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January 8, 2018

District of West Vancouver
 750 17th Street
 West Vancouver, BC
 V7V 3T3

Attn: To Whom This May Concern
RE: The Courtenay to meet Sustainability Guidelines

British Pacific Properties has retained E3 Eco Group as the sustainability consultant to review the energy, resource, and environmental efficiency of The Courtenay development at 3100 Burfield Place in the District of West Vancouver. The intention is to ensure that the development is Certified BuiltGreen™ Silver on the 2017 High Density Checklist.

The BuiltGreen™ Silver level requires a minimum of 110 points from the Checklist as well as an energy performance 15% better than ASHRAE 90.1 2010.

In order to provide the verification, E3 Eco Group will perform the following:

- 1) Review the computer modeling completed by others to ensure design meets 15% better than ASHRAE 90.1 2010.
- 2) Consult with British Pacific Properties regarding the Checklist to ensure that at least 110 points are achievable. Throughout construction E3 will perform site visits and review documentation to ensure all points are incorporated.
- 3) Upon project completion E3 will submit all photos and documents collected to BuiltGreen™ Canada for final Certification.

The completion of the above steps will ensure the development is Certified BuiltGreen™ Silver on the 2017 High Density Checklist.

If you have any questions please contact the undersigned,

Kind Regards,

Emma Conway, B.A., CEA
 Project Manager E3 Eco Group Inc
 604-874-3715
emma@e3ecogroup.com

BUILT GREEN® Checklist: High Density (HD) New Construction Effective January 1, 2017



To select checklist points, click and select point values from the drop-down list for each item.

Builder	British Pacific Homes	
Address	3100 Burfield Place	
Date	Jan 8 2018	
Summary	1 - Energy and Envelope:	30 points
	2 - Materials and Methods:	28 points
	3 - Indoor Air Quality:	17 points
	4 - Ventilation:	8 points
	5 - Waste Management:	11 points
	6 - Water Conservation:	13 points
	7 - Business Practices:	17 points
	TOTAL POINTS:	124 points (SILVER) OK!

I. ENERGY AND ENVELOPE

This section awards points for construction methods and types of products that contribute to lower energy consumption, as well as alternative heating and electrical systems.

Minimum Energy Modelling 25 Points Required for Bronze, 30 points for Silver, 35 points for Gold, and 40 points for Platinum.

Find BUILT GREEN® Approved products that help earn your build points towards certification by viewing our online Product Catalogue: www.builtgreencanada.ca/envelope-and-energy-systems

1.0: Energy Modelling

ASHRAE	Select modelling method here
15.00	Input % energy savings here

Relative cost
Points per item

1.0 Energy modelling is a requirement for Section I (Energy and Envelope). Model the performance of your HD Project with any approved government software, such as EE4, eQuest, or CanQuest. Points will be awarded for efficiency gains noted above the reference codes. A building achieving greater than 100% efficiency is net-positive and can earn bonus points for generating more energy than it consumes.

The energy requirement for each certification level is based on the percent improvement. In other words, the energy model rating must meet the required percent improvement over the reference building. Input the modelling method and the % improvement. The checklist will automatically calculate the points earned.

Over NECB 2011:
 Bronze certification: building rating meets the code and earns 25 points.
 Silver certification: building rating is 10% improvement and earns 30 points.
 Gold certification: building rating is 20% improvement and earns 35 points.
 Platinum certification: building rating is 30% improvement and earns 40 points.

Over ASHRAE 90.1 2010
 Bronze certification: building rating is 5% improvement and earns 25 points.
 Silver certification: building rating is 15% improvement and earns 30 points.
 Gold certification: building rating is 25% improvement and earns 35 points.
 Platinum certification: building rating is 35% improvement and earns 40 points.

Note: future versions of this checklist will reference the updated NECB/ASHRAE standards, after the industry has adapted more fully to their use.

The remaining action items and points hereafter in Section I may be used for additional points to be earned in your overall score; however, these points will not impact the earned energy points determined by the % improvement over reference building.

30	\$\$ - \$\$\$\$\$	0 to 150
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I.1: Building Envelope

1.1.1	Window to wall ratio does not exceed 40%.	NC	2
1.1.2	Install additional roof insulation above amounts already required by building code: (i) +R5 (for 1 point); (ii) +R10 (2 points); or (iii) +R15 (3 points).	\$ - \$\$\$	1, 2 or 3
1.1.3	Install additional insulation on exterior of above grade walls, above insulation amounts already required by building code: (i) +R5 for 2 point; or (ii) +R10 for 4 points.	\$ - \$\$\$	2 or 4
1.1.4	Install additional insulation on exterior of foundation system, above code required amounts for interior insulation: (i) +R7.5 (for 1 point); (ii) +R10 (2 points); or (iii) +R15 (3 points).	\$\$\$	1, 2 or 3
1.1.5	Install insulation under the entire basement slab above amounts already required by code: (i) +R5 (for 1 point); (ii) +R8 (2 points); or (iii) +R12 (3 points).	\$\$ - \$\$\$	1, 2 or 3
1.1.6	Attached garage or parking structure walls are insulated to minimum R12, and ceilings are insulated to minimum R35.	\$ - \$\$\$	1
1.1.7	Attached garage, parking, and/or loading dock overhead doors are insulated with R8 to R12 (for 1 point) or greater than R12 (for 2 points).	\$ - \$\$\$	1 or 2
1.1.8	Structural design eliminates the need for headers, or use insulated headers with minimum insulation value of R10.	\$ - \$\$	1
1.1.9	Structural design eliminates the need for rim/band joists, or use manufactured rim/band joists insulated to minimum R10.	\$ - \$\$	2
1.1.10	Install weather-stripped and insulated (R20 minimum for 1 point and R28 for 2 points) manufactured interior attic hatch, or have no interior attic access.	NC - \$	1 or 2
1.1.11	Install opaque doors that are a minimum R6, and any glazed sliding or swing doors at minimum R4 (for 1 point).	\$\$	1
1.1.12	All decks or balconies are thermally broken from the building envelope by: (i) Minimum R10 (for 1 point); OR (ii) Are fully separated (for 3 points); OR (iii) There are no decks or balconies (for 3 points).	\$ - \$\$	1 or 3
1.1.13	Windows are rated for high performance: (i) Windows are ENERGY STAR labeled at greater than 90% of all windows (3 points); OR (ii) All windows have U value of less than 2.2 W/m2k (1 point); less than 2.0 W/m2k (2 points); or less than 1.8 W/m2k (3 points).	\$ - \$\$\$	1, 2 or 3
1.1.14	Window systems are installed to be air tight: (i) Non-HCFC expanding foam around all windows, door openings, and exterior wall penetrations (2 points); AND/OR (ii) All sill plates are sealed with foam gaskets or a continuous bead of acoustical sealant (1 point); OR (iii) The building has a contiguous window-wall or curtain-wall (3 points).	\$ - \$\$\$	1, 2 or 3
1.1.15	All electrical back-boxes in exterior walls and ceilings are air tight (e.g. molded plastic).	NC - \$	1
1.1.16	Design all fire separations to be air tight, effectively sealing adjacent units from one another and from common space.	\$ - \$\$	2
1.1.17	Building includes passive solar shading, the benefits of which are demonstrated through an energy model: (i) exterior or interstitial solar shading devices for glazing (2 points); OR (ii) exterior operational shading devices (4 points), with automated control (1 additional point).	\$\$ - \$\$\$\$	2, 4 or 5
1.1.18	Use roofing material with a high solar reflectance index (SRI) of ≥78 (for roof slopes ≤ 2:12), or ≥29 (for roof slopes > 2:12). Roof areas that are covered by energy generation appliances (e.g. solar panels or wind turbines) or by vegetation (e.g. green roofing materials) are exempt.	\$\$ - \$\$\$\$	1
1.1.19	Builder utilizes a certified building envelope engineer for the design of the building envelope (1 point).	\$\$\$	1

