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Table 2: Envelope U-Value Measures

Primary Area	Secondary Measures (by Level)	NECB 2011 Prescribed Levels	Explanations for Levels ⁽¹⁾
Adjust U-Values	Window: High – U-Value = 1.6 Triple Glazed, Argon Filled, Low e. Mid-High – U-Value = 2.0 Double Glazed, Argon Filled, Low e. Mid-Low – U-Value = 2.6 Double Glazed, Air Filled, Low e. Low – U-Value = 3.2 Double Glazed, Air Filled, no Low e	NECB 2011 U-Value Requirements (function of HDD) Location U-Value Victoria 2.4 Windsor 2.2 Montreal 2.2 Ottawa 2.2 Edmonton 2.2 Fort McMurray 2.2 Yellowknife 1.6	High - matches NECB 2011 requirement for Yellowknife Mid-High - matches ASHRAE 189-2011 requirement for Zones 7 and 8 (cold climates) Mid-Low - matches ASHRAE 189-2011 requirement for Zone 6 Low – matches MNECB 1997 requirement for Ontario with less than 40% glazing. U-value adjustment measures will be run for all building types and locations
	Wall: High – U-Value = 0.183 Mid-High – U-Value = 0.210 Mid-Low – U-Value = 0.370 Low – U-Value = 0.550	NECB 2011 U-Value Requirements (function of HDD) Location U-Value Victoria 0.315 Windsor 0.278 Montreal 0.247 Ottawa 0.247 Edmonton 0.210 Fort McMurray 0.210 Yellowknife 0.183	High - matches NECB 2011 requirement for Yellowknife Mid-High - matches NECB 2011 requirement for Edmonton. Mid-Low - matches MNECB 1997 requirement for various locations Low - matches MNECB 1997 requirement for Ontario – Region A. U-value adjustment measures will be run for all building types and locations
	Roof: High – U-Value = 0.142 Mid-High – U-Value = 0.162 Mid-Low – U-Value = 0.270 Low – U-Value = 0.480	NECB 2011 U-Value Requirements (function of HDD) Location U-Value Victoria 0.227 Windsor 0.183 Montreal 0.183 Ottawa 0.183 Edmonton 0.162 Fort McMurray 0.162 Yellowknife 0.142	High - matches NECB 2011 requirement for Yellowknife Mid-High - matches ASHRAE 189 -2011 requirement for Zones 7 and 8. Mid-Low - matches ASHRAE 90.1-2007 requirement for Zone 6. Low - matches MNECB 1997 requirement for Ontario U-value adjustment measures will be run for all building types and locations

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Table 3: FDWR Measures

Primary Area	Secondary Measures (by Level)	NECB 2011 Prescribed Levels	Explanations for Levels ⁽¹⁾
FDWR	Adjust FDWR Equation: High $HDD < 4000 = 0.30$ $4000 \leq HDD \leq 7000$ $(1700 - 0.20HDD)/3000$ $HDD > 7000 = 0.10$ Mid-High $HDD < 4000 = 0.35$ $4000 \leq HDD \leq 7000$ $(1850 - 0.20HDD)/3000$ $HDD > 7000 = 0.15$ Mid-Low $HDD < 4000 = 0.45$ $4000 \leq HDD \leq 7000$ $(2150 - 0.20HDD)/3000$ $HDD > 7000 = 0.25$ Low $HDD < 4000 = 0.50$ $4000 \leq HDD \leq 7000$ $(2300 - 0.20HDD)/3000$ $HDD > 7000 = 0.30$	NECB 2011 FDWR: $HDD < 4000 = 0.4$ $4000 \leq HDD \leq 7000$ $(2000 - 0.2HDD)/3000$ $HDD > 7000 = 0.2$ Archetype building FDWR: Apartment 0.29 Large Office 0.40 Strip Mall 0.20 School 0.26 Big Box Store 0.076 Warehouse 0.035	<p>Changed the FDWR formula by shifting the equation by 5%, either up or down.</p> <p>FDWR Adjustment measures will not affect all building types, since some archetype buildings have FDWR below any of the proposed levels.</p>
	Set to One Level for FDWR: High Set FDWR to 20% maximum Mid-High Set FDWR to 25% maximum Mid-Low Set FDWR to 30% maximum Low Set FDWR to 40% maximum	NECB 2011 FDWR: $HDD < 4000 = 0.4$ $4000 \leq HDD \leq 7000$ $(2000 - 0.2HDD)/3000$ $HDD > 7000 = 0.2$ Archetype building FDWR: Apartment 0.29 Large Office 0.40 Strip Mall 0.20 School 0.26 Big Box Store 0.076 Warehouse 0.035	<p>High - Set equal to the lowest percent prescribed in the NECB 2011.</p> <p>Mid-High – Increased up 5% relative to the high level requirement.</p> <p>Mid-Low – Set equal to midpoint between the upper level (40%) and lower level (20%) prescribed by the NECB 2011</p> <p>Low - Set equal to the highest percent prescribed in the NECB 2011.</p> <p>FDWR Adjustment measures will not affect all building types, since some archetype buildings have FDWR below any of the proposed levels.</p>

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Table 4: HVAC and SHW Measures

Primary Area	Secondary Measures (by Level)	NECB 2011 Prescribed Levels	Explanations for Levels ⁽¹⁾
HVAC and SHW	Boiler Efficiency: High <i>Natural Gas</i> < 88kW - 89% AFUE ≥88kW and < 733kW - 89% thermal ≥ 733kW - 91% Combustion <i>Oil</i> < 88kW - 89% AFUE ≥88kW and < 733kW - 89% thermal ≥ 733kW - 91% Combustion Mid-High –Modulating on all capacities Mid-Low – 80% thermal efficiency Low – 80% thermal efficiency Remove staging/modulating	NECB 2011 boiler efficiency Natural Gas < 88kW - 85% AFUE ≥88kW and<733kW - 83% thermal ≥733kW - 83.3% combustion Oil < 88kW – 84.7% AFUE ≥88kWand<733kW- 83.4% thermal ≥733kW - 85.8% combustion Staging requirements >176kW – two stage >352kW – fully modulating	High - Set to match requirements of ASHRAE 189-2011 Mid-High – Extend NECB 2011 staging/modulation requirement to all capacity ranges Mid-Low - Set to match lowest efficiency in market, but leave NECB 2011 staging/modulating requirement. Low - Set to match lowest efficiency in market, and remove NECB 2011 staging/modulating requirement. Adjustment measures will be run for all building types and locations, where applicable
	Chiller Efficiency: High – Centrifugal Chiller 528 kW to 1,055 kW – COP=6.4 1,055 kW to 2,110 kW – COP=6.9 Mid-High – Centrifugal Chiller 528 kW to 1,055 kW – COP=6.0 1,055 kW to 2,110 kW – COP=6.4 Mid-Low – Cannot lower Low – Cannot lower	NECB 2011 chiller efficiency requirements. Centrifugal Chiller 528 kW to 1,055 kW COP=5.55 1,055 kW to 2,110 kW COP=6.10	High - Set to match top 25% of chillers in market. Mid-High – Set efficiency level to match those prescribed by FEMP Mid-Low – Cannot lower – NECB 2011 values equal to those prescribed federally. Low – Cannot lower – NECB 2011 values equal to those prescribed federally. Adjustment measures will be run for all building types and locations, where applicable
	DX Cooling Efficiency: High ≤19kW-SEER=15.0 >19kWand<40kW-EER=12.0 ≥40kWand<70kW-EER=12.0 ≤70kWand<223kW-EER=10.6 >223kW-EER=10.2 Mid-High – N/A Mid-Low – Cannot lower Low – Cannot lower	NECB 2011 air conditioner (DX) efficiency requirements. ≤19kW-SEER=14.0 >19kWand<40kW-EER=11.0 ≥40kWand<70kW-EER=10.8 ≤70kWand<223kW-EER=9.8 >223kW-EER=9.5	High -Set to Consortium of Energy Efficiency (CEE) Tier II efficiency levels. Mid-High – N/A – There is not sufficient space between the NECB 2011 level and the High level to justify a Mid-High level Mid-Low – Cannot lower – NECB 2011 values equal to those prescribed federally. Low – Cannot lower – NECB 2011 values equal to those prescribed federally. Adjustment measures will be run for all building types and locations, where applicable

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Table 4: HVAC and SHW Measures – Cont’d

