zero Carbon Ready	None		Medium	Low	Zero Carbon Ready	None		Medium	Low	Zero Carbon Ready	
GHG Target (based on 169m ² unit size x 6 units = 1016m ² total size)	>6300 kgCO ₂ /yr		6300 kgCO ₂ /yr	2640 kgCO ₂ /yr	1590 kgCO ₂ /yr	>6300 kgCO ₂ /yr		6300 kgCO ₂ /yr	2640 kgCO ₂ /yr	1590 kgCO ₂ /yr	>6300 kgCO ₂ /yr		6300 kgCO ₂ /yr	2640 kgCO ₂ /yr	1590 kgCO ₂ /yr	
	A	B				A	B				A	B				
Space heating equipment																
Gas furnace	●	●				●	●				●	●				
Electric baseboard				None modeled					None modeled					None modeled		
Air-source heat pump			●		●			●		●			●		●	
Water heating equipment																
Tankless gas heater 95%	●		●			●		●			●		●			
Electric resistance																
ASHP	●				●	●				●	●				●	
Cost and performance data																
Annual modelled GHG	17071	14252	5564		1030	13469	10594	5468		924	10619	7440	5378		831	
Annual modelled GHGI	16.8	14	5.5		1	13.3	10.4	5.4		0.9	10.5	7.3	5.3		0.8	
Annual modelled utility cost (\$/m ²)	8	8.1	Not calculated		6.7	7	7	6.3		6	6.1	6.1	5.8		5.4	
Annual modelled utility cost increase vs. base case (%)	0	1.3%	Not calculated		-16.3%	0	0	-10.0%		-14.3%	0%	0.0%	-4.9%		-11.5%	
Total ICC vs. base case (\$/m ²)	0	1.1	4.7		5.8	0	1.4	5.0		6.1	0	1.1	4.7		5.8	
% ICC vs base case	0%	0%	0.2%		0.2%	0%	0%	0.1%		0.2%	0%	0.1%	0.2%		0.2%	

Row Home data tables: Climate Zone 8 (Uranium City)

	Step 3					Step 4					Step 5			
Target Level Achieved	None		Medium	Low	Zero Carbon Ready	None		Medium	Low	Zero Carbon Ready	None	Medium	Low	Zero Carbon Ready
GHG Target (based on 169m ² unit size x 6 units = 1016m ² total size)	>6300 kgCO ₂ /yr		6300 kgCO ₂ e/yr	2640 kgCO ₂ e/yr	1590 kgCO ₂ e/yr	>6300 kgCO ₂ /yr		6300 kgCO ₂ e/yr	2640 kgCO ₂ e/yr	1590 kgCO ₂ e/yr	>6300 kgCO ₂ /yr	6300 kgCO ₂ e/yr	2640 kgCO ₂ e/yr	1590 kgCO ₂ e/yr
	A	B				A	B							
Space heating equipment														
Gas furnace	●	●				●	●				●			
Electric baseboard				None modeled					None modeled				None modeled	
Air-source heat pump			●		●			●		●		●		●
Water heating equipment														
Tankless gas heater 95%	●		●			●		●			●	●		
Electric resistance														
ASHP		●			●		●			●				●
Cost and performance data														
Annual modelled GHG	24335	21771	6089		1402	18179	15167	5877		1184	15460	5785		1089
Annual modelled GHGI	23.8	21.4	6		1.4	17.9	14.9	5.8		1.2	15.2	5.7		1.1
Annual modelled utility cost (\$/m ²)	9.9	10.1	9.2		9	8.2	8.3	7.9		7.6	7.5	7.3		7
Annual modelled utility cost increase vs. base case (%)	0	2.0%	-7.1%		-9.1%	0	1.2%	-3.7%		-7.3%	0%	-2.7%		-6.7%
Total ICC vs. base case (\$/m ²)	0	1.4	5.0		6.1	0	1.1	4.7		5.8	0.0	5.0		6.1
% ICC vs base case	0%	0%	0.2%		0.2%	0%	0%	0.1%		0.2%	0%	0.2%		0.2%

Quadplex data tables: Climate Zone 4 (Vancouver)