I.2: Mechanical Systems

1.2.1	Calculate design heat loss and properly size HVAC equipment using CSA F280-M90 or ASHRAE/ACCA Standard 183.	\$ - \$\$	2
1.2.2	Centrally locate HVAC systems inside the building's heated envelope and reduce duct length.	NC	1
1.2.3	District Energy used for primary space conditioning (heating and cooling): (i) The building is designed for, and ready to connect to, a district heating system within one year of opening (1 point); (ii) The building will be connected to a district heating system from occupancy (1 additional point); (iii) The district energy system will also provide cooling (1 additional point).	NC - \$\$	1, 2 or 3
1.2.4	Install high efficiency heating systems for all units and systems serving common areas (minimum 90% AFUE gas furnace; minimum 85% AFUE oil furnace; or minimum 85% AFUE oil/gas boiler).	\$ - \$\$	3
1.2.5	Implement a boiler management system to match the system operation to building loads and optimize controls for maximum energy savings.	\$ - \$\$	2
1.2.6	Install high efficiency cooling systems for all units and systems serving common areas (minimum 14 SEER central A/C; or minimum ENERGY STAR individual appliance for each unit).	NC - \$\$	1
1.2.7	Install heat pumps to supply majority of space heating and cooling loads: ground/water with minimum COP of 4 or SEER 15, or air source with minimum COP of 2 or SEER 15.	\$\$ - \$\$\$\$\$	10
1.2.8	Install a centralized high efficiency domestic hot water heating system with minimum 85% AFUE boiler, minimum 0.67 EF gas water heater, or instantaneous tankless systems in each unit (3 points). For commercial boiler, the minimum thermal efficiency is 90 E, for oil and 95 E, for gas.	\$ - \$\$	3
1.2.9	Install heat pump-based DHW heating system (ground-, water-, or air-sourced, EF of 1.5 for 2 points; EF of 2 for 3 points) to supply a minimum of 35% of the peak DHW heating load and 70% of the total DHW energy load.	\$\$ - \$\$\$\$\$	2 or 3
1.2.10	Hot water storage tanks insulated by manufacturer to a minimum R-12.5.	\$	2
1.2.11	Insulate DHW piping: CASE 1: Where dwelling units contain independent DHW systems: (i) insulate the first three feet of the water lines from the hot water tank (1 point); OR (ii) insulate all hot water lines to all locations (2 points). CASE 2: Where DHW systems are common among multiple units: (i) insulate all hot water lines (including traps) for the first six feet from the central hot water tank (1 point); OR (ii) insulate all hot water lines to all locations (2 points).	\$ - \$\$\$	1 or 2
1.2.12	Install ENERGY STAR labeled bathroom exhaust fans for each unit.	\$	1
1.2.13	Fireplaces are all electric (2 points) or gas with sealed combustion and electronic ignition (2 points), or are EPA or CSA certified high-efficiency wood stove or pellet stove with a minimum efficiency of 72% (1 point) or 85% (2 points).	\$ - \$\$	1 or 2
1.2.14	All fireplaces, wherever installed, include a fan kit to circulate warm air into the room (2 points).	\$ - \$\$	2
1.2.15	Engage an independent Commissioning Engineer to review the Owner's HVAC and lighting system requirements, and perform a review of drawings and specifications (approx. 90% working drawings (2 points); AND Verify installation and operation of HVAC and lighting systems (3 points); AND/OR Carry out a follow-up onsite review of HVAC and lighting warranty items including comfort, controls, and energy efficiency (1 point).	\$\$ - \$\$\$	2 to 6

I.3: Metering and Controls

1.3.1	Provide electricity (1 point) and/or natural gas (1 point) direct metering for each unit.	\$ - \$\$	1 or 2
1.3.2	Provide programmable thermostats in each individual unit capable of managing at least two different daily schedules per week (e.g. weekday and weekend settings) (2 points total for all units).	\$ - \$\$	2
1.3.3	Parkade/garage heating setpoint is no higher than 4 degrees C, or garage/parkade is unheated.	\$ - \$\$	2
1.3.4	Units contain multiple heating/cooling zones with independent programmable thermostat control for each zone (2 zones = 2 points; 3 zones = 3 points; 4 zones = 4 points).	\$ - \$\$\$\$	2, 3 or 4
1.3.5	Install premium efficiency pump drive motors on all motors 1 hp or greater.	\$	1
1.3.6	Install HVAC systems with variable speed drives on all motors where there is a variable flow requirement.	NC - \$\$	3

APPENDIX C: BUILTGREEN CHECKLIST

I.4: Re-Use or Recovery of Waste Energy

1.4.1	Install and balance ventilation energy recovery systems: (i) individually controlled active Heat/Energy Recovery Ventilator (HRV/ERV) for each dwelling unit (4 points); AND/OR (ii) solar/geo fresh air pre-heating for each unit (3 points); AND/OR (iii) same for all common areas (2 points).	<input type="checkbox"/>	\$ - \$\$\$\$	2 to 9
1.4.2	Install drain water heat recovery (DWHR) units on the main drain stack to recover heat from shower drain water. DWHR units must be CSA certified to B55.1 and B55.2: (i) 1 point for units less than 42% efficient; (ii) 2 points for units greater than or equal to 42% efficient; (iii) 1 additional point for units that are fully insulated. DWHR units may be installed centrally or by dwelling unit, but must collect heat from a minimum of 90% of the showers in the building complex.	<input type="checkbox"/>	\$\$ - \$\$\$	1, 2 or 3
1.4.3	Install a properly supported and wired ceiling fan in every dwelling unit.	<input type="checkbox"/>	\$	1

I.5: Appliances

1.5.1	Electric ranges are induction based, or are otherwise certified to use below 480 kWh/year on the EnerGuide Rating System.	<input type="checkbox"/>	\$ - \$\$	1
1.5.2	Refrigerators are ENERGY STAR labeled products.	<input type="checkbox"/>	\$ - \$\$	1
1.5.3	Dishwashers are ENERGY STAR labeled products.	<input type="checkbox"/>	\$ - \$\$	1
1.5.4	Clothes washer or combo washer-dryers are ENERGY STAR labeled products.	<input type="checkbox"/>	\$ - \$\$	1
1.5.5	Provide energy efficient clothes drying facilities for each unit (1 point each, maximum 2 points total). (i) Clothes dryers are ENERGY STAR labeled; (ii) Clothes dryers have an "auto sense" dry setting that utilizes a humidity sensor for efficiency; (iii) Each dwelling unit is provided outdoor clothes drying facilities (e.g. clothes lines).	<input type="checkbox"/>	\$ - \$\$	1 or 2
1.5.6	All other eligible appliances supplied by the builder are ENERGY STAR rated (i.e. TV, LCDs, security systems).	<input type="checkbox"/>	\$ - \$\$	1