Primary Area	Secondary Measures (by Level)	NECB 2011 Prescribed Levels	Explanations for Levels ⁽¹⁾
HVAC and SHW	Furnace Heating Efficiency: High N/A – Not enough products exceed NECB 2011 Mid-High Add modulation above 117.23kW Mid-Low <i>Natural Gas:</i> 80% thermal <i>Oil:</i> 78% SEUE Low Cannot Lower	NECB 2011 furnace efficiency requirements. Gas-fired ≤117.23 - 92.4% AFUE >117.23kW - 81% thermal Oil-fired ≤66kW - 84.5% thermal >66kW - 81.3% thermal	High – N/A – Efficiencies do not exceed those prescribed by NECB 2011, for non-weatherized furnaces. Mid-High – Add burner modulation to the burners, and keep efficiency as prescribed by NECB 2011 Mid-Low – Federal regulation - As per CSA-B212-M93 for oil; As per As per CSA3.2-01 for Natural Gas. Low – Cannot lower federal regulation Adjustment measures will be run for all building types and locations, where applicable
	DHW Efficiency: High <i>Natural Gas:</i> <22 kW – 0.62 energy factor ≥22kW and ≤117 kW - 90% thermal >117 kW – 90% thermal <i>Oil:</i> ≤30.5 kW – 0.62 energy factor >30.5 kW – 82% thermal Mid-High – N/A-Negligible product available Mid-Low – Cannot lower below federal regulation Low – Cannot lower below federal regulation	NECB 2011 storage tank efficiency requirements. Gas-fired <22kW-0.67-0.0006V EF ≥22kW and ≤117 kW 0.67-0.0006V EF >117 kW – 80% thermal Oil-fired ≤30.5 kW – 0.55 energy factor >30.5 kW – 0.55 energy factor	High - Thermal efficiencies and energy factors based on products listed in AHRI database. Natural gas ≥22kW is set to a condensing efficiency. Energy factor <22kW taken as most common energy factor above the NECB 2011 level. Oil > 30.5kW taken as the most efficient model in the AHRI data base. Energy factor <30.5kW taken as most common energy factor above the NECB 2011 level. Adjustment measures will be run for all building types and locations, where applicable
	Require HRVs and ERVs: High Set the heat recovery effectiveness to 75% Decrease sensible heat content to 100 kW Mid-High – Set effectiveness to 75% Mid-Low - Set heat content to 200 kW. Low - No heat recovery required.	The NECB 2011 requires heat recovery, whenever the exhaust air has a sensible heat content exceeding 150 kW.	
	Automatic Controls – Demand Control Ventilation: High - Set to ASHRAE 189-2011 requirements Mid-High - Set to ASHRAE 90.1-2010 requirements Mid-Low – Cannot lower, NECB 2011 has no requirement Low – Cannot lower, NECB 2011 has no requirement	NECB 2011 has no requirement for demand control ventilation.	High – ASHRAE 189-2011 - Required for spaces larger than 500 ft ² and with design occupancy for ventilation greater than 25 people per 1,000 ft ² Mid-High – ASHRAE 90.1-2010 - Required for spaces larger than 500 ft ² and with design occupancy for ventilation greater than 40 people per 1000 ft ² .

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Table 5: Lighting Measures

Primary Area	Secondary Measures (by Level)	NECB 2011 Prescribed Levels	Explanations for Levels ⁽¹⁾
Lighting	Occupancy Sensors – Auto-on: Occupancy sensor auto-on controls will be added to all spaces that are required to have occupancy sensor control, as per the NECB 2011.	NECB 2011 prescribes manual on/ auto off occupancy sensors, in prescribed spaces.	This measure involves changing the lighting control from the NECB 2011 manual on, to auto on. Accurate evaluation of this measure is very difficult. The impact of changing from manual on to auto-on is a function of the behaviour of any given individual and their tendency to be in rooms without the lights on. The impact of this change would increase the energy use of the lighting.
	Occupancy Sensors in Parking Garage: Add occupancy sensor control to parking garage lighting, in applicable buildings.	NECB 2011 does not prescribe occupancy sensor control for parking garage lighting.	The midrise apartment is the only building type that would have a parking garage, so this measure will only be applied to this building type.
	Continuous Dimming in Daylight Areas: Add continuous dimming to daylight controlled spaces, in applicable buildings.	NECB 2011 prescribes two stage daylighting in enclosed spaces that exceed 100m ² of primary sidelight area.	No archetype buildings currently qualify for daylighting controls. To evaluate this measure, the high rise office will be modelled with daylighting control assuming in the exterior zone, and then the continuous dimming measure will be applied.
	Revise Lighting Power Density: High Set to ASHRAE 189-2011 e.g. Office = 9.2W/m ² Mid-Low Set to ASHRAE 90.1-2004 e.g. Office = 11.0 W/m ² Low Set equal to MNECB 1997 e.g. Office = 16.9 W/m ²	NECB 2011 prescribes lighting power density by building function and by space function. e.g. Office = 9.7W/m ²	The lighting power densities are based on existing codes. Increase Minimum Efficiencies and New Technologies: Increasing the minimum efficiency or the implementation of new technologies are methods that can be used to improve the lighting power density. Since the NECB 2011 prescribes only lighting power density, and does not prescribe efficiency or technologies, only the effect of changing the lighting power density will be evaluated.

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Table 6: Envelope U-Value Measure Results – Energy Savings Compared to NECB 2011

Primary Area	Location	Building Type	Secondary Measures - Energy Savings Relative to NECB 2011 (%)						Combined Measures - Energy Savings Relative to NECB 2011 (%)			
			Window		Wall		Roof		5% Target		10% Target	
			Mid-High	High	Mid-High	High	Mid-High	High	Individual Measures Combined	%	Individual Measures Combined	%
U-Value Adjustment	Victoria (Zone 4)	Mid-rise Apartment	-	4.1	-	1.5	-	1.7	Window&Wall(High)	5.6	Window&Wall&Roof (High)	7.4
		Large Office	3.2	5.5	-	1.5	-	0.4	Window (High)	5.5	Window&Wall&Roof (High)	7.2
		Strip Mall	-	2.8	-	1.7	-	4.0	Wall&Roof (High)	5.7	Window&Wall&Roof (High)	8.5
		Secondary School	-	2.4	-	1.4	-	2.5	Window&Roof (High)	4.9	Window&Wall&Roof (High)	6.2
		Big Box Retail	-	1.2	-	1.6	4.0	5.4	Roof (High)	5.4	Window&Wall&Roof (High)	8.1
		Warehouse	-	1.3	4.9	6.1	4.8	6.3	Wall (Midhigh)	4.9	Wall&Roof (Midhigh)	9.8
	Windsor (Zone 5)	Mid-rise Apartment	-	3.1	-	1.2	-	0.9	Window&Wall&Roof (High)	5.1	-	-
		Large Office	2.3	5.2	-	1.2	-	0.3	Window (High)	5.2	Window&Wall&Roof (High)	6.6
		Strip Mall	-	2.0	-	1.3	-	1.8	Window&Wall&Roof (High)	5.0	-	-
		Secondary School	-	1.9	-	0.9	-	1.3	Window&Wall&Roof (High)	4.1	-	-
		Big Box Retail	-	1.0	-	1.3	-	2.3	Window&Wall&Roof (High)	4.7	-	-
		Warehouse	-	1.1	4.0	5.1	-	2.9	Wall (High)	5.1	Window&Wall&Roof (High)	9.1
	Montreal (Zone 6)	Mid-rise Apartment	-	3.3	-	0.7	-	0.8	Window&Wall&Roof (High)	4.9	-	-
		Large Office	2.7	6.3	-	1.1	-	0.3	Window(MidHigh)+Wall&Roof (High)	4.0	Window&Wall&Roof (High)	7.5
		Strip Mall	-	2.0	-	0.8	-	1.9	Window&Wall&Roof (High)	4.8	-	-
		Secondary School	-	2.1	-	0.6	-	1.4	Window&Wall&Roof (High)	4.1	-	-
		Big Box Retail	-	1.0	-	0.9	-	2.8	Window&Wall&Roof (High)	4.9	-	-
		Warehouse	-	1.1	-	3.3	-	3.1	Window&Wall (High)	4.4	Window&Wall&Roof (High)	7.4
	Ottawa (Zone 6)	Mid-rise Apartment	-	3.4	-	0.8	-	0.8	Window&Wall&Roof (High)	5.0	-	-
		Large Office	2.7	6.3	-	1.1	-	0.4	Window(MidHigh)+Wall&Roof (High)	4.1	Window&Wall&Roof (High)	7.7
		Strip Mall	-	2.1	-	0.9	-	1.9	Window&Wall&Roof (High)	4.8	-	-
		Secondary School	-	2.2	-	0.6	-	1.5	Window&Wall&Roof (High)	4.3	-	-
		Big Box Retail	-	1.1	-	0.9	-	3.0	Window&Wall&Roof (High)	5.1	-	-
		Warehouse	-	1.1	-	3.4	-	3.1	Window & Wall (High)	4.5	Window&Wall&Roof (High)	7.6
	Edmonton (Zone 7A)	Mid-rise Apartment	-	3.8	-	0.4	-	0.5	Window&Wall&Roof (High)	4.7	-	-
		Large Office	2.7	6.2	-	0.7	-	0.2	Window(MidHigh)+Wall&Roof (High)	3.6	Window&Wall&Roof (High)	7.1
		Strip Mall	-	2.3	-	0.4	-	1.0	Window&Wall&Roof (High)	3.7	-	-
		Secondary School	-	2.3	-	0.4	-	0.7	Window&Wall&Roof (High)	3.5	-	-
		Big Box Retail	-	1.2	-	0.5	-	1.7	Window&Wall&Roof (High)	3.4	-	-
		Warehouse	-	1.2	-	1.5	-	1.7	Window&Wall&Roof (High)	4.4	-	-
	Fort McMurray (Zone 7B)	Mid-rise Apartment	-	3.0	-	0.4	-	0.6	Window&Wall&Roof (High)	4.0	-	-
		Large Office	2.3	5.4	-	0.9	-	0.3	Window (High)	5.4	Window&Wall&Roof (High)	6.5
		Strip Mall	-	2.1	-	0.5	-	1.1	Window&Wall&Roof (High)	3.8	-	-
		Secondary School	-	2.3	-	0.4	-	0.9	Window&Wall&Roof (High)	3.6	-	-
		Big Box Retail	-	1.1	-	0.4	-	1.8	Window&Wall&Roof (High)	3.4	-	-
		Warehouse	-	1.1	-	1.5	-	1.7	Window&Wall&Roof (High)	4.3	-	-
	Yellowknife (Zone 8)	Mid-rise Apartment	-	-	-	-	-	-	-	-	-	-
		Large Office	-	-	-	-	-	-	-	-	-	-
		Strip Mall	-	-	-	-	-	-	-	-	-	-
		Secondary School	-	-	-	-	-	-	-	-	-	-
		Big Box Retail	-	-	-	-	-	-	-	-	-	-
		Warehouse	-	-	-	-	-	-	-	-	-	-