	Step 3				Step 4				Step 5			
Target Level Achieved	None	Medium	Low	Zero Carbon Ready	None	Medium	Low	Zero Carbon Ready	None	Medium	Low	Zero Carbon Ready
GHG Target (based on 113m ² unit size x 4 units = 451m ² total size)	>4200 kgCO ₂ /yr	4200 kgCO ₂ /yr	1760 kgCO ₂ /yr	1060 kgCO ₂ /yr	>4200 kgCO ₂ /yr	4200 kgCO ₂ /yr	1760 kgCO ₂ /yr	1060 kgCO ₂ /yr	>4200 kgCO ₂ /yr	4200 kgCO ₂ /yr	1760 kgCO ₂ /yr	1060 kgCO ₂ /yr
				A B				A B				A B
Space heating equipment												
Gas furnace	●				●				All modeled options meet	●		
Electric baseboard			None modeled	●			None modeled	●			None modeled	●
Air-source heat pump		●		●		●		●		●		●
Water heating equipment												
Tankless gas heater 95%	●	●			●	●				●	●	
Electric resistance												
ASHP				●				●				●
Cost and performance data												
Annual modelled GHG	4886	3147		542 469	4250	3133		507 453		3818 3124		475 441
Annual modelled GHGI	10.9	7		1.2 1	9.4	7		1.1 1		8.5 6.9		1.1 1
Annual modelled utility cost (\$/m ²)	Not calculated	6.7		8.1 7.1	6.7	6.5		7.6 6.9		6.1 6.3		7.2 6.7
Annual modelled utility cost increase vs. base case (%)	0	Not calculated		Not calculated calculated	0.0%	-3.0%		13.4% 3.0%		0% 3.3%		18.0% 9.8%
Total ICC vs. base case (\$/m ²)	0	14.2		-6.7 20.9	0.0	31.6		10.6 38.5		0.0 31.9		10.8 38.8
% ICC vs base case	0%	0.7%		-0.3% 1.0%	0.0%	1.4%		0.5% 1.8%		0.0% 1.4%		0.5% 1.7%

Quadplex data tables: Climate Zone 5 (Summerland)

	Step 3					Step 4					Step 5				
Target Level Achieved	None	Medium		Low	Zero Carbon Ready	None	Medium	Low	Zero Carbon Ready		None	Medium	Low	Zero Carbon Ready	
GHG Target (based on 113m ² unit size x 4 units = 451m ² total size)	>4200 kgCO ₂ /yr	4200 kgCO ₂ e/yr		1760 kgCO ₂ e/yr	1060 kgCO ₂ e/yr	>4200 kgCO ₂ /yr	4200 kgCO ₂ e/yr	1760 kgCO ₂ e/yr	1060 kgCO ₂ e/yr		>4200 kgCO ₂ /yr	4200 kgCO ₂ e/yr	1760 kgCO ₂ e/yr	1060 kgCO ₂ e/yr	
		A	B		A B				A B					A B	
Space heating equipment															
Gas furnace	●					●					●				
Electric baseboard		●		None modeled	●			None modeled	●				None modeled	●	
Air-source heat pump			●		●		●		●			●		●	
Water heating equipment															
Tankless gas heater 95%	●	●	●			●	●				●	●			
Electric resistance															
ASHP					● ●				● ●					● ●	
Cost and performance data															
Annual modelled GHG	5526	3235	3199		585 519	4852	3179		542 500		4656	3170		531 490	
Annual modelled GHGI	12.3	7.2	7.1		1.3 1.2	10.8	7.1		1.2 1.1		10.3	7		1.2 1.1	
Annual modelled utility cost (\$/m ²)	6.7	7.9	7.4		8.7 7.8	6.5	7.1		8.2 7.6		6.4	7		8 7.4	
Annual modelled utility cost increase vs. base case (%)	0	17.9%	10.4%		29.9% 16.4%	0	9.2%		26.2% 16.9%		0%	9.4%		25.0% 15.6%	
Total ICC vs. base case (\$/m ²)	0	5.4	35.4		12.8 42.8	0	34.4		11.8 41.8		0.0	34.4		11.8 41.8	
% ICC vs base case	0%	0.1%	1.4%		0.5% 1.7%	0%	1.5%		0.5% 1.8%		0.0%	1.5%		0.5% 1.8%	