I.6: On-Site Energy Generation

1.6.1	Building is built "Solar Ready" following the guidelines from either Natural Resources Canada (NRCan) or the Canadian Solar Industries Association (CanSIA): (i) Minimum 10% of the total roof area is designed to support future solar collectors, is not shaded by other structures, and is structurally capable of supporting solar panels; (ii) A suitably sized conduit/chaseway is provided for routing solar energy conductors (wires and/or fluid lines) from the roof to the mechanical room (6 inches for a central shared solar system, or 4 inches conduit per dwelling unit); (iii) The purchaser of the unit is given information upon sale showing them where future solar panels would be installed (e.g. building drawings with a clearly indicated location for future solar panels).	<input type="checkbox"/>	NC - \$\$	1
1.6.2	Install active solar hot water heating system. Sized for 30% of DHW load (5 points), 50% (6 points), 80% (8 points).	<input type="checkbox"/>	\$\$ - \$\$\$\$	5, 6 or 8
1.6.3	Install on-site wind or solar (PV) electrical generation that supplies a portion of the designed electrical load (other than heat) in private dwelling areas: 10% for 4 pts, 25% for 8 pts, 50% for 12 pts, 75% for 16 pts, and 100% for 20 pts.	<input type="checkbox"/>	\$ - \$\$\$\$\$	4, 8, 12, 16 or 20
1.6.4	Install on-site wind or solar (PV) electrical generation that supplies 50% (2 point) or 100% (4 points) of electrical needs for the common areas. This does not include electric heat.	<input type="checkbox"/>	\$ - \$\$	2 or 4
1.6.5	Any exposed exterior accessibility ramps are heated with renewable energy or waste heat.	<input type="checkbox"/>	\$\$	2
1.6.6	Buildings are built ready for plug-in electric vehicles for minimum 5% of allocated parking spaces: 1 point for 240V plugs in the vehicle parking area, 2 points for certified charging stations.	<input type="checkbox"/>	\$ - \$\$	1 or 2

I.7: Lighting and Automation

1.7.1	Exterior lighting follows IESNA illuminance requirements for recommended practice manual: Lighting for Exterior Environments.	<input type="checkbox"/>	NC - \$	2
1.7.2	All exit signage is photo-luminescent or LED based.	<input type="checkbox"/>	NC - \$	2
1.7.3	Common areas are illuminated with high efficiency (ENERGY STAR or LED) lighting.	<input type="checkbox"/>	NC - \$	1

1.7.4	Dwelling units are illuminated with high efficiency (ENERGY STAR or LED) lighting throughout: minimum 25% of all lighting (2 points); 50% (3 points); 75% (4 points); or 100% (5 points).	<input type="checkbox"/>	\$ - \$\$	2 to 5
1.7.5	Insulated ceilings have no recessed lights, or advanced air-sealing methods are employed to ensure that recessed lights are fully air-tight (e.g. air tight and insulation contact rated recessed lights).	<input type="checkbox"/>	\$	1
1.7.6	Install interior motion sensor light switches in over 25% (1 point), 50% (2 points) or 75% (3 points) of all common interior spaces, including hallways/corridors, stairwells, laundry, garage, etc.	<input type="checkbox"/>	\$ - \$\$	1, 2 or 3
1.7.7	Install interior motion sensor light switches in each dwelling unit. 1 point per switch, to a maximum of 3 points (averaged across all dwelling units).	<input type="checkbox"/>	\$ - \$\$	1, 2 or 3
1.7.8	Install lighting with an automation control system capable of unified automation control of lighting loads for all common areas.	<input type="checkbox"/>	\$\$ - \$\$\$	2
1.7.9	In all garages/parkades, provide automatic lighting system (2 points) and/or ventilation system (2 points) triggered by movement or CO levels.	<input type="checkbox"/>	\$\$ - \$\$\$	2 or 4
1.7.10	Paint interior exposed surfaces of parkade (including walls, columns, and ceilings) semi-gloss white to reduce number of required lighting fixtures.	<input type="checkbox"/>	NC - \$\$	1
1.7.11	Install a master "all-off" switch in each dwelling unit that disables all non-essential electrical loads in the home.	<input type="checkbox"/>	\$\$	2
1.7.12	Install a home automation system in each dwelling unit that is capable of monitoring and adjusting: (i) heating, cooling, and humidity (2 points); (ii) lighting greater than 4 locations/rooms (1 point); (iii) if system can be controlled through a Wi-Fi, a smart phone, or app (1 additional point); (iv) all lighting and/or blinds to adjust to hourly sun schedule (1 point) (v) Domestic Hot Water (1 point); (vi) pre-set irrigation systems to account for weather (1 point); (vii) and a "vacation or away" mode that can turn off all non-essential electrical loads (1 point).	<input type="checkbox"/>	\$\$ - \$\$\$\$	1 to 8
1.7.13	Install home energy monitoring system that monitors and reports use and consumption patterns of all energy (gas, electricity, oil) in the home (1 point). An additional 1 point may be gained if the system is integrated with onsite renewable energy generation and storage technology.	<input type="checkbox"/>	or 2	\$\$\$ - \$\$\$\$

TOTAL SECTION POINTS 30

II. MATERIALS AND METHODS

This section rewards the use of environmentally preferred materials and building construction methods: recycled/reclaimed content, materials from renewable or sustainably managed sources, alternatives to dimensional lumber, more durable construction methods, and reducing the overall amount of material used.

Minimum 20 Points Required

Find BUILT GREEN® Approved products that help earn your build points towards certification by viewing our online Product Catalogue: www.builtgreencanada.ca/en/materials-and-methods

2.1: Material Efficient Framing

2.1.1	Use Insulated Concrete Forms (ICF) or other systems that eliminate the need for traditional formwork: 3 points for below grade, and/or 4 points for 75% of above grade.	<input type="checkbox"/>	\$\$\$\$	3 to 7
2.1.2	Use Optimum Value Engineering (OVE) for framing design: (i) Exterior and interior wall stud spacing at minimum 19.2 inches on-center; (ii) Elimination of headers at non-bearing interior and exterior walls. (iii) Use of header hangers instead of jack studs. (iv) Elimination of cripples on hung windows. (v) Elimination of double plates, using single plates with connectors by lining up roof framing with wall and floor OR: Use concrete floors and roof with cambering of slabs to reduce slab thickness and column sizes with a total project concrete savings of at least 5%.	<input type="checkbox"/>	NC 1 NC \$ NC NC NC	1 1 1 1 1 5
2.1.3	Walls and roof designed on 24 inch modules to reduce waste.	<input type="checkbox"/>	NC	2
2.1.4	Reduce dimensional lumber use by using engineered stud material for minimum 10% of structural stud wall framing.	<input type="checkbox"/>	\$ - \$\$\$	1
2.1.5	Finger-jointed plate material and/or engineered plate material used for all framing plates.	<input type="checkbox"/>	\$ - \$\$\$	1