Table 7: Envelope U-Value Measure Results - Increase Energy Use Compared to NECB 2011

Primary Area	Location	Building Type	Secondary Measures - Energy Increase Relative to NECB 2011 (%)						Combined Measures - Energy Increase Relative to NECB 2011 (%)			
			Window		Wall		Roof		5% Target		10% Target	
			Mid-Low	Low	Mid-Low	Low	Mid-Low	Low	Individual Measures Combined	%	Individual Measures Combined	%
U-Value Adjustment	Victoria (Zone 4)	Mid-rise Apartment	-	-4.0	-	-2.9	-0.9	-5.0	Roof (Low)	-5.0	Window&Wall&Roof(Low)	-11.9
		Large Office	-	-4.6	-	-2.8	-	-1.5	Window (Low)	-4.6	Window&Wall&Roof(Low)	-9.3
		Strip Mall	-	-2.6	-	-3.1	-2.1	-11.7	Wall (low) + Roof (Mid-Low)	-5.2	Roof (Low)	-11.7
		Secondary School	-	-2.3	-	-2.4	-1.2	-6.7	Window (Low) + Wall (Low)	-4.7	Window&Wall&Roof(Low)	-11.4
		Big Box Retail	-	-0.9	-	-3.1	-3.0	-16.1	Wall(Low) + Roof (Mid-Low)	-6.0	Roof(Low)	-16.1
		Warehouse	-	-0.9	-2.0	-9.9	-3.4	-17.5	Wall&Roof (Mid-Low)	-5.4	Wall (Low)	-9.9
	Windsor (Zone 5)	Mid-rise Apartment	-2.1	-5.3	-	-3.4	-1.7	-5.9	Window (Low)	-5.3	Window&Wall(Low)+Roof(Mid-Low)	-10.5
		Large Office	-2.5	-7.5	-	-3.8	-	-2.1	Window(Mid-Low) + Roof(Low)	-4.7	Window(Low)+Roof(Low)	-9.6
		Strip Mall	-	-3.2	-	-3.5	-3.8	-12.1	Roof(Mid-Low)	-3.8	Window&Wall(Low)+Roof(Mid-Low)	-10.5
		Secondary School	-	-2.9	-	-2.9	-2.3	-7.5	Wall(Low)+Roof(Mid-Low)	-5.3	Wall(Low)+Roof(Low)	-10.5
		Big Box Retail	-	-1.2	-	-3.6	-5.4	-17.6	Roof (Mid-Low)	-5.4	Window&Wall(Low)+Roof(Mid-Low)	-10.0
		Warehouse	-	-1.4	-4.0	-12.8	-6.8	-21.0	Window(Low)+Wall(Mid-Low)	-5.4	Wall(Mid-Low)+Roof(Mid-Low)	-10.7
	Montreal (Zone 6)	Mid-rise Apartment	-2.2	-5.5	-	-4.0	-1.9	-6.1	Window(Low)	-5.5	Wall(Low)+Roof(Low)	-9.9
		Large Office	-2.9	-8.6	-2.0	-5.1	-	-2.6	Wall(Low)	-5.1	Window(Low)+Wall(Mid-Low)	-10.7
		Strip Mall	-	-3.3	-	-4.1	-3.9	-12.6	Wall(Low)	-4.1	Window&Wall(Low)+Roof(Mid-Low)	-11.2
		Secondary School	-	-3.4	-	-3.7	-2.5	-8.1	Window(Low)+Roof(Mid-Low)	-5.9	Window&Wall(Low)+Roof(Mid-Low)	-9.6
		Big Box Retail	-	-1.3	-	-4.4	-6.1	-19.1	Wall (Low)	-4.4	Wall(Low)+Roof(Mid-Low)	-10.3
		Warehouse	-	-1.4	-5.9	-14.8	-7.0	-21.5	Wall(Mid-Low)	-5.9	Wall&Roof(Mid-Low)	-12.8
	Ottawa (Zone 6)	Mid-rise Apartment	-2.3	-5.6	-	-4.2	-1.9	-6.2	Window (Low)	-5.6	Window(Low)+Wall(Low)	-9.9
		Large Office	-3.0	-8.7	-2.2	-5.6	-	-2.7	Wall(Low)	-5.6	Window(Low)+Wall(Mid-Low)	-11.0
		Strip Mall	-	-3.3	-	-4.1	-3.9	-12.6	Wall(Low)	-4.1	Window&Wall(Low)+Roof(Mid-Low)	-11.3
		Secondary School	-	-3.6	-	-3.7	-2.5	-8.1	Window(Low)+Roof(Mid-Low)	-6.2	Window&Wall(Low)+Roof(Mid-Low)	-9.9
		Big Box Retail	-	-1.3	-	-4.5	-6.1	-19.3	Wall(Low)	-4.5	Wall(Low)+Roof(Mid-Low)	-10.5
		Warehouse	-	-1.5	-6.1	-15.2	-7.1	-21.8	Wall(Mid-Low)	-6.1	Wall&Roof(Mid-Low)	-13.1
	Edmonton (Zone 7A)	Mid-rise Apartment	-2.5	-6.2	-2.5	-5.4	-2.6	-7.4	Wall (Low)	-5.4	Wall (Mid-Low)+Roof(Low)	-9.8
		Large Office	-2.9	-8.6	-3.5	-7.7	-	-3.3	Window(Mid-Low)+Roof(Low)	-6.2	Window&Wall(Mid-Low)+Roof(Low)	-9.9
		Strip Mall	-	-3.7	-2.4	-5.1	-5.3	-15.0	Wall (Low)	-5.1	Wall (Low)+Roof(Mid-Low)	-10.3
		Secondary School	-	-3.8	-	-4.4	-3.6	-10.3	Wall (Low)	-4.4	Roof (Low)	-10.3
		Big Box Retail	-	-1.5	-2.9	-6.0	-9.2	-25.1	Window (Low) + Wall (Mid-Low)	-4.3	Roof (Mid-Low)	-9.2
		Warehouse	-	-1.6	-8.8	-18.6	-9.9	-26.5	Window(Low)	-1.6	Roof (Mid-Low)	-9.9
	Fort McMurray (Zone 7B)	Mid-rise Apartment	-	-4.8	-2.5	-5.4	-2.6	-7.5	Wall(Low)	-5.4	Window(Low)+Wall(Low)	-10.4
		Large Office	-2.5	-7.2	-4.6	-9.9	-	-4.1	Wall(Mid-Low)	-4.6	Wall(Low)	-9.9
		Strip Mall	-	-3.3	-	-4.8	-5.1	-14.6	Roof(Mid-Low)	-5.1	Wall(Low)+Roof(Mid-Low)	-9.9
		Secondary School	-	-3.6	-	-4.9	-3.8	-10.6	Wall(Low)	-4.9	Roof (Low)	-10.6
		Big Box Retail	-	-1.4	-2.7	-5.8	-9.3	-23.2	Wall(Low)	-5.8	Roof(Mid-Low)	-9.3
		Warehouse	-	-1.4	-8.3	-17.6	-9.9	-26.2	Window(Low)	-1.4	Roof(Mid-Low)	-9.9
	Yellowknife (Zone 8)	Mid-rise Apartment	-4.9	-7.8	-3.9	-7.6	-3.3	-8.5	Window(Mid-Low)	-4.9	Wall(Low)+Roof(Mid-Low)	-11.0
		Large Office	-8.7	-14.2	-7.9	-15.7	-2.1	-5.5	Roof(Low)	-5.5	Wall&Roof(Mid-Low)	-10.1
		Strip Mall	-3.7	-5.8	-2.9	-5.8	-6.0	-15.1	Wall(Low)	-5.8	Window&roof(Mid-Low)	-9.6
		Secondary School	-3.3	-5.3	-3.1	-6.0	-5.0	-12.5	Roof(Mid-Low)	-5.0	Window(Low)+Roof(Mid-Low)	-10.3
		Big Box Retail	-	-2.8	-3.7	-7.1	-11.3	-27.6	Window(Low)+Wall(Mid-Low)	-6.4	Window&Wall (Low)	-9.8
		Warehouse	-	-2.8	-10.8	-21.0	-12.2	-29.3	Window(Low)	-2.8	Wall(Mid-Low)	-10.8