Quadplex data tables: Climate Zone 6 (Cranbrook)

	Step 3				Step 4				Step 5				
Target Level Achieved	None	Medium		Low	Zero Carbon Ready	None	Medium	Low	Zero Carbon Ready	None	Medium	Low	Zero Carbon Ready
GHG Target (based on 113m ² unit size x 4 units = 451m ² total size)	>4200 kgCO ₂ /yr	4200 kgCO ₂ e/yr		1760 kgCO ₂ e/yr	1060 kgCO ₂ e/yr	>4200 kgCO ₂ /yr	4200 kgCO ₂ e/yr	1760 kgCO ₂ e/yr	1060 kgCO ₂ e/yr	>4200 kgCO ₂ /yr	4200 kgCO ₂ e/yr	1760 kgCO ₂ e/yr	1060 kgCO ₂ e/yr
		A	B										
Space heating equipment													
Gas furnace	●					●				●			
Electric baseboard		●		None modeled	●			None modeled	●			None modeled	●
Air-source heat pump				●			●				●		
Water heating equipment													
Tankless gas heater 95%	●	● ●				●	●			●	●		
Electric resistance													
ASHP					●				●				●
Cost and performance data													
Annual modelled GHG	6662	3417	3328		652	5618	3304		589	5334	3291		569
Annual modelled GHGI	14.8	7.6	7.4		1.4	12.5	7.3		1.3	11.8	7.3		1.3
Annual modelled utility cost (\$/m ²)	7	8.8	7.5		9.7	6.8	5.4		8.8	Not calculated	7		8.5
Annual modelled utility cost increase vs. base case (%)	0	25.7%	7.1%		38.6%	0	-20.6%		29.4%	0%	Not calculated		Not calculated
Total ICC vs. base case (\$/m ²)	0	4.7	36.2		4.7	0	36.2		12.4	0.0	34.6		10.9
% ICC vs base case	0%	0.2%	1.5%		0.2%	0%	1.4%		0.5%	0.0%	1.4%		0.4%

Quadplex data tables: Climate Zone 7a (Fort St. John)

	Step 3					Step 4				Step 5				
Target Level Achieved	None	Medium		Low	Zero Carbon Ready		None	Medium	Low	Zero Carbon Ready	None	Medium	Low	Zero Carbon Ready
GHG Target (based on 113m ² unit size x 4 units = 451m ² total size)	>4200 kgCO ₂ /yr	4200 kgCO ₂ e/yr		1760 kgCO ₂ e/yr	1060 kgCO ₂ e/yr		>4200 kgCO ₂ /yr	4200 kgCO ₂ e/yr	1760 kgCO ₂ e/yr	1060 kgCO ₂ e/yr	>4200 kgCO ₂ /yr	4200 kgCO ₂ e/yr	1760 kgCO ₂ e/yr	1060 kgCO ₂ e/yr
		A	B		A	B								
Space heating equipment														
Gas furnace	●						●				●			
Electric baseboard		●		None modeled	●				None modeled				None modeled	●
Air-source heat pump					●			●		●		●		
Water heating equipment														
Tankless gas heater 95%	●	● ●					●	●			●	●		
Electric resistance														
ASHP					● ●					●				●
Cost and performance data														
Annual modelled GHG	8839	3753	3637		753	604	7341	3604		571	6302	3570		536
Annual modelled GHGI	19.6	8.3	8.1		1.7	1.3	16.3	8		1.3	14	7.9		1.2
Annual modelled utility cost (\$/m ²)	7.5	10	8.4		11.1	9	7.2	7.9		8.6	7	7.5		8.1
Annual modelled utility cost increase vs. base case (%)	0	33.3%	12.0%		48.0%	20.0%	0	9.7%		19.4%	0%	7%		15.7%
Total ICC vs. base case (\$/m ²)	0	0.0	42.1		10.3	52.5	0	48.6		58.9	0.0	48.9		59.0
% ICC vs base case	0%	0.0%	1.3%		0.3%	1.6%	0%	1.5%		1.8%	0.0%	1.5%		1.8%