2.1.6	Structural insulated panel system (SIPS) or other panelized construction systems are used for walls (3 points) and/or roofs (2 points).	<input type="checkbox"/>	\$\$ - \$\$\$\$	2, 3, or 5
2.1.7	Use insulating sheathing on the exterior of steel studs, or with corresponding structural bracing (metal fasteners) instead of non-insulated exterior wood sheathing	<input type="checkbox"/>	NC - \$\$	2
2.2: Environmentally Preferable Materials				
2.2.1	Use environmentally engineered flooring system, such as reclaimed/recycled/rapidly renewable wood waste, cross-laminated timber, concrete with minimum 30% fly ash or other SCM, or minimum 75% recycled steel (1 point) from third-party certified, sustainably harvested sources (CSA, SFI, or FSC for 2 points). The use of third-party certified subfloor sheathing for 1 extra point.	<input type="checkbox"/>	NC - \$\$\$	1, 2, 3 or 4
2.2.2	Use environmentally engineered products for all load-bearing beams, such as reclaimed/recycled/rapidly renewable wood waste, concrete with minimum 30% fly ash or other SCM, or minimum 75% recycled steel.	<input type="checkbox"/>	\$\$ - \$\$\$\$	2
2.2.3	Use environmentally engineered products for all exterior window and door headers, such as reclaimed/recycled/rapidly renewable wood waste, concrete with minimum 30% fly ash or other SCM, or minimum 75% recycled steel.	<input type="checkbox"/>	\$ - \$\$\$	1
2.2.4	Deck, balcony, or veranda surfaces (1 point) and/or structure (1 point) made from a third-party certified, sustainably harvested wood source (CSA, SFI, or FSC) or third-party certified sustainable concrete.	<input type="checkbox"/>	\$\$\$	1 or 2
2.2.5	Dimensional lumber from a third-party certified sustainably harvested source (CSA, SFI, or FSC) used for floor framing (1 point), wall framing (2 points), and/or roof framing (1 point).	<input type="checkbox"/>	\$ - \$\$	1 to 4
2.2.6	Finger-jointed studs for minimum 90% of non-structural (1 point) and/or minimum 90% of structural (1 point) wall framing.	<input type="checkbox"/>	\$ - \$\$\$	1 or 2
2.2.7	Steel studs made from minimum 75% recycled steel are used for interior walls (1 point) and exterior walls (1 additional point).	<input type="checkbox"/>	\$	1
2.2.8	Recycled and/or recovered content gypsum wallboard, minimum of 40% post-consumer recycled content.	<input type="checkbox"/>	1	1
2.2.9	Recycled content exterior wall sheathing (minimum 50% pre- or post-consumer).	<input type="checkbox"/>	\$\$\$	2
2.2.10	Concrete used in the building has a minimum supplementary cementitious material of 25% (1 point), 30% (2 points), or 40% (4 points) within the scope of proper engineering practices.	<input type="checkbox"/>	\$ - \$\$\$	1, 2 or 4
2.2.11	Insulation used in walls, roofs, and exposed floors (cantilevers) is certified by a third-party to contain a minimum recycled content: 25% (1 point) or 50% (2 points).	<input type="checkbox"/>	1	1 or 2
2.2.12	Overhead garage door is made of 75% or greater recycled material.	<input type="checkbox"/>	\$\$ - \$\$\$	1
2.2.13	Floor Coverings: (i) Install carpet that has a minimum of 50% recycled content or 30% renewable content. (ii) Natural or 100% recycled-content carpet pad (e.g. made from textile, carpet cushion, or tire waste, rebond qualifies). (iii) Save materials by eliminating carpet: have minimum of 20% concrete floor finished (e.g. stamped, acid-etched, etc.) and left exposed. (iv) Install ecologically preferred bamboo, cork, or hardwood flooring in each dwelling unit (1 point); more than 40% of all indoor floors (2 points) or more than 80% of all indoor floors (3 points). Products must be third-party certified from sustainably managed forests or certified sustainable sources (e.g. Rainforest Alliance, FSC, CSA, or SFI). (v) All ceramic tile installed in any dwelling unit has a minimum of 25% recycled content	<input type="checkbox"/>	NC - \$	1
		<input type="checkbox"/>	1	1
		<input type="checkbox"/>	NC - \$\$	3
		<input type="checkbox"/>	\$ - \$\$\$	1 to 3
		<input type="checkbox"/>	\$\$\$	2
2.2.14	Paints or finishes are manufactured with minimum 20% recycled content.	<input type="checkbox"/>	\$ - \$\$	1
2.2.15	Shelving made from 100% agricultural waste or 100% recycled wood particle board, including shelving inside cabinets.	<input type="checkbox"/>	\$ - \$\$\$	2
2.2.16	Doors: (i) Exterior doors contain minimum 15% recycled and/or recovered content. (ii) Interior doors contain minimum 25% recycled and/or recovered content. (iii) Minimum 50% of interior doors made from third-party certified, sustainably harvested wood (CSA, SFI, or FSC). (iv) Minimum 50% of interior doors have been salvaged from another project.	<input type="checkbox"/>	1	1
		<input type="checkbox"/>	\$	1
		<input type="checkbox"/>	NC - \$\$	2
		<input type="checkbox"/>	NC - \$\$	3
2.2.17	Windows: (i) Exterior window frames contain minimum 10% recycled or reclaimed content. (ii) Exterior window frames made from third-party certified, sustainably harvested wood (CSA, SFI, or FSC).	<input type="checkbox"/>	\$\$	1
		<input type="checkbox"/>	\$\$\$	3
2.2.18	Parapets (2 points) or fascia and soffit (1 point each) made from minimum 50% recycled and/or recovered content (pre- or post-consumer).	<input type="checkbox"/>	\$	1 or 2

2.2.19	Exterior cladding materials contain a minimum of 50% recycled and/or recovered content for 25% of the building's exterior (1 point); or more than 50% of exterior (2 points); or more than 75% of the exterior (3 points); or more than 90% of the exterior (4 points).	<input type="checkbox"/>	\$ - \$\$\$	1, 2, 3 or 4
2.2.20	Exterior trim materials include at minimum 50% recycled and/or recovered content. This should include window, door, corner, and deck trim complete with any associated flashing.	<input type="checkbox"/>	\$ - \$\$\$	3
2.2.21	Exterior trim materials are manufactured from OSB, which must have no added formaldehyde.	<input type="checkbox"/>	\$ - \$\$\$	1
2.2.22	MDF and/or finger-jointed casing and baseboard used throughout (1 point), and in all jambs (1 point).	<input type="checkbox"/>	2	1 to 2
2.2.23	Solid hardwood from third-party certified, sustainably harvested sources (CSA, SFI, or FSC) used for millwork and/or cabinets in all kitchens (2 points) and/or all bathrooms (2 points) in all dwelling units and common areas.	<input type="checkbox"/>	\$ - \$\$\$	2 or 4
2.2.24	More than 90% of all wood used for flooring, cabinets, and millwork is from: (i) domestic (i.e. North American) sources (4 points), (ii) recovered or re-milled sources (5 points), (iii) salvaged or re-used (6 points).	<input type="checkbox"/>	\$\$\$ - \$\$\$\$	4, 5, or 6
2.2.25	Minimum 25% recycled-content roofing system, including underlay and finish for 2 points, 50% recycled content for 4 points.	<input type="checkbox"/>	NC - \$\$	2 or 4
2.2.26	Provide a green roof over 50% (3 points), 75% (5 points), or 100% of total roof area (7 points), excluding any roof area used for energy generation (e.g. wind turbines or solar panels).	<input type="checkbox"/>	\$\$	3, 5, or 7
2.2.27	Use of miscellaneous salvaged materials derived from local sources for any building assembly or component not otherwise listed above (1 point for each different product used, to a maximum of 3).	<input type="checkbox"/>	\$ - \$\$\$\$	1 to 3