Table 8: Lighting Measure Results - Energy Savings Compared to NECB 2011

Primary Area	Location	Building Type	Secondary Measures - Energy Savings Relative to NECB 2011 (%)					Combined Measures - Energy Savings Relative to NECB 2011 (%)			
			Lighting Power Density		Auto-On Occupancy Sensors	Parking Garage Occupancy Sensors	Continuous Dimming on Daylighting Control	5% Target		10% Target	
			Mid-High	High				Individual Measures Combined	%	Individual Measures Combined	%
Lighting	Victoria (Zone 4)	Mid-rise Apartment	-	0.0	-	1.0	-	LPD(High)+Garage OS	1.0	-	-
		Large Office	-	1.2	-	-	0.2	LPD(High)+Continuous Dimming	1.2	-	-
		Strip Mall	-	0.3	-	-	-	LPD(High)	0.3	-	-
		Secondary School	-	1.3	-	-	-	LPD(High)	1.3	-	-
		Big Box Retail	-	1.1	-	-	-	LPD(High)	1.1	-	-
		Warehouse	-	-0.1	-	-	-	LPD(High)	-0.1	-	-
	Windsor (Zone 5)	Mid-rise Apartment	-	0.2	-	0.8	-	LPD(High)+Garage OS	1.0	-	-
		Large Office	-	1.1	-	-	0.2	LPD(High)+Continuous Dimming	1.1	-	-
		Strip Mall	-	0.5	-	-	-	LPD(High)	0.5	-	-
		Secondary School	-	1.4	-	-	-	LPD(High)	1.4	-	-
		Big Box Retail	-	1.2	-	-	-	LPD(High)	1.2	-	-
		Warehouse	-	0.5	-	-	-	LPD(High)	0.5	-	-
	Montreal (Zone 6)	Mid-rise Apartment	-	0.1	-	0.7	-	LPD(High)+Garage OS	0.8	-	-
		Large Office	-	1.0	-	-	0.2	LPD(High)+Continuous Dimming	0.9	-	-
		Strip Mall	-	0.4	-	-	-	LPD(High)	0.4	-	-
		Secondary School	-	1.2	-	-	-	LPD(High)	1.2	-	-
		Big Box Retail	-	0.9	-	-	-	LPD(High)	0.9	-	-
		Warehouse	-	0.3	-	-	-	LPD(High)	0.3	-	-
	Ottawa (Zone 6)	Mid-rise Apartment	-	0.1	-	0.7	-	LPD(High)+Garage OS	0.8	-	-
		Large Office	-	0.9	-	-	0.2	LPD(High)+Continuous Dimming	1.0	-	-
		Strip Mall	-	0.3	-	-	-	LPD(High)	0.3	-	-
		Secondary School	-	1.2	-	-	-	LPD(High)	1.2	-	-
		Big Box Retail	-	0.9	-	-	-	LPD(High)	0.9	-	-
		Warehouse	-	0.2	-	-	-	LPD(High)	0.2	-	-
	Edmonton (Zone 7A)	Mid-rise Apartment	-	0.1	-	0.5	-	LPD(High)+Garage OS	0.6	-	-
		Large Office	-	1.0	-	-	0.2	LPD(High)+Continuous Dimming	1.0	-	-
		Strip Mall	-	0.2	-	-	-	LPD(High)	0.2	-	-
		Secondary School	-	1.1	-	-	-	LPD(High)	1.1	-	-
		Big Box Retail	-	0.7	-	-	-	LPD(High)	0.7	-	-
		Warehouse	-	-0.1	-	-	-	LPD(High)	-0.1	-	-
	Fort McMurray (Zone 7B)	Mid-rise Apartment	-	0.0	-	0.4	-	LPD(High)+Garage OS	0.4	-	-
		Large Office	-	0.9	-	-	0.4	LPD(High)+Continuous Dimming	1.2	-	-
		Strip Mall	-	0.2	-	-	-	LPD(High)	0.2	-	-
		Secondary School	-	1.0	-	-	-	LPD(High)	1.0	-	-
		Big Box Retail	-	0.6	-	-	-	LPD(High)	0.6	-	-
		Warehouse	-	0.0	-	-	-	LPD(High)	0.0	-	-
	Yellowknife (Zone 8)	Mid-rise Apartment	-	0.0	-	0.0	-	LPD(High)+Garage OS	0.0	-	-
		Large Office	-	0.7	-	-	0.5	LPD(High)+Continuous Dimming	1.1	-	-
		Strip Mall	-	0.1	-	-	-	LPD(High)	0.1	-	-
		Secondary School	-	0.9	-	-	-	LPD(High)	0.9	-	-
		Big Box Retail	-	0.3	-	-	-	LPD(High)	0.3	-	-
		Warehouse	-	-0.2	-	-	-	LPD(High)	-0.2	-	-

Table 9: Lighting Measure Results - Increase Energy Use Compared to NECB 2011

Primary Area	Location	Building Type	Secondary Measures - Energy Increase Relative to NECB 2011 (%)					Combined Measures - Energy Increase Relative to NECB 2011 (%)			
			Lighting Power Density		Auto-On Occupancy Sensors	Parking Garage Occupancy Sensors	Continuous Dimming on Daylighting Control	5% Target		10% Target	
			Mid-Low	Low				Individual Measures Combined	%	Individual Measures Combined	%
Lighting	Victoria (Zone 4)	Mid-rise Apartment	-0.1	-0.4	-	-	-	LPD (Low)	-0.4	-	-
		Large Office	-3.2	-19.0	-0.1	-	-	LPD(Mid-Low)+Auto-on	-3.3	LPD(Low)	-19.2
		Strip Mall	-0.4	-0.6	-	-	-	LPD(Low)	-0.6	-	-
		Secondary School	-3.5	-11.9	-0.2	-	-	LPD(Mid-Low)+Auto-on	-3.7	LPD(Low)	-12.2
		Big Box Retail	-1.6	-16.8	-	-	-	LPD(Mid-Low)	-1.6	LPD(Low)	-16.8
		Warehouse	0.04	-0.04	-0.01	-	-	LPD(Low)+Auto-on	-0.1	-	-
	Windsor (Zone 5)	Mid-rise Apartment	-0.5	-1.3	-	-	-	LPD (Low)	-1.3	-	-
		Large Office	-2.8	-18.2	-0.1	-	-	LPD(Mid-Low)+Auto-on	-2.9	LPD(Low)	-18.4
		Strip Mall	-0.7	-0.8	-	-	-	LPD(Low)	-0.8	-	-
		Secondary School	-3.6	-11.7	-0.1	-	-	LPD(Mid-Low)+Auto-on	-3.7	LPD(Low)	-11.9
		Big Box Retail	-1.6	-15.5	-	-	-	LPD(Mid-Low)	-1.6	LPD(Low)	-15.5
		Warehouse	-0.6	-1.5	0.0	-	-	LPD(Low)+Auto-on	-1.5	-	-
	Montreal (Zone 6)	Mid-rise Apartment	-0.3	-0.9	-	-	-	LPD (Low)	-0.9	-	-
		Large Office	-2.5	-16.1	-0.1	-	-	LPD(Mid-Low)+Auto-on	-2.6	LPD(Low)	-16.3
		Strip Mall	-0.5	-0.6	-	-	-	LPD(Low)	-0.6	-	-
		Secondary School	-3.1	-10.0	-0.1	-	-	LPD(Mid-Low)+Auto-on	-3.2	LPD(Low)	-10.2
		Big Box Retail	-1.2	-12.0	-	-	-	LPD(Mid-Low)	-1.2	LPD(Low)	-12.0
		Warehouse	-0.4	-0.9	-0.01	-	-	LPD(Low)+Auto-on	-1.0	-	-
	Ottawa (Zone 6)	Mid-rise Apartment	-0.3	-0.8	-	-	-	LPD (Low)	-0.8	-	-
		Large Office	-2.3	-15.7	-0.1	-	-	LPD(Mid-Low)+Auto-on	-2.4	LPD(Low)	-15.8
		Strip Mall	-0.5	-0.6	-	-	-	LPD(Low)	-0.6	-	-
		Secondary School	-3.1	-10.0	-0.1	-	-	LPD(Mid-Low)+Auto-on	-3.2	LPD(Low)	-10.2
		Big Box Retail	-1.2	-11.4	-	-	-	LPD(Mid-Low)	-1.2	LPD(Low)	-11.4
		Warehouse	-0.3	-0.8	-0.01	-	-	LPD(Low)+Auto-on	-0.8	-	-
	Edmonton (Zone 7A)	Mid-rise Apartment	-0.1	-0.4	-	-	-	LPD (Low)	-0.4	-	-
		Large Office	-2.5	-16.5	-0.1	-	-	LPD(Mid-Low)+Auto-on	-2.6	LPD(Low)	-16.7
		Strip Mall	-0.2	-0.3	-	-	-	LPD(Low)	-0.3	-	-
		Secondary School	-2.9	-9.8	-0.1	-	-	LPD(Mid-Low)+Auto-on	-3.1	LPD(Low)	-10.0
		Big Box Retail	-0.9	-9.8	-	-	-	LPD(Mid-Low)	-0.9	LPD(Low)	-9.8
		Warehouse	0.0	0.0	0.0	-	-	LPD(Low)+Auto-on	0.0	-	-
	Fort McMurray (Zone 7B)	Mid-rise Apartment	-0.1	-0.3	-	-	-	LPD (Low)	-0.3	-	-
		Large Office	-2.4	-16.0	-0.1	-	-	LPD(Mid-Low)+Auto-on	-2.5	LPD(Low)	-16.1
		Strip Mall	-0.2	-0.3	-	-	-	LPD(Low)	-0.3	-	-
		Secondary School	-2.7	-9.0	-0.1	-	-	LPD(Mid-Low)+Auto-on	-2.8	LPD(Low)+Auto-on	-9.2
		Big Box Retail	-0.8	-8.0	-	-	-	LPD(Mid-Low)	-0.8	LPD(Low)	-8.0
		Warehouse	-0.03	-0.1	-0.01	-	-	LPD(Low)+Auto-on	-0.2	-	-
	Yellowknife (Zone 8)	Mid-rise Apartment	0.0	-0.1	-	-	-	LPD (Low)	-0.1	-	-
		Large Office	-1.9	-12.8	-0.1	-	-	LPD(Mid-Low)	-2.0	LPD(Low)	-13.0
		Strip Mall	-0.1	-0.2	-	-	-	LPD(Low)	-0.2	-	-
		Secondary School	-2.3	-7.8	-0.1	-	-	LPD(Mid-Low)	-2.4	LPD(Low)+Auto-on	-8.0
		Big Box Retail	-0.4	-4.7	-	-	-	LPD(Low)	-4.7	-	-
		Warehouse	0.1	0.3	-0.01	-	-	LPD(Low)+Auto-on	0.3	-	-