Quadplex data tables: Climate Zone 7b (Fort Nelson)

	Step 3				Step 4				Step 5			
Target Level Achieved	None	Medium	Low	Zero Carbon Ready	None	Medium	Low	Zero Carbon Ready	None	Medium	Low	Zero Carbon Ready
GHG Target (based on 113m ² unit size x 4 units = 451m ² total size)	>4200 kgCO ₂ /yr	4200 kgCO ₂ e/yr	1760 kgCO ₂ e/yr	1060 kgCO ₂ e/yr	>4200 kgCO ₂ /yr	4200 kgCO ₂ e/yr	1760 kgCO ₂ e/yr	1060 kgCO ₂ e/yr	>4200 kgCO ₂ /yr	4200 kgCO ₂ e/yr	1760 kgCO ₂ e/yr	1060 kgCO ₂ e/yr
Space heating equipment												
Gas furnace	●				●				No simulated options meet Step 5.			
Electric baseboard			None modeled				None modeled					
Air-source heat pump		●		●		●		●				
Water heating equipment												
Tankless gas heater 95%	●	●			●	●						
Electric resistance												
ASHP				●				●				
Cost and performance data												
Annual modelled GHG	10740	3792		889	8756	3732		640				
Annual modelled GHGI	23.8	8.4		2	19.4	8.3		1.4				
Annual modelled utility cost (\$/m ²)	8.1	9.7		13.1	7.5	8.9		9.5				
Annual modelled utility cost increase vs. base case (%)	0	19.8%		61.7%	0	18.7%		26.7%				
Total ICC vs. base case (\$/m ²)	0	50.0		18.3	0	44.7		55.0				
% ICC vs base case	0%	1.5%		0.6%	0%	1.3%		1.6%				

Quadplex data tables: Climate Zone 8 (Uranium City)

	Step 3				Step 4				Step 5				
Target Level Achieved	None	Medium	Low	Zero Carbon Ready		None	Medium	Low	Zero Carbon Ready	None	Medium	Low	Zero Carbon Ready
GHG Target (based on 113m ² unit size x 4 units = 451m ² total size)	>4200 kgCO ₂ /yr	4200 kgCO ₂ /yr	1760 kgCO ₂ /yr	1060 kgCO ₂ /yr		>4200 kgCO ₂ /yr	4200 kgCO ₂ /yr	1760 kgCO ₂ /yr	1060 kgCO ₂ /yr	>4200 kgCO ₂ /yr	4200 kgCO ₂ /yr	1760 kgCO ₂ /yr	1060 kgCO ₂ /yr
				A	B								
Space heating equipment													
Gas furnace	●					●				No simulated options meet Step 5.			
Electric baseboard			None modeled	●				None modeled					
Air-source heat pump		●		●			●		●				
Water heating equipment													
Tankless gas heater 95%	●	●				●	●						
Electric resistance													
ASHP				● ●					●				
Cost and performance data													
Annual modelled GHG	12002	3929		963	795	10237	3857		724				
Annual modelled GHGI	26.6	8.7		2.1	1.8	22.7	8.6		1.6				
Annual modelled utility cost (\$/m ²)	8.3	11		14.1	11.7	7.9	10		10.7				
Annual modelled utility cost increase vs. base case (%)	0	32.5%		69.9%	41.0%	0	26.6%		35.4%				
Total ICC vs. base case (\$/m ²)	0	44.7		13.0	55.0	0	44.7		55.0				
% ICC vs base case	0%	1.3%		0.4%	1.6%	0%	1.4%		1.7%				