2.3: Durable Construction

2.3.1	Minimum 30-year manufacturer warranty roofing material (2 points plus 1 point for each additional 5 years). "Lifetime" warranties have terms/conditions that ultimately have a limit in real years, and will not be considered unless clarified. Inspection by certified roofing inspector or an envelope engineer for 1 point.	<input type="checkbox"/>	6	NC - \$\$\$\$\$	2 to 7
2.3.2	Low VOC water or damp proofing on foundation walls. ((SCAQMD Rule 1113, 2004 VOC limits: Waterproofing sealers <=250 g/L / Waterproofing Concrete or Masonry Sealers: <=400 g/L).	<input type="checkbox"/>	1	\$ - \$\$	1
2.3.3	Use a rain screen system to separate cladding from the wall sheathing with a drainage plane (2 points), made from 60% or more recycled content (additional 1 point for 60% OR additional 2 points for more than 90% recycled content). Integrate windows into drainage plane by angling bottom sills slightly down towards the exterior, and install window flashing to direct moisture out towards the drainage plane (additional 1 point).	<input type="checkbox"/>	2	\$ - \$\$\$	1 to 5
2.3.4	All exterior doors and windows manufactured from fiberglass (1 point for windows and/or 1 point for doors).	<input type="checkbox"/>	NC - \$\$	1 or 2	
2.3.5	Natural cementitious stone/stucco/brick, metal cladding, or fiber cement siding, or combination thereof for 25% of exterior cladding (1 point), 50% (2 points), 75% (3 points) or more than 90% (4 points).	<input type="checkbox"/>	4	\$\$\$	1 to 4
2.3.6	Fascia and/or soffit made from fiber cement (1 point each).	<input type="checkbox"/>	2	\$\$\$ - \$\$\$\$	1 or 2
2.3.7	Exterior trim materials made from alternatives to solid lumber.	<input type="checkbox"/>	\$ - \$\$\$\$	1	
2.3.8	All exterior trim is clad with pre-finished metal (1 point over wood backings, 2 points without wood backings).	<input type="checkbox"/>	2	\$\$\$	1 or 2
2.3.9	Deck, veranda, and balcony surfaces made from environmentally preferable low-maintenance materials (e.g. stone, concrete, tile, composites, etc.) that do not need maintenance of any kind, including painting, for a minimum of 5 years.	<input type="checkbox"/>	2	\$ - \$\$\$	2
2.3.10	Install durable flooring (e.g. laminate, finished concrete, tile, hardwood, etc.) in all high traffic areas (halls, kitchen, living space) (1 point); more than 30% of all indoor flooring (2 points); more than 60% of all indoor flooring (3 points); or more than 90% of all indoor flooring (4 points).	<input type="checkbox"/>	1	\$\$ - \$\$\$\$	1 to 4
2.3.11	Countertops are made from durable materials such as granite, concrete, recycled glass, metal, or local natural stone, for all kitchen counters (2 points), or all other countertop areas (1 point), or both (3 points total).	<input type="checkbox"/>	\$\$ - \$\$\$	1, 2 or 3	
2.3.12	Lifetime finish on all faucets.	<input type="checkbox"/>	NC - \$	1	
2.3.13	Lifetime finish on all door hardware.	<input type="checkbox"/>	NC - \$	1	
2.3.14	Install only Type 1 or 2 grade door hardware with lifetime mechanical warranty.	<input type="checkbox"/>	\$ - \$\$\$	2	

TOTAL SECTION POINTS 28

III. INDOOR AIR QUALITY

This section focuses on the quality of the air within the finished building. Products listed here include materials that are low in VOCs, products made from all natural materials as well as various air cleaning and ventilation systems.

Minimum 15 Points Required

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3.1: Air Treatment

	Relative cost	Points per item
3.1.1 Install air filtration on all air handling systems: (i) pleated media filter with minimum MERV rating of 7 (1 point) or 12 (2 points); OR (ii) an electrostatic air cleaner (2 points); OR (iii) an electronic air cleaner (3 points); OR (iv) a HEPA filtration system (6 points).	1 NC - \$\$\$	1, 2, 3 or 6
3.1.2 Install ultraviolet air purification in air handling systems.	\$\$\$	2
3.1.3 Provide thermostats in each dwelling unit or zone that indicates the need for the air filter to be changed or cleaned.	1 \$	1
3.1.4 The HVAC design includes humidity control within each dwelling unit, zone and/or common area.	\$	2

3.2: Contaminant Source Elimination

3.2.1 All combustion space and water heating equipment located within building are sealed with no possibility of backdraft.	1 \$ - \$\$	1
3.2.2 Provide soil gas/radon protection: (i) either verify that radon gas levels are within government-approved safe limits at the site, or provide passive sub-slab ventilation (1 point); OR (ii) actively depressurizing the sub-slab (i.e. add a fan for 2 points).	\$	1 or 2
3.2.3 Seal all permanent ductwork upon installation, removing seals once all phases of construction are complete.	NC - \$	1
3.2.4 Prior to occupancy, but after all interior construction is substantially complete and all finishes have been installed, perform a full flush of the air within the building by running the air handler (on maximum speed if a variable speed device) for a minimum of 48 hours (combined over not more than 4 sessions), and provide new filters in the air handler after the flush is complete.	\$	2
3.2.5 Central vacuum system exhausted outside conditioned space.	\$ - \$\$	1
3.2.6 Insulation used is third-party certified to have zero formaldehyde.	2 \$	2
3.2.7 Low formaldehyde sub floor sheathing (third-party certified to less than 0.18 ppm).	\$ - \$\$\$	2
3.2.8 Low formaldehyde underlayment is used throughout (third-party certified to less than 0.21 ppm).	\$	1
3.2.9 Low formaldehyde particle board/MDF used for cabinets: more than 0.21 ppm for 1 point, or zero formaldehyde for 2 points.	1 \$ - \$\$	1 or 2
3.2.10 Low formaldehyde particle board/MDF used for shelving: more than 0.21 ppm for 1 point, or zero formaldehyde for 2 points.	1 \$ - \$\$	1 or 2
3.2.11 All interior wire shelving is factory coated with low VOC/no off gassing coatings.	\$ - \$\$	2
3.2.12 All hardwood floors are site-finished with water-based urethane finishes, or are factory finished.	2 \$ - \$\$	2
3.2.13 Water-based lacquer or paints are used on all site-built and installed millwork, including doors, casing, and baseboards (less than 200 grams/litre of VOCs for 2 points or less than 50 grams/litre for 3 points).	2 \$\$	2 or 3
3.2.14 Interior paints used have low VOC content (less than 200 grams/litre of VOCs for 1 point or less than 50 grams/litre for 2 points).	1 NC - \$	1 or 2
3.2.15 Interior paints have no VOCs in base paint prior to tint (1 point) or in tint (2 additional points). Alternatively, for a full 3 points, use natural finishes such as lime plasters (NOTE: If taking points in 3.2.15, then also take point in 3.2.14).	\$\$\$	1 to 3
3.2.16 All ceramic tiles are installed with low VOC adhesives (less than 65 grams/litre) and plasticizer-free grout.	1 \$\$	1
3.2.17 All vinyl flooring is replaced with natural linoleum installed with low VOC adhesives, or other hard-surface flooring.	\$ - \$\$\$\$	2