Table 10: HVAC and SHW Measure Results – Energy Savings Compared to NECB 2011

Primary Area	Location	Building Type	Secondary Measures - Energy Savings Relative to NECB 2011 (%)												Combined Measures - Energy Savings Relative to NECB 2011 (%)					
			Boiler		Chiller		DX Cooling		Furnace		DHW		Heat Recovery (HR)		DCV		5% Target		10% Target	
			Mid-High	High	Mid-High	High	Mid-High	High	Mid-High	High	Mid-High	High	Mid-High	High	Mid-High	High	Individual Measures Combined	%	Individual Measures Combined	%
HVAC and SHW	Victoria (Zone 4)	Mid-rise Apartment	2.8	6.4	-	-	-	0.2	-	-	-	4.8	-	-	-	-	DHW(High)	4.8	Boiler&DHW(High)	11.2
		Large Office	-	2.7	-	0.7	-	-	-	-	-	0.7	0.0	0.0	-	1.4	Boiler&DHW&DCV&Chiller(High)	5.3	-	-
		Strip Mall	-	-	-	-	-	0.2	3.8	-	-	0.9	-	-	-	-	DX&DHW(High)+Furnace(Mid-High)	4.8	-	-
		Secondary School	-	5.0	-	0.5	-	-	-	-	-	2.2	0.0	0.8	-	3.6	Boiler(High)	5.0	Boiler&DHW&DCV(High)	10.2
		Big Box Retail	-	-	-	-	-	0.1	3.3	-	-	0.4	-	-	-	-	DX&DHW(High)+Furnace(Mid-High)	3.9	-	-
		Warehouse	-	-	-	-	-	0.01	-	-	-	0.4	-	-	-	-	DHW(High)	0.4	-	-
	Windsor (Zone 5)	Mid-rise Apartment	3.3	7.3	-	-	-	0.4	-	-	-	4.3	-	-	-	-	DX&DHW(High)	4.7	Boiler&DHW(High)	11.6
		Large Office	-	3.2	-	1.0	-	-	-	-	-	0.6	0.1	0.1	-	2.2	Boiler(High)+DCV(High)	5.2	-	-
		Strip Mall	-	-	-	-	-	0.6	3.6	-	-	0.7	-	-	-	-	DX&DHW(High)+Furnace(Mid-High)	4.9	-	-
		Secondary School	-	5.2	-	0.8	-	-	-	-	-	1.9	0.4	5.4	-	5.1	Boiler(High)	5.2	Boiler&DCV(High)	9.7
		Big Box Retail	-	-	-	-	-	0.5	3.6	-	-	0.4	-	-	-	-	DX&DHW(High)+Furnace(Mid-High)	4.4	-	-
		Warehouse	-	-	-	-	-	0.1	-	-	-	0.3	-	-	-	-	DHW(High)	0.3	-	-
	Montreal (Zone 6)	Mid-rise Apartment	2.7	6.8	-	-	-	0.3	-	-	-	4.1	-	-	-	-	DX&DHW(High)	4.4	Boiler&DHW(High)	10.9
		Large Office	-	3.9	-	0.8	-	-	-	-	-	0.6	0.4	0.4	-	3.2	Boiler&DHW(High)	4.5	Boiler&Chiller&DHW&DCV(High)+HR(Mid-High)	8.1
		Strip Mall	-	-	-	-	-	0.4	3.6	-	-	0.7	-	-	-	-	DX&DHW(High)+Furnace(Mid-High)	4.6	-	-
		Secondary School	-	6.0	-	0.6	-	-	-	-	-	1.8	1.0	8.6	-	5.9	DCV(High)	5.9	DHW&HR(High)	10.4
		Big Box Retail	-	-	-	-	-	0.2	4.1	-	-	0.3	-	-	-	-	DX&DHW(High)+Furnace(Mid-High)	4.7	-	-
		Warehouse	-	-	-	-	-	0.03	-	-	-	0.3	-	-	-	-	DHW(High)	0.3	-	-
	Ottawa (Zone 6)	Mid-rise Apartment	2.6	6.8	-	-	-	0.3	-	-	-	4.0	-	-	-	-	DX&DHW(High)	4.3	Boiler&DHW(High)	10.8
		Large Office	-	4.0	-	0.7	-	-	-	-	-	0.6	0.5	0.5	-	-	Boiler&DHW(High)	4.6	-	-
		Strip Mall	-	-	-	-	-	0.3	3.5	-	-	0.7	-	-	-	-	DX&DHW(High)+Furnace(Mid-High)	4.4	-	-
		Secondary School	-	6.1	-	0.6	-	-	-	-	-	1.8	1.1	7.0	-	6.1	Boiler(High)	6.1	Boiler&DCV(High)	11.4
		Big Box Retail	-	-	-	-	-	0.2	4.2	-	-	0.3	-	-	-	-	DX&DHW(High)+Furnace(Mid-High)	4.7	-	-
		Warehouse	-	-	-	-	-	0.02	-	-	-	0.3	-	-	-	-	DHW(High)	0.3	-	-
	Edmonton (Zone 7A)	Mid-rise Apartment	3.0	7.4	-	-	-	0.1	-	-	-	4.1	-	-	-	-	DHW(High)	4.1	Boiler&DHW(High)	11.5
		Large Office	-	4.2	-	0.5	-	-	-	-	-	0.7	0.6	0.6	-	3.2	Boiler&DHW(High)	4.8	Boiler&Chiller&DHW&DCV(High)+HR(Mid-High)	8.1
		Strip Mall	-	-	-	-	-	0.1	4.2	-	-	0.7	-	-	-	-	Furnace(Mid-High)+DHW(High)	4.9	-	-
		Secondary School	-	6.3	-	0.4	-	-	-	-	-	2.0	2.2	11.5	-	4.7	DCV(High)	4.7	Boiler&DCV(High)	10.4
		Big Box Retail	-	-	-	-	-	0.1	4.7	-	-	0.3	-	-	-	-	Furnace(Mid-High)	4.7	-	-
		Warehouse	-	-	-	-	-	0.0	-	-	-	0.3	-	-	-	-	DHW(High)	0.3	-	-
	Fort McMurray (Zone 7B)	Mid-rise Apartment	3.1	7.8	-	-	-	0.1	-	-	-	3.8	-	-	-	-	DX&DHW(High)	3.9	Boiler&DHW(High)	11.6
		Large Office	-	4.0	-	0.5	-	-	-	-	-	0.7	1.6	1.6	-	4.7	DCV(High)	4.7	Boiler&chiller&DHW&DCV(High)+HR(Mid-High)	9.4
		Strip Mall	-	-	-	-	-	0.1	3.8	-	-	0.6	-	-	-	-	DHW(High)+Furnace(Mid-High)	4.5	-	-
		Secondary School	-	6.7	-	0.4	-	-	-	-	-	1.9	3.5	12.0	-	4.7	DCV(High)	4.7	Boiler&Chiller(High)+HR(Mid-High)	10.0
		Big Box Retail	-	-	-	-	-	0.1	4.7	-	-	0.3	-	-	-	-	Furnace(Mid-High)	4.7	-	-
		Warehouse	-	-	-	-	-	0.01	-	-	-	0.2	-	-	-	-	DHW(High)	0.2	-	-
	Yellowknife (Zone 8)	Mid-rise Apartment	3.1	8.1	-	-	-	0.1	-	-	-	1.5	-	-	-	-	Boiler(Mid-High)+DHW(High)	4.7	Boiler(High)+DHW(High)	9.6
		Large Office	-	3.9	-	0.3	-	-	-	-	-	0.3	5.1	5.1	-	4.9	DCV(High)	4.9	Boiler&Chiller&DCV(High)+HR(Mid-High)	9.1
		Strip Mall	-	-	-	-	-	0.1	3.2	-	-	0.2	-	-	-	-	DX&DHW(High)+Furnace(Mid-High)	3.5	-	-
		Secondary School	-	6.0	-	0.2	-	-	-	-	-	0.8	4.7	16.0	-	7.0	HR(Mid-High)	4.7	Boiler(High)+HR(Mid-High)	10.3
		Big Box Retail	-	-	-	-	-	0.05	5.0	-	-	0.3	-	-	-	-	Furnace(Mid-High)	5.0	-	-
		Warehouse	-	-	-	-	-	0.003	-	-	-	0.2	-	-	-	-	DHW(High)	0.2	-	-

Table 11: HVAC and SHW Measure Results - Increase Energy Use Compared to NECB 2011