Target Level Achieved	None	Medium		Low	Zero Carbon Ready		None	Medium		Low	Zero Carbon Ready		None	Medium		Low	Zero Carbon Ready		
GHG Target (based on 166m ² unit size x 10 units = 1655m ² total size)	>10500 kgCO ₂ /yr	10500 kgCO ₂ e/yr		4400 kgCO ₂ e/yr	2650 kgCO ₂ e/yr		>10500 kgCO ₂ /yr	10500 kgCO ₂ e/yr		4400 kgCO ₂ e/yr	2650 kgCO ₂ e/yr		>10500 kgCO ₂ /yr	10500 kgCO ₂ e/yr		4400 kgCO ₂ e/yr	2650 kgCO ₂ e/yr		
		A	B		A	B		A	B		A	B		A	B		A	B	
Space heating equipment																			
Gas furnace	●			None modeled			●			None modeled			All modeled options meet targets	●		None modeled			
Electric baseboard		●			●			●			●						●		
Air-source heat pump		●			●			●			●			●					
Water heating equipment																			
Tankless gas heater 95%	●	● ●					●	● ●						● ●					
Electric resistance																			
ASHP					● ●						● ●			● ●					
Cost and performance data																			
Annual modelled GHG	12995	5565	5291		1182	847	11472	5477	5258		1087	812		8157	5180		882	730	
Annual modelled GHGI	7.9	3.4	3.2		0.7	0.5	6.9	3.3	3.2		0.7	0.5		4.9	4.9		0.5	0.4	
Annual modelled utility cost (\$/m ²)	4.3	4.6	3.6		4.7	3.4	4	4.3	3.5		4.3	3.3		3.5	3.5		3.5	2.9	
Annual modelled utility cost increase vs. base case (%)	0	7.0%	-16.3%		9.3%	-20.9%	0.0%	7.5%	-12.5%		7.5%	-17.5%		0.0%	0.0%		0.0%	-17.1%	
Total ICC vs. base case (\$/m ²)	0	0.0	19.0		4.7	23.7	0	0	19		4.7	23.7		0.0	19.0		4.7	23.7	
% ICC vs base case	0%	0.0%	0.8%		0.2%	1.0%	0.0%	0.0%	0.8%		0.2%	1.0%		0.0%	0.7%		0.2%	0.9%	

10-unit MURB data tables: Climate Zone 5 (Summerland)

Step 3

Step 4

Step 5

Target Level Achieved	None	Medium		Low	Zero Carbon Ready		None	Medium		Low	Zero Carbon Ready		None	Medium		Low	Zero Carbon Ready		
GHG Target (based on 166m ² unit size x 10 units = 1655m ² total size)	>10500 kgCO ₂ /yr	10500 kgCO ₂ e/yr		4400 kgCO ₂ e/yr	2650 kgCO ₂ e/yr		>10500 kgCO ₂ /yr	10500 kgCO ₂ e/yr		4400 kgCO ₂ e/yr	2650 kgCO ₂ e/yr		>10500 kgCO ₂ /yr	10500 kgCO ₂ e/yr		4400 kgCO ₂ e/yr	2650 kgCO ₂ e/yr		
		A	B		A	B		A	B	A	B	A		B	A	B			
Space heating equipment																			
Gas furnace	●						●						All modeled options meet targets	●					
Electric baseboard		●		None modeled	●			●		None modeled	●					None modeled	●		
Air-source heat pump		●			●			●			●			●			●		
Water heating equipment																			
Tankless gas heater 95%	●	● ●					●	● ●						● ●					
Electric resistance																			
ASHP					● ●						● ●						● ●		
Cost and performance data																			
Annual modelled GHG	16416	5759	5459		1369	1016	11710	5479	5338		1089	898		10188	5300		994	854	
Annual modelled GHGI	9.9	3.5	3.3		0.8	0.6	7.1	3.3	3.2		0.7	0.5		6.2	3.2		0.6	0.5	
Annual modelled utility cost (\$/m ²)	4.9	5.4	4		5.4	4	4	4.3	3.8		4.3	3.6		3.8	3.6		4	3.4	
Annual modelled utility cost increase vs. base case (%)	0	10.2%	-18.4%		10.2%	-18.4%	0.0%	7.5%	-5.0%		7.5%	-10.0%		0.0%	-5.3%		5.3%	-10.5%	
Total ICC vs. base case (\$/m ²)	0	2.1	22.5		7.1	27.5	0	0	21		5.3	25.7		0.0	20.7		5.3	25.7	
% ICC vs base case	0%	0.0%	0.8%		0.2%	1.0%	0.0%	0.0%	0.8%		0.2%	1.0%		0.0%	0.8%		0.2%	1.0%	