3.2.18 All flooring is installed with low VOC (less than 60 grams/litre) adhesives (for 1 point), or with zero VOC adhesive (2 points), or no adhesive (2 points).	1 \$\$ - \$\$\$\$	1 or 2
3.2.19 Carpet and Rug Institute (CRI) IAQ label on all carpet used. Gemeinschaft umweltfreundlicher Teppichboden's (GUT) production information system PRODIS is also recognized.	2 NC - \$\$	2
3.2.20 Carpet and Rug Institute (CRI) IAQ label on all underlay used. Gemeinschaft umweltfreundlicher Teppichboden's (GUT) production information system PRODIS is also recognized.	1 NC - \$\$	1
3.2.21 Natural material-based carpet (e.g. wool) in all living areas (for minimum 150 ft2).	\$\$\$	2
3.2.22 Carpet-free design: all flooring surfaces are hard (including stairs).	\$ - \$\$\$\$	2
3.2.23 For all permanent or significant entryways leading from outdoors, install an entryway system of at least 10 feet in length to captures dirt and particulates (i.e. grates/grills/slotted systems or roll-out mats that are maintained weekly by a service organization).	\$ - \$\$	2

TOTAL SECTION POINTS 17

IV. VENTILATION

This section covers the mechanical ventilation systems in the building, including air filtration and heat recovery.

Minimum 5 Points Required

Platinum Level Note: Platinum level homes must use item 4.1.

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	Relative cost	Points per item
4.1 Ventilation system is designed and installed according to CSA Standard F326 or ASHRAE 62.1.	\$ - \$\$\$	4
4.2 All ductwork thoroughly sealed along all seams, joints, connections, penetrations, etc., in accordance with local prevailing code and industry best practice (2 points) or test/verify duct leakage to be less than 5 cfm (at 25 Pa) per 100 ft ² of conditioned floor area (2 additional points).	2 NC - \$\$	2 or 4
4.3 Install in-line ventilation fan with programmable timer (separate switch from lighting) in each unit.	\$	1
4.4 Install motorized damper on all bathroom/exhaust fans.	\$\$	2
4.5 All bath fans have a noise level of 1 sone or less.	2 NC - \$\$	2
4.6 Provide local bathroom exhaust fan controls in each unit using either an occupancy sensor, automatic humidistat controller, automatic timer, or continuously operating exhaust fan.	\$ - \$\$	1
4.7 Install timer switches, occupancy sensors or central BAS controls on all local exhaust fans outside of individual units (i.e. laundry, recreation, storage areas, etc.).	\$ - \$\$	1
4.8 Install passive Heat Recovery Ventilator (HRV, for 2 points) or an active Heat Recovery Ventilator/Energy Recovery Ventilator (HRV or ERV, 4 points) either centrally or in each unit.	4 \$ - \$\$\$	2 or 4
4.9 Install permanent (de)humidification control in each unit (ERVs are considered acceptable).	\$ - \$\$	1
4.10 For indoor pool areas, install a designated dehumidification system designed by a consulting engineer or qualified contractor to match the water and air temperatures maintained in the area.	\$ - \$\$	1

TOTAL SECTION POINTS 8

V. WASTE MANAGEMENT

This section deals with the handling of waste materials on the construction site and encourages recycling.

Minimum 7 Points Required

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	Relative cost	Points per item
5.1 Comprehensive recycling program during construction for building site including education, site signage, and bins.	2 \$	2
5.2 Implement a recycling program: collection of waste materials from site by a waste management company that is a current member of a provincial recycling council or equivalent association and verifies that a minimum of 25% of the materials collected from the construction site have been recycled.	4 \$ - \$\$	4

5.3	Suppliers and trades recycle their own waste, including leftover material and packaging (1 point per trade—maximum 4 points).	1	\$	1 to 4
5.4	Minimum 25% (1 point), 50% (2 points), 75% (3 points), or 90% (4 points) by weight or volume of waste materials collected from construction site is diverted from waste stream.	3	\$ - \$\$\$	1 to 4
5.5	OR Waste reduction for remote projects: for projects occurring in regions that are minimum 100km away from the nearest population center with minimum 30,000 residents, the project may earn 1 point if the total amount of waste produced on the construction site is less than 4 lbs/ft ² , 2 points are available for less than 3 lbs/ft ² , and 3 points for less than 2 lbs/ft ² , and 4 points less than 1 lbs/ft ² .		\$ - \$\$\$	1 to 4
5.6	Metal or engineered durable form systems used for concrete foundation walls.		NC - \$\$	1
5.7	Install permanent recycling center in each residential unit with two or more 26L bins (1 point), or four or more 26L bins (2 points), located in, or conveniently close to, the kitchen. Multiple bins are intended to facilitate sorting of different recyclables, potentially including compost. Equivalent bin configurations will be accepted where aligned with local recycling program requirements.		\$ - \$\$\$	1 or 2
5.8	Provide a central recycling center for the housing project including, as a minimum, separate bins for paper, glass, and metal (1 point), and/or install a trash compactor (1 point).	1	\$ - \$\$\$	1 or 2
5.9	Existing dwellings onsite from prior to construction are recycled (greater than 50% diverted from landfill for 3 points) or relocated (6 points) rather than demolished.		\$\$\$\$ - \$\$\$\$\$	3 or 6

TOTAL SECTION POINTS 11

VI. WATER CONSERVATION

This section encourages a reduction in the amount of water used in the building.

Minimum 10 Points Required

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6.1: Indoor Water Conservation

		Relative cost	Points per item
6.1.1	Install a calibrated water meter in every unit.	\$ - \$\$\$	3
6.1.2	Install ultra efficient toilets with average flow rates less than or equal to 3L/flush for 2 points each (up to 6 points).	\$ - \$\$\$	2, 4 or 6
6.1.3	Install efficient toilets with average flow rates less than or equal to 4.5L/flush for 1 point each (up to 3 points).	\$ - \$\$\$	1, 2 or 3
6.1.4	Install waterless urinals in all public washrooms for men.	\$ - \$\$	1
6.1.5	Install hot water recirculation system with all hot water lines insulated (2 points) with local activation/call switches installed at all points of use (additional 2 points), or point-of-use instant DHW system (1 point each, maximum 4).	\$\$\$ - \$\$\$\$\$	1 to 4
6.1.6	Install low-flow aerated faucets for all lavatories (less than 5.7 lpm) including kitchen (less than 6.8 lpm) for 2 points, and all showers and tub/showers (less than 7.5 lpm) for 1 additional point.	\$	2 or 3
6.1.7	Provide front-loading clothes washer (2 points), or condensing combination wash/dry unit (4 points), or top-loading clothes washer having a rated water factor of less than 25 litres per cycle per cubic foot (3 points).	\$ - \$\$\$	2, 3 or 4
6.1.8	Install water-saving dishwasher that uses less than 20.0 L/water per load.	\$ - \$\$	1

6.2: Outdoor Water Conservation

6.2.1	Install permeable paving materials for all driveways and walkways (minimum 70% of hardscaped area).	\$\$\$ - \$\$\$\$\$	3
6.2.2	Design all impermeable hardscape surfaces to direct rainwater to an on-site infiltration feature (i.e. vegetated swale, rain-garden, cistern, etc.).	NC - \$\$	1
6.2.3	Provide a minimum of 8 inches of topsoil or composted yard waste as finish grading throughout site.	\$\$\$ - \$\$\$\$\$	2
6.2.4	Provide a list of drought-tolerant plants and a copy of the local municipality water usage guide to building manager(s)/occupants with closing package.	NC - \$\$	1