Primary Area	Location	Building Type	Secondary Measures - Energy Increase Relative to NECB 2011 (%)														Combined Measures - Energy Increase Relative to NECB 2011 (%)			
			Boiler		Chiller		DX Cooling		Furnace		DHW		Heat Recovery (HR)		DCV		5% Target		10% Target	
			Mid-Low	Low	Mid-Low	Low	Mid-Low	Low	Mid-Low	Low	Mid-Low	Low	Mid-Low	Low	Mid-Low	Low	Individual Measures Combined	%	Individual Measures Combined	%
HVAC and SHW	Victoria (Zone 4)	Mid-rise Apartment	-1.4	-	-	-	-	-	-	-	-	-	-	-	-	-	Boiler(Mid-Low)	-1.4	-	-
		Large Office	-0.4	-4.0	-	-	-	-	-	-	-	-	-	-1.1	-	-	Boiler&HR(Low)	-5.4	-	-
		Strip Mall	-	-	-	-	-	-	-4.4	-	-	-	-	-	-	-	Furnace(Mid-low)	-4.4	-	-
		Secondary School	-0.8	-7.1	-	-	-	-	-	-	-	-	-	-1.4	-	-	Boiler(Mid-Low)+HR(Low)	-2.2	Boiler&HR(Low)	-8.7
		Big Box Retail	-	-	-	-	-	-	-0.3	-	-	-	-	-	-	-	Furnace(Mid-low)	-0.3	-	-
		Warehouse	-	-	-	-	-	-	-5.2	-	-	-	-	-	-	-	Furnace(Mid-low)	-5.2	-	-
	Windsor (Zone 5)	Mid-rise Apartment	-1.5	-	-	-	-	-	-	-	-	-	-	-	-	-	Boiler(Mid-Low)	-1.5	-	-
		Large Office	-0.5	-4.7	-	-	-	-	-	-	-	-	-	-5.3	-	-	Boiler(Low)	-4.7	Boiler&HR(Low)	-10.8
		Strip Mall	-	-	-	-	-	-	-4.5	-	-	-	-	-	-	-	Furnace(Mid-low)	-4.5	-	-
		Secondary School	-0.8	-7.0	-	-	-	-	-	-	-	-	-	-2.3	-	-	Boiler(Mid-Low)+HR(Low)	-3.2	Boiler(Low)+HR(Low)	-9.5
		Big Box Retail	-	-	-	-	-	-	-0.4	-	-	-	-	-	-	-	Furnace(Mid-low)	-0.4	-	-
		Warehouse	-	-	-	-	-	-	-4.6	-	-	-	-	-	-	-	Furnace(Mid-low)	-4.6	-	-
	Montreal (Zone 6)	Mid-rise Apartment	-1.7	-	-	-	-	-	-	-	-	-	-	-	-	-	Boiler(Mid-Low)	-1.7	-	-
		Large Office	-0.6	-5.7	-	-	-	-	-	-	-	-	-	-8.5	-	-	Boiler(Low)	-5.7	Boiler(Mid-Low)+HR(Low)	-9.3
		Strip Mall	-	-	-	-	-	-	-5.1	-	-	-	-	-	-	-	Furnace(Mid-low)	-5.1	-	-
		Secondary School	-1.0	-8.1	-	-	-	-	-	-	-	-	-1.8	-4.6	-	-	HR(Low)	-4.6	Boiler(Low)+HR(Mid-Low)	-10.4
		Big Box Retail	-	-	-	-	-	-	-0.5	-	-	-	-	-	-	-	Furnace(Mid-low)	-0.5	-	-
		Warehouse	-	-	-	-	-	-	-4.5	-	-	-	-	-	-	-	Furnace(Mid-low)	-4.5	-	-
	Ottawa (Zone 6)	Mid-rise Apartment	-1.7	-	-	-	-	-	-	-	-	-	-	-	-	-	Boiler(Mid-Low)	-1.7	-	-
		Large Office	-0.7	-5.8	-	-	-	-	-	-	-	-	-	-8.8	-	-	Boiler(Low)	-5.8	Boiler(Mid-Low)+HR(Low)	-9.7
		Strip Mall	-	-	-	-	-	-	-5.2	-	-	-	-	-	-	-	Furnace(Mid-low)	-5.2	-	-
		Secondary School	-1.0	-8.0	-	-	-	-	-	-	-	-	-1.8	-4.6	-	-	HR(Low)	-4.6	Boiler(Low)+HR(Mid-Low)	-10.1
		Big Box Retail	-	-	-	-	-	-	-0.5	-	-	-	-	-	-	-	Furnace(Mid-low)	-0.5	-	-
		Warehouse	-	-	-	-	-	-	-4.4	-	-	-	-	-	-	-	Furnace(Mid-low)	-4.4	-	-
	Edmonton (Zone 7A)	Mid-rise Apartment	-1.8	-	-	-	-	-	-	-	-	-	-	-	-	-	Boiler(Mid-Low)	-1.8	-	-
		Large Office	-0.7	-6.3	-	-	-	-	-	-	-	-	-	-9.7	-	-	Boiler(Low)	-6.3	HR(Low)	-9.7
		Strip Mall	-	-	-	-	-	-	-5.5	-	-	-	-	-	-	-	Furnace(Mid-low)	-5.5	-	-
		Secondary School	-1.0	-8.7	-	-	-	-	-	-	-	-	-4.2	-9.3	-	-	Boiler&HR(Mid-Low)	-5.3	Boiler(Mid-Low)+HR(Low)	-10.5
		Big Box Retail	-	-	-	-	-	-	-0.5	-	-	-	-	-	-	-	Furnace(Mid-low)	-0.5	-	-
		Warehouse	-	-	-	-	-	-	-4.6	-	-	-	-	-	-	-	Furnace(Mid-low)	-4.6	-	-
	Fort McMurray (Zone 7B)	Mid-rise Apartment	-1.9	-	-	-	-	-	-	-	-	-	-	-	-	-	Boiler(Mid-Low)	-1.9	-	-
		Large Office	-0.7	-5.1	-	-	-	-	-	-	-	-	-	-14.1	-	-	Boiler(Low)	-5.1	HR(Low)	-14.1
		Strip Mall	-	-	-	-	-	-	-5.7	-	-	-	-	-	-	-	Furnace(Mid-low)	-5.7	-	-
		Secondary School	-1.1	-8.8	-	-	-	-	-	-	-	-	-6.3	-12.1	-	-	HR(Mid-Low)	-6.3	Boiler(Low)	-8.8
		Big Box Retail	-	-	-	-	-	-	-0.6	-	-	-	-	-	-	-	Furnace(Mid-low)	-0.6	-	-
		Warehouse	-	-	-	-	-	-	-4.3	-	-	-	-	-	-	-	Furnace(Mid-low)	-4.3	-	-
	Yellowknife (Zone 8)	Mid-rise Apartment	-2.4	-	-	-	-	-	-	-	-	-	-	-	-	-	Boiler(Mid-Low)	-2.4	-	-
		Large Office	-1.9	-7.8	-	-	-	-	-	-	-	-	-	-22.0	-	-	Boiler(Mid-Low)	-1.9	Boiler(Low)	-7.8
		Strip Mall	-	-	-	-	-	-	-3.7	-	-	-	-	-	-	-	Furnace(Mid-low)	-3.7	-	-
		Secondary School	-2.9	-11.4	-	-	-	-	-	-	-	-	-7.2	-13.9	-	-	Boiler(Mid-Low)	-2.9	Boiler&HR(Mid-Low)	-10.5
		Big Box Retail	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Warehouse	-	-	-	-	-	-	-0.5	-	-	-	-	-	-	-	Furnace(Mid-low)	-0.5	-	-