10-unit MURB data tables: Climate Zone 6 (Cranbrook)

	Step 3					Step 4					Step 5				
Target Level Achieved	None	Medium		Low	Zero Carbon Ready	None	Medium		Low	Zero Carbon Ready	None	Medium		Low	Zero Carbon Ready

GHG Target (based on 166m ² unit size x 10 units = 1655m ² total size)	>10500 kgCO ₂ /yr	10500 kgCO ₂ e/yr		4400 kgCO ₂ e/yr	2650 kgCO ₂ e/yr		>10500 kgCO ₂ /yr	10500 kgCO ₂ e/yr		4400 kgCO ₂ e/yr	2650 kgCO ₂ e/yr		>10500 kgCO ₂ /yr	10500 kgCO ₂ e/yr		4400 kgCO ₂ e/yr	2650 kgCO ₂ e/yr	
		A	B		A	B		A	B		A	B		A	B		A	B
Space heating equipment																		
Gas furnace	●			None modeled			●			None modeled			●			None modeled		
Electric baseboard		●			●			●			●		●				●	
Air-source heat pump		●			●			●			●		●				●	
Water heating equipment																		
Tankless gas heater 95%	●	● ●					●	● ●					●	● ●				
Electric resistance																		
ASHP					● ●						● ●						● ●	
Cost and performance data																		
Annual modelled GHG	20330	6167	5685		1591	1039	15943	5927	5613		1345	966	12781	5735	5527		1151	879
Annual modelled GHGI	12.3	3.7	3.4		1	0.6	9.6	3.6	3.4		0.8	0.6	7.7	3.5	3.3		0.7	0.5
Annual modelled utility cost (\$/m ²)	5.4	6.2	4.3		6.3	4.1	4.7	5.3	4.1		5.3	3.9	4.2	4.5	3.7		4.6	3.5
Annual modelled utility cost increase vs. base case (%)	0	14.8%	-20.4%		16.7%	-24.1%	0	12.8%	-12.8%		12.8%	-17.0%	0%	7.1%	-11.9%		9.5%	-16.7%
Total ICC vs. base case (\$/m ²)	0	0.5	21.9		5.7	27.2	0	0	22		5.7	27.2	0	0.5	21.9		5.7	27.2
% ICC vs base case	0%	0.1%	0.8%		0.3%	1.0%	0%	0.0%	0.8%		0.2%	1.0%	0%	0.0%	218.5%		0.2%	0.9%

10-unit MURB data tables: Climate Zone 7a (Fort St. John)

	Step 3				Step 4				Step 5			
Target Level Achieved	None	Medium		Low	Zero Carbon Ready		None	Medium		Low	Zero Carbon Ready	
GHG Target (based on 166m ² unit size x 10 units = 1655m ² total size)	>10500 kgCO ₂ /yr	10500 kgCO ₂ e/yr		4400 kgCO ₂ e/yr	2650 kgCO ₂ e/yr		>10500 kgCO ₂ /yr	10500 kgCO ₂ e/yr		4400 kgCO ₂ e/yr	2650 kgCO ₂ e/yr	
		A	B		A	B		A	B		A	B
Space heating equipment												
Gas furnace	●						●					
Electric baseboard		●		None modeled	●			●		None modeled	●	
Air-source heat pump			●			●			●			●
Water heating equipment												
Tankless gas heater 95%	●	●	●				●	●	●			
Electric resistance												
ASHP					●	●					●	●
Cost and performance data												
Annual modelled GHG	23192	6734	6286		1774	1249	17924	6420	6121		1453	1082
Annual modelled GHGI	14	4.1	3.8		1.1	0.8	10.8	3.9	3.7		0.9	0.7
Annual modelled utility cost (\$/m ²)	5.9	6.9	5.1		7	4.9	5	5.6	4.5		5.7	4.3
Annual modelled utility cost increase vs. base case (%)	0	16.9%	-13.6%		18.6%	-16.9%	0	12.0%	-10.0%		14.0%	-14.0%
Total ICC vs. base case (\$/m ²)	0	1.8	30.4		8.8	37.4	0	2	30		8.8	37.4
% ICC vs base case	0%	0.1%	0.8%		0.3%	1.0%	0%	0.0%	0.8%		0.2%	1.0%