6.2.5	Reduce lawn/turf to 50% of landscaped area.	1	NC - \$\$	1
6.2.6	Provide permeable landscaping that is water efficient (for 1 point), xeriscaped (50% of landscaping for 2 points, 100% for 4 points), or is 100% plant-free landscaping (4 points).		\$ - \$\$\$\$\$	1, 2 or 4
6.2.7	OR Install efficient irrigation technology including (for 1 point each, to maximum 3 points): (i) has head-to-head coverage; (ii) uses high efficiency spray heads with distribution uniformity of 0.7 or greater; (iii) uses a square spray patterns to increase efficiency and reduce overspray onto non-permeable surfaces; (iv) uses drip irrigation for minimum 50% of planting bed area, including all larger shrub bed areas; (v) includes a flow sensor, central shut-off valve, and sub meter; (vi) has a pressure regulating device; (vii) includes a moisture sensor/rain delay controller.	1	\$ - \$\$\$	1 to 3

6.3: Water Re-Use

6.3.1	Provide one rain barrel per unit, complete with insect screen, drain, and overflow spouts, and connect to building downspout (1 point).		NC - \$\$	1
6.3.2	OR Provide a central rainwater collection cistern (minimum 50L per unit) to offset domestic water usage either indoors (e.g. atrium water, toilet flushing) or outdoor (e.g. irrigation for atria or gardens) (3 points for above grade, 5 points for below grade).		\$ - \$\$\$\$\$	3 or 5
6.3.3	Grey water: rough-in a system for collecting waste water from sinks, showers, and/or kitchens to capture and treat for use in toilets or irrigation (3 points), or complete the system by installing greywater treatment equipment (6 points).		\$\$\$ - \$\$\$\$\$	3 or 6
6.3.4	Install on-site black water treatment system or engineered wetland for reprocessing local sewage (8 points).		\$\$\$\$\$	8

TOTAL SECTION POINTS 13

VII. BUSINESS PRACTICES

This section deals more with manufacturers and builders office and business practices.

Minimum 8 Points Required

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7.1: Builder's Internal Policies

		Relative cost	Points per item	
7.1.1	Builder has a written environmental policy defining their commitment (must include an office recycling program, a staff education program, appropriate signage in the builder's offices, and energy efficient lighting). The policy must be signed by a senior executive and published on the company website.	1	NC	1
7.1.2	Builder's environmental policy includes and prioritizes milestones for future net-zero housing developments.		\$\$\$\$\$	1
7.1.3	Manufacturer and/or supplier has a written environmental policy with defined environmental commitments (must include an office recycling program and energy efficient lighting). (1 point per supplier/manufacturer—maximum of 2 points).	1	\$\$\$\$\$	1 or 2
7.1.4	Products used for the building are manufactured within 800 km of build site (1 point for each 2 products to maximum 5 points).	4	\$	1 to 5
7.1.5	Manufacturers and/or suppliers purchase 50% or more of their power needs from solar, wind, or renewable electricity (1 point per supplier to maximum 3).		NC	1, 2 or 3
7.1.6	Builder's office and show homes/presentation centers purchase a minimum of 50% (1 point) or 100% (2 points) of their energy from renewable resources such as solar, wind, or biogas.		\$	1 or 2
7.1.7	50% (2 points) or 100% (4 points) of electricity used during construction of the project is generated by wind power or equivalent green power certificate. Usage from a typical 6 month construction period or a recent similar project can be used to determine the monthly average.		\$\$\$	2 or 4
7.1.8	50% (2 points) or 100% (4 points) of electricity used by occupants during first year of occupancy is generated by wind power or an equivalent renewable energy supply (prepaid by builder).		\$ - \$\$\$	2 or 4
7.1.9	When building in winter, builder uses best-practice cold-construction techniques to minimize energy wasted during construction (e.g. no propane heaters with tarps; consider radiant heaters, manufacturing components indoors, etc.).		NC	1

7.1.10	Perform air-tightness inspections at the pre-drywall stage (1 point) with optional door-fan depressurization test where applicable (1 additional point).	<input type="checkbox"/>	\$	1 or 2
7.1.11	Builder's show home(s) or presentation centres (i.e. the building(s) incorporating model suites) incorporate permeable landscaping, which is water efficient or xeriscaped (50% of lawn for 2 points, 100% for 4 points).	<input type="checkbox"/>	\$\$ - \$\$\$\$	2 or 4
7.1.12	The builder integrates innovative sustainable building practices above and beyond what is contained within the checklist section and provides supporting documentation. The innovation must apply to the project and will be reviewed by the Technical Standards Committee at the time of submission.	<input type="checkbox"/>	NC - \$\$\$	1 to 5

7.2: Community Development & Transportation

7.2.1	Implement a Construction Traffic/Truck Management Plan to avoid high congestion areas during construction by (as a minimum): (i) identifying potentially sensitive neighbours; (ii) ensuring that all vehicles can manoeuvre and park efficiently; (iii) avoiding vehicle idling; (iv) scheduling vehicle movements appropriately.	<input type="checkbox"/>	NC	1
7.2.2	Project site has a designated delivery area where truck wheels are washed/treated during construction (to contain dirt).	<input type="checkbox"/>	NC - \$\$	1
7.2.3	Builder's company vehicles are electric, hybrid, or bio-diesel vehicles (1 point per vehicle—maximum of 3 points).	<input type="checkbox"/>	NC - \$\$	1 to 3
7.2.4	Development site provides community amenity space for not-for-profit (NFP) community services.	<input type="checkbox"/>	NC - \$\$\$\$	2
7.2.5	Development site provides for Publicly Accessible Private Space.	<input type="checkbox"/>	NC	1
7.2.6	Trees and natural features on site are protected during construction. (Point not available where there is nothing to protect.)	<input type="checkbox"/>	1 NC	1
7.2.7	Development includes a diversity of housing types, including minimum 20% live/work units (2 points) and/or minimum 25% mixed use facilities (2 points).	<input type="checkbox"/>	NC	2 or 4
7.2.8	Masterplan to encourage shared transportation: (i) Provide minimum one parking stall for a car-sharing vehicle (1 point); AND/OR (ii) Provide a shared vehicle as an asset owned by the condominium association (3 points); AND/OR (iii) Provide permanent bicycle storage on site that is convenient, secure, and sheltered (1 point).	<input type="checkbox"/>	\$ - \$\$\$\$\$	1, 2, 3, 4 or 5

7.3: Training

7.3.1	Builder provides BUILT GREEN® building owner manual, completed BUILT GREEN® checklist, and educational walkthrough for building manager(s)/owner(s) upon closing.	<input type="checkbox"/>	2 \$ - \$\$	2
7.3.2	Contracted trades, suppliers, and/or supporting design professionals have successfully taken and maintained BUILT GREEN® Training (1 point per trade organization, maximum 5).	<input type="checkbox"/>	1 \$	1 to 5
7.3.3	Builder's Site Superintendent has successfully taken and maintained BUILT GREEN® Orientation Training status (1 point), or Building Science Training endorsed by Built Green Canada (e.g. NRCan's Energy Advisor or R-2000 courses, or related formal schooling) (2 additional points).	<input type="checkbox"/>	1 \$	1, 2 or 3

7.4: BUILT GREEN® Promotion

7.4.1	Builder's construction site and sales office signage clearly display the BUILT GREEN® logo and promotes the fact that the project is registered as a BUILT GREEN® project.	<input type="checkbox"/>	1 \$	1
7.4.2	Builder's primary place of business (i.e. office) is certified via a recognized third-party best practice program.	<input type="checkbox"/>	\$\$	3
7.4.3	Builder agrees to construct and label a minimum of 50% of all their buildings in all their projects to the applicable BUILT GREEN® standard each calendar year (3 points for 50%, 5 points for 100%).	<input type="checkbox"/>	5 \$ - \$\$	3 or 5

TOTAL SECTION POINTS **17**

TOTAL CHECKLIST POINTS **124**

MEMORANDUM



TO: Allan Seppanen, RWA
Jason Wexler, BPP

FROM: Ruth McClung, MASc
Alex Blue, P.Eng.