Table 12: FDWR Measure Results - Energy Use Compared to NECB

Primary Area	Location	Building Type	Secondary Measures - Energy Savings Relative to NECB (%)							
			Set FDWR to One Level				Adjust FDWR Equation			
			20.0%	25.0%	30.0%	40.0%	Low	Mid-Low	Mid-High	High
FDWR	Victoria (Zone 4)	Mid-rise Apartment	1.4	0.7	-	-	-	-	-	-
		Large Office	7.9	6.1	4.1	-	-	-	2.0	4.1
		Strip Mall	-	-	-	-	-	-	-	-
		Secondary School	3.0	0.6	-	-	-	-	-	-
		Big Box Retail	-	-	-	-	-	-	-	-
		Warehouse	-	-	-	-	-	-	-	-
	Windsor (Zone 5)	Mid-rise Apartment	1.7	0.8	-	-	-	-	-	-
		Large Office	7.7	5.8	3.9	-	-	-	2.0	3.9
		Strip Mall	-	-	-	-	-	-	-	-
		Secondary School	3.4	0.6	-	-	-	-	-	-
		Big Box Retail	-	-	-	-	-	-	-	-
		Warehouse	-	-	-	-	-	-	-	-
	Montreal (Zone 6)	Mid-rise Apartment	1.7	0.8	-	-	-	-	-	0.1
		Large Office	7.7	5.7	3.7	-0.6	-	-0.6	2.1	4.2
		Strip Mall	-	-	-	-	-	-	-	-
		Secondary School	2.9	0.6	-	-	-	-	-	-
		Big Box Retail	-	-	-	-	-	-	-	-
		Warehouse	-	-	-	-	-	-	-	-
	Ottawa (Zone 6)	Mid-rise Apartment	1.7	0.8	-	-	-	-	-	0.5
		Large Office	7.4	5.2	3.0	-1.5	-	-1.5	2.3	4.5
		Strip Mall	-	-	-	-	-	-	-	-
		Secondary School	2.9	0.5	-	-	-	-	-	-
		Big Box Retail	-	-	-	-	-	-	-	-
		Warehouse	-	-	-	-	-	-	-	-
	Edmonton (Zone 7A)	Mid-rise Apartment	1.6	0.7	-	-	-	-	0.3	1.3
		Large Office	6.6	4.0	1.4	-4.1	-4.1	-2.7	2.7	5.3
		Strip Mall	-	-	-	-	-	-	-	-
		Secondary School	3.2	0.6	-	-	-	-	-	1.8
		Big Box Retail	-	-	-	-	-	-	-	-
		Warehouse	-	-	-	-	-	-	-	-
	Fort McMurray (Zone 7B)	Mid-rise Apartment	1.0	-	-0.9	-	-	-0.9	1.0	1.9
		Large Office	3.1	-	-3.1	-9.7	-6.3	-3.1	3.1	6.0
		Strip Mall	-	-	-	-	-	0.0	-	1.3
		Secondary School	2.6	-	-0.6	-	-	-0.6	2.6	5.1
		Big Box Retail	-	-	-	-	-	-	-	-
		Warehouse	-	-	-	-	-	-	-	-
	Yellowknife (Zone 8)	Mid-rise Apartment	-	-0.5	-1.0	-	-1.0	-0.5	0.4	0.8
		Large Office	-	-3.1	-6.1	-12.5	-6.1	-3.1	2.9	5.6
		Strip Mall	-	-	-	-	-	-	0.8	1.7
		Secondary School	-	-2.6	-3.2	-	-3.2	-2.6	2.4	4.6
		Big Box Retail	-	-	-	-	-	-	-	-
		Warehouse	-	-	-	-	-	-	-	-

Table 13: Combined Measures to Achieve 5% Energy Savings Target (Within 0.5% Tolerance)

Location	Building Type	Measures to Achieve 5% Energy Savings (within 0.5% Tolerance)				
		Envelope U-Value	FDWR	HVAC and SHW	Lighting	Combined Measures
Victoria (Zone 4)	Mid-rise Apartment	-	-	DHW(High)	-	N/A
	Large Office	Window (High)	-	Boiler&DHW&DCV&Chiller(High)	-	N/A
	Strip Mall	-	-	DX&DHW(High)+Furnace(Mid-High)	-	N/A
	Secondary School	Window&Roof (High)	-	Boiler(High)	-	N/A
	Big Box Retail	Roof (High)	-	-	-	N/A
	Warehouse	Wall (Midhigh)	-	-	-	N/A
Windsor (Zone 5)	Mid-rise Apartment	Window&Wall&Roof (High)	-	DX&DHW(High)	-	N/A
	Large Office	Window (High)	-	Boiler(High)+DCV(High)	-	N/A
	Strip Mall	Window&Wall&Roof (High)	-	DX&DHW(High)+Furnace(Mid-High)	-	N/A
	Secondary School	-	-	Boiler(High)	-	N/A
	Big Box Retail	Window&Wall&Roof (High)	-	-	-	N/A
	Warehouse	Wall (High)	-	-	-	N/A
Montreal (Zone 6)	Mid-rise Apartment	Window&Wall&Roof (High)	-	-	-	N/A
	Large Office	-	-	Boiler&DHW(High)	-	N/A
	Strip Mall	Window&Wall&Roof (High)	-	DX&DHW(High)+Furnace(Mid-High)	-	N/A
	Secondary School	-	-	-	-	Window&Wall&Roof(High)+LPD(High)
	Big Box Retail	Window&Wall&Roof (High)	-	DX&DHW(High)+Furnace(Mid-High)	-	N/A
	Warehouse	-	-	-	-	Window&Wall(High)+LPD(High)
Ottawa (Zone 6)	Mid-rise Apartment	Window&Wall&Roof (High)	-	-	-	N/A
	Large Office	-	One Level(Mid-High)	Boiler&DHW(High)	-	N/A
	Strip Mall	Window&Wall&Roof (High)	-	-	-	N/A
	Secondary School	-	-	-	-	Window&Wall&Roof(High)+LPD(High)
	Big Box Retail	Window&Wall&Roof (High)	-	DX&DHW(High)+Furnace(Mid-High)	-	N/A
	Warehouse	Window & Wall (High)	-	-	-	N/A
Edmonton (Zone 7A)	Mid-rise Apartment	Window&Wall&Roof (High)	-	-	-	N/A
	Large Office	-	Equation(High)	Boiler&DHW(High)	-	N/A
	Strip Mall	-	-	Furnace(Mid-High)+DHW(High)	-	N/A
	Secondary School	-	-	DCV(High)	-	N/A
	Big Box Retail	-	-	Furnace(Mid-High)	-	N/A
	Warehouse	Window&Wall&Roof (High)	-	-	-	N/A
Fort McMurray (Zone 7B)	Mid-rise Apartment	-	-	-	-	Window(High)+Boiler(Mid-High)
	Large Office	Window (High)	-	DCV(High)	-	N/A
	Strip Mall	-	-	DHW(High)+Furnace(Mid-High)	-	N/A
	Secondary School	-	Equation(High)	DCV(High)	-	N/A
	Big Box Retail	-	-	Furnace(Mid-High)	-	N/A
	Warehouse	-	-	-	-	Window&Wall&Roof(High)+DHW(High)
Yellowknife (Zone 8)	Mid-rise Apartment	-	-	Boiler(Mid-High)+DHW(High)	-	N/A
	Large Office	-	-	DCV(High)	-	N/A
	Strip Mall	-	-	-	-	DX&DHW(High)+Furnace(Mid-High)+FDWR Eq(High)
	Secondary School	-	Equation(High)	HR(Mid-High)	-	N/A
	Big Box Retail	-	-	Furnace(Mid-High)	-	N/A
	Warehouse	-	-	-	-	-

Table 14: Combined Measures to Achieve 10% Energy Savings Target (Within 0.5% Tolerance)

Location	Building Type	Measures to Achieve 10% Energy Savings (within 0.5% Tolerance)				
		Envelope U-Value	FDWR	HVAC and SHW	Lighting	Combined Measures
Victoria (Zone 4)	Mid-rise Apartment	-	-	-	-	Window&Wall(High)+DHW(High)
	Large Office	-	-	-	-	Window(High)+Boiler&DHW&DCV&Chiller(High)
	Strip Mall	-	-	-	-	Wall&Roof(High)+Boiler(High)
	Secondary School	-	-	Boiler&DHW&DCV(High)	-	N/A
	Big Box Retail	-	-	-	-	Window&wall(High)+Roof(Mid-High)+Furnace(Mid-High)
	Warehouse	Wall&Roof (Midhigh)	-	-	-	N/A
Windsor (Zone 5)	Mid-rise Apartment	-	-	-	-	Window(High)+Boiler(High)
	Large Office	-	-	-	-	Window&Wall&Roof(High)+Boiler&Chiller&DHW(High)
	Strip Mall	-	-	-	-	Window&Wall&Roof(High)+DX&DHW(High)+Furnace(Mid-High)+LPD(High)
	Secondary School	-	-	Boiler&DCV(High)	-	N/A
	Big Box Retail	-	-	-	-	Window&Wall&Roof(High)+DX&DHW(High)+Furnace(Mid-High)+LPD(High)
	Warehouse	-	-	-	-	Window&Wall&Roof(High)+DHW(High)+LPD(High)
Montreal (Zone 6)	Mid-rise Apartment	-	-	-	-	Window(High)+DHW&DX(High)+Boiler (Midhigh)
	Large Office	-	-	-	-	Window&Wall&Roof(High)+Boiler(High)
	Strip Mall	-	-	-	-	Window&Wall&Roof(High)+DX&DHW(High)+Furnace(Mid-High)+LPD(High)
	Secondary School	-	-	DHW&HR(High)	-	N/A
	Big Box Retail	-	-	-	-	Window&Wall&Roof(High)+DX&DHW(High)+Furnace(Mid-High)+LPD(High)
	Warehouse	-	-	-	-	-
Ottawa (Zone 6)	Mid-rise Apartment	-	-	-	-	Window(High)+DHW(High)+Boiler(Mid-High)
	Large Office	-	-	-	-	Window&Roof(High)+Boiler&DHW(High)
	Strip Mall	-	-	-	-	Window&Wall&Roof(High)+DX&DHW(High)+Furnace(Mid-High)+LPD(High)
	Secondary School	-	-	-	-	Window&Wall&Roof(High)+Boiler(High)
	Big Box Retail	-	-	-	-	Window&Wall&Roof(High)+DX&DHW(High)+Furnace(Mid-High)+LPD(High)
	Warehouse	-	-	-	-	-
Edmonton (Zone 7A)	Mid-rise Apartment	-	-	-	-	Window(High)+Boiler(Mid-High)+DHW(High)
	Large Office	-	-	-	-	Window&Wall&Roof(High)+Boiler(High)
	Strip Mall	-	-	-	-	-
	Secondary School	-	-	Boiler&DCV(High)	-	-
	Big Box Retail	-	-	-	-	-
	Warehouse	-	-	-	-	-
Fort McMurray (Zone 7B)	Mid-rise Apartment	-	-	-	-	Window(High)+Boiler(High)
	Large Office	-	-	-	-	-
	Strip Mall	-	-	-	-	-
	Secondary School	-	-	Boiler&Chiller(High)+HR(Mid-High)	-	-
	Big Box Retail	-	-	-	-	-
	Warehouse	-	-	-	-	-
Yellowknife (Zone 8)	Mid-rise Apartment	-	-	Boiler(High)+DHW(High)	-	-
	Large Office	-	-	-	-	-
	Strip Mall	-	-	-	-	-
	Secondary School	-	-	Boiler(High)+HR(Mid-High)	-	-
	Big Box Retail	-	-	-	-	-
	Warehouse	-	-	-	-	-