10-unit MURB data tables: Climate Zone 7b (Fort Nelson)

	Step 3				Step 4				Step 5			
Target Level Achieved	None	Medium		Low	Zero Carbon Ready		None	Medium		Low	Zero Carbon Ready	
GHG Target (based on 166m ² unit size x 10 units = 1655m ² total size)	>10500 kgCO ₂ /yr	10500 kgCO ₂ e/yr		4400 kgCO ₂ e/yr	2650 kgCO ₂ e/yr		>10500 kgCO ₂ /yr	10500 kgCO ₂ e/yr		4400 kgCO ₂ e/yr	2650 kgCO ₂ e/yr	
		A	B		A	B		A	B		A	B
Space heating equipment												
Gas furnace	●						●					
Electric baseboard		●		None modeled	●			●		None modeled	●	
Air-source heat pump			●			●			●			●
Water heating equipment												
Tankless gas heater 95%	●	●	●				●	●	●			
Electric resistance												
ASHP					●	●					●	●
Cost and performance data												
Annual modelled GHG	27683	7074	6593		2010	1462	23075	6811	6441		1745	1308
Annual modelled GHGI	16.7	4.3	4		1.2	0.9	13.9	4.1	3.9		1.1	0.8
Annual modelled utility cost (\$/m ²)	6.6	7.8	5.9		7.9	5.8	5.9	6.8	5.3		6.9	5.2
Annual modelled utility cost increase vs. base case (%)	0	18.2%	-10.6%		19.7%	-12.1%	0	15.3%	-10.2%		16.9%	-11.9%
Total ICC vs. base case (\$/m ²)	0	1.8	30.4		8.8	37.4	0	2	30		8.8	37.4
% ICC vs base case	0%	0.1%	0.8%		0.3%	1.0%	0%	0.1%	0.8%		0.3%	1.0%

10-unit MURB data tables: Climate Zone 8 (Uranium City)

	Step 3				Step 4				Step 5			
Target Level Achieved	None	Medium		Low	Zero Carbon Ready		None	Medium		Low	Zero Carbon Ready	
GHG Target (based on 166m ² unit size x 10 units = 1655m ² total size)	>10500 kgCO ₂ /yr	10500 kgCO ₂ e/yr		4400 kgCO ₂ e/yr	2650 kgCO ₂ e/yr		>10500 kgCO ₂ /yr	10500 kgCO ₂ e/yr		4400 kgCO ₂ e/yr	2650 kgCO ₂ e/yr	
		A	B		A	B		A	B		A	B
Space heating equipment												
Gas furnace	●						●					
Electric baseboard		●		None modeled	●			●		None modeled	●	
Air-source heat pump			●			●			●			●
Water heating equipment												
Tankless gas heater 95%	●	●	●				●	●	●			
Electric resistance												
ASHP					●	●					●	●
Cost and performance data												
Annual modelled GHG	33699	7498	7004		2361	1798	25340	7019	6694		1875	1485
Annual modelled GHGI	20.4	4.5	4.2		1.4	1.1	15.3	4.2	4		1.1	0.9
Annual modelled utility cost (\$/m ²)	7.6	9.1	7.2		9.2	7.1	6.3	7.3	6		7.4	5.9
Annual modelled utility cost increase vs. base case (%)	0	19.7%	-5.3%		21.1%	-6.6%	0	15.9%	-4.8%		17.5%	-6.3%
Total ICC vs. base case (\$/m ²)	0	1.8	30.4		8.8	37.4	0	2	30		8.8	37.4
% ICC vs base case	0%	0.1%	0.8%		0.3%	1.0%	0%	0.1%	0.8%		0.3%	1.0%