PROJECT No.: 5160511

DATE: 1/11/2018

RE: Energy Model for BPP Area 4 Lot 37
ASHRAE 90.1-2010 Baseline rev1

0:\VANCOUVER\PROJ\5160511\8 EVALUATION\3 REPORTS\BPP LOT 37 MEMO 9JAN2018 - ASHRAE 2010.DOCX

Morrison Hershfield has updated our preliminary energy model for the British Pacific Properties Area 4 Lot 37 project in West Vancouver, BC, to compare the model with an ASHRAE 90.1-2010 baseline following the project's transition to Built Green HD 2017. The intent of this memo is to communicate the energy performance of the preliminary design scheme with respect with the requirement to demonstrate compliance with BCBC by meeting NECB 2011 and the project target of Built Green HD 2017 Silver, with a minimum requirement of 15% energy savings over ASHRAE 90.1-2010.

The energy model is based on drawing sets dated March 6, 2017, discussions with the design team, and our experience on similar projects including the previous project at Lot 36. The design includes a VRF system with suite HRVs, high efficiency natural gas DHW heater, DHW load savings over ASHRAE baseline, and fan power savings from ECM motors for zone VRF terminals. Detailed energy modeling inputs are available in Appendix A.

The anticipated design includes:

- Thermally broken aluminum window frames with double glazed IGUs (U-0.37)
- R-20 roof performance
- Thermally efficient exterior insulated wall assemblies, with 4" exterior mineral wool and 6" batt
- Credit for developer designed and installed suite LED lighting, 5W/m²
- Other inputs in Appendix A

The current design achieves 22.9% energy savings over NECB 2011, meeting Part 10 of BCBC, and 26.0% energy savings over ASHRAE 90.1-2010, achieving the required Built Green Silver target of 15% energy savings over ASHRAE 2010.

Energy savings for the building come from:

- VRF efficiency savings vs. packaged terminal heat pump system in reference building
- DHW load savings over baseline
- Suite HRVs coupled with VRF
- Fan power savings from ECM motors for suite VRF
- Windows and balcony doors with higher than baseline performance

Results and Analysis

The detailed end use results for the proposed design and the ASHRAE reference building are presented in Table 1 and Figures 1 and 2.

Table 1. ASHRAE 90.1-2010 Energy End Use Breakdown

	Proposed		ASHRAE 90.1-2010 Baseline		Savings (%)
	Electricity (GJ)	Natural Gas (GJ)	Electricity (GJ)	Natural Gas (GJ)	
Heating	482	0	781	0	38.3%
DHW	0	472	0	747	36.8%
Cooling	41	0	76	0	46.8%
Lighting	657	0	890	0	26.2%
Equipment	413	0	413	0	0.0%
Fans	396	0	572	0	30.7%
Total	1,988	472	2,732	747	29.3%
Cost (\$)	53,073	4,246	72,954	6,719	28.1%

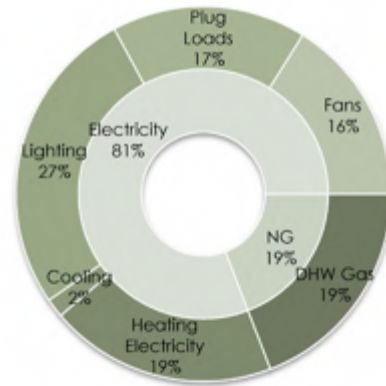


Figure 1. Proposed Energy End Use

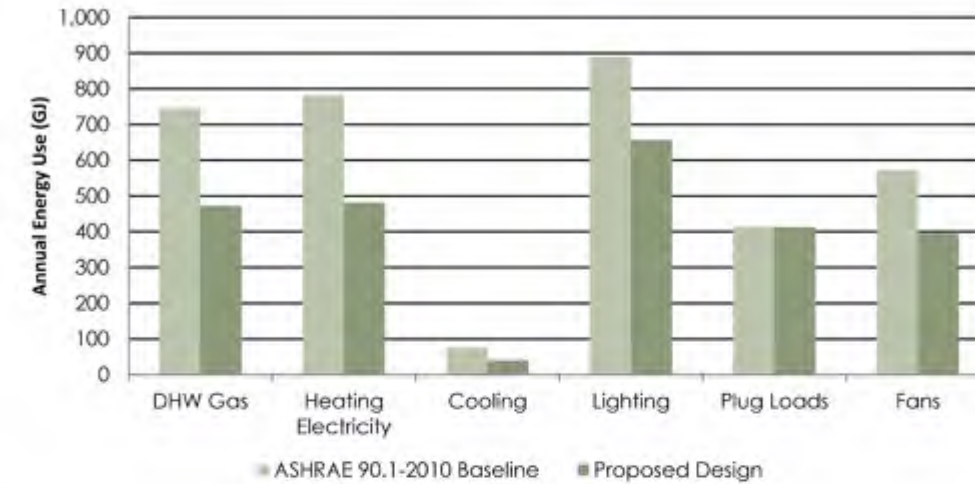


Figure 2. ASHRAE Energy End Use Breakdown

Photovoltaic panels were also evaluated for additional energy savings. PV panels with a total capacity of 4.3kW, over an area of 29 m² is expected to provide 5.55 MWh of electricity annually, for an additional 0.6% energy savings over the ASHRAE 90.1-2010 baseline.

The energy models developed for Built Green and BCBC follow the energy modeling guidelines and requirements for those programs rather than for Step Code, however we have attempted a high-level comparison to Step Code for information (not for compliance). The proposed building has an annual energy use intensity (EUI) of 78.2 kWh/m², which is low enough to comply with the Step 4 of the new BC Step Code. The TEDI of the proposed design is impossible to compare exactly without following the BC Step Code modeling guidelines, but appears to be slightly too high to comply with the Step 2 target of 45 kWh/m². The high TEDI of the proposed design is attributed to the high vertical surface area to floor area ratio, as well as a relatively high proportion of common corridor and stairway space, which is ventilated without the use of heat recovery. The BC Step Code does not have an annual greenhouse gas intensity (GHGI) requirement, but in comparison with the City of Vancouver's ZEBP target of 5 kgCO₂/m², the building has an annual greenhouse gas intensity (GHGI) of 3.5 kgCO₂/m².

The British Pacific Properties Area 4 Lot 37 project currently meets both the NECB 2011 requirement and the Built Green Silver HD 2017 Requirement. If you have any questions or comments regarding the above information, please feel free to contact the undersigned.

Regards,
Morrison Hershfield

Ruth McClung, M.A.S.c.
Building Science Consultant

Alex Blue, P.Eng., LEED AP BD+C
Building Science Consultant