Table 15: Combined Measures to Achieve 5% Energy Increase Target (Within 0.5% Tolerance)

Location	Building Type	Measures to Achieve 5% Energy Increase (within 0.5% tolerance)				
		Envelope U-Value	FDWR	HVAC and SHW	Lighting	Combined Measures
Victoria (Zone 4)	Mid-rise Apartment	Roof (Low)	-	-	-	N/A
	Large Office	Window (Low)	-	Boiler&HR(Low)	-	N/A
	Strip Mall	Wall (low) + Roof (Mid-Low)	-	-	-	N/A
	Secondary School	Window (Low) + Wall (Low)	-	-	-	N/A
	Big Box Retail	-	-	-	-	Window&Wall(Low)+LPD(Mid-Low)
	Warehouse	Wall&Roof (Mid-Low)	-	Furnace(Mid-low)	-	N/A
Windsor (Zone 5)	Mid-rise Apartment	Window (Low)	-	-	-	N/A
	Large Office	Window(Mid-Low) + Roof(Low)	-	Boiler(Low)	-	N/A
	Strip Mall	-	-	Furnace(Mid-low)	-	N/A
	Secondary School	Wall(Low)+Roof(Mid-Low)	-	-	-	N/A
	Big Box Retail	Roof (Mid-Low)	-	-	-	N/A
	Warehouse	Window(Low)+Wall(Mid-Low)	-	Furnace(Mid-low)	-	N/A
Montreal (Zone 6)	Mid-rise Apartment	Window(Low)	-	-	-	N/A
	Large Office	Wall(Low)	-	-	-	N/A
	Strip Mall	-	-	Furnace(Mid-low)	-	N/A
	Secondary School	-	-	HR(Low)	-	N/A
	Big Box Retail	Wall(Low)	-	-	-	N/A
	Warehouse	-	-	Furnace(Mid-low)	-	N/A
Ottawa (Zone 6)	Mid-rise Apartment	Window(Low)	-	-	-	N/A
	Large Office	Window(Low)	-	-	-	N/A
	Strip Mall	-	-	Furnace(Mid-low)	-	N/A
	Secondary School	-	-	HR(Low)	-	N/A
	Big Box Retail	Wall(Low)	-	-	-	N/A
	Warehouse	-	-	Furnace(Mid-low)	-	N/A
Edmonton (Zone 7A)	Mid-rise Apartment	Wall (Low)	-	-	-	N/A
	Large Office	-	-	-	-	Window(Mid-Low)+LPD(Mid-Low)
	Strip Mall	Wall (Low)	-	Furnace(Mid-low)	-	N/A
	Secondary School	-	-	Boiler&HR(Mid-Low)	-	N/A
	Big Box Retail	-	-	-	-	Window(Low)+Wall(Mid-Low)+LPD(Mid-Low)
	Warehouse	-	-	Furnace(Mid-low)	-	N/A
Fort McMurray (Zone 7B)	Mid-rise Apartment	Wall(Low)	-	-	-	N/A
	Large Office	Wall(Mid-Low)	-	Boiler(Low)	-	N/A
	Strip Mall	Roof(Mid-Low)	-	-	-	N/A
	Secondary School	Wall(Low)	-	-	-	N/A
	Big Box Retail	-	-	-	-	Window(Low)+Wall(MidLow)+LPD(Mid-Low)
	Warehouse	-	-	-	-	Window(Low)+Furnace(Mid-Low)
Yellowknife (Zone 8)	Mid-rise Apartment	Window(Mid-Low)	-	-	-	N/A
	Large Office	Roof(Low)	-	-	-	N/A
	Strip Mall	-	-	-	-	-
	Secondary School	Roof(Mid-Low)	-	-	-	N/A
	Big Box Retail	-	-	-	LPD(Low)	N/A
	Warehouse	-	-	-	-	-

Table 16: Combined Measures to Achieve 10% Energy Increase Target (Within 0.5% Tolerance)

Location	Building Type	Measures to Achieve 10% Energy Increase (within 0.5% Tolerance)				
		Envelope U-Value	FDWR	HVAC and SHW	Lighting	Combined Measures
Victoria (Zone 4)	Mid-rise Apartment	-	-	-	-	Wall&Roof(Low)+Boiler(Mid-Low)
	Large Office	-	-	-	-	Window&Wall&Roof(Low)+Boiler(Mid-Low)
	Strip Mall	-	-	-	-	Wall(low)+Roof(Mid-Low)+Furnace(Mid-low)
	Secondary School	-	-	-	-	Roof(Mid-Low)+Boiler&HR(Low)
	Big Box Retail	-	-	-	-	Window&Wall(Low)+Roof(Mid-Low)+Furnace(Mid-Low)+LPD(Mid-Low)
	Warehouse	Wall (Low)	-	-	-	N/A
Windsor (Zone 5)	Mid-rise Apartment	Window&Wall(Low)+Roof(Mid-Low)	-	-	-	N/A
	Large Office	Window(Low)+Roof(Low)	-	-	-	N/A
	Strip Mall	Window&Wall(Low)+Roof(Mid-Low)	-	-	-	N/A
	Secondary School	Wall(Low)+Roof(Low)	-	Boiler(Low)+HR(Low)	-	N/A
	Big Box Retail	Window&Wall(Low)+Roof(Mid-Low)	-	-	-	N/A
	Warehouse	-	-	-	-	Window(Low)+Wall(Mid-Low)+Furnace(Mid-low)
Montreal (Zone 6)	Mid-rise Apartment	Wall(Low)+Roof(Low)	-	-	-	N/A
	Large Office	-	-	-	-	Wall(Mid-Low)+Boiler(Low)+LPD(Mid-Low)
	Strip Mall	-	-	-	-	Wall(Low)+Furnace(Mid-Low)
	Secondary School	Window&Wall(Low)+Roof(Mid-Low)	-	Boiler(Low)+HR(Mid-Low)	LPD(Low)	N/A
	Big Box Retail	Wall(Low)+Roof(Mid-Low)	-	-	-	N/A
	Warehouse	-	-	-	-	Wall(Mid-Low)+Furnace(Mid-Low)
Ottawa (Zone 6)	Mid-rise Apartment	Window(Low)+Wall(Low)	-	-	-	N/A
	Large Office	-	-	Boiler(Mid-Low)+HR(Low)	-	N/A
	Strip Mall	-	-	-	-	Wall(Low)+Furnace(Mid-Low)
	Secondary School	Window&Wall(Low)+Roof(Mid-Low)	-	Boiler(Low)+HR(Mid-Low)	LPD(Low)	N/A
	Big Box Retail	Wall(Low)+Roof(Mid-Low)	-	-	-	N/A
	Warehouse	-	-	-	-	Wall(Mid-Low)+Furnace(Mid-Low)
Edmonton (Zone 7A)	Mid-rise Apartment	Wall (Mid-Low)+Roof(Low)	-	-	-	N/A
	Large Office	Window&Wall(Mid-Low)+Roof(Low)	-	HR(Low)	-	N/A
	Strip Mall	Wall (Low)+Roof(Mid-Low)	-	-	-	N/A
	Secondary School	Roof (Low)	-	Boiler(Mid-Low)+HR(Low)	LPD(Low)	N/A
	Big Box Retail	-	-	-	LPD(Low)	N/A
	Warehouse	Roof (Mid-Low)	-	-	-	N/A
Fort McMurray (Zone 7B)	Mid-rise Apartment	Window(Low)+Wall(Low)	-	-	-	N/A
	Large Office	Wall(Low)	OneLevel(Low)	-	-	N/A
	Strip Mall	Wall(Low)+Roof(Mid-Low)	-	-	-	N/A
	Secondary School	-	-	-	-	N/A
	Big Box Retail	-	-	-	-	Roof(Mid-Low)+Furnace(Mid-Low)
	Warehouse	Roof(Mid-Low)	-	-	-	N/A
Yellowknife (Zone 8)	Mid-rise Apartment	-	-	-	-	Wall(Low)+Boiler(Mid-Low)
	Large Office	Wall&Roof(Mid-Low)	-	-	-	N/A
	Strip Mall	Window&roof(Mid-Low)	-	-	-	N/A
	Secondary School	Window(Low)+Roof(Mid-Low)	-	Boiler&HR(Mid-Low)	-	N/A
	Big Box Retail	Window&Wall (Low)	-	-	-	N/A
	Warehouse	-	-	-	-	-

Table 17: Self-Contained Mechanical Ventilation in Dwelling Unit – Heat Recovery Results

Building Type	Location	Energy Savings Relative to NECB (%)	
		Low	High
Mid-rise Apartment (Self-Contained)	Edmonton	-13.3	6.2
	Fort McMurray	-14.1	6.7
	Yellowknife	-15.8	7.6