

## Proposed Changes to the British Columbia Building Code 2024

Title: Smaller Homes in Cold Climates

Subject/description: Part 9 Energy Step Code adjustments for smaller homes in cold climates

Applicable Code references: Sentences 9.36.6.2.(1), 9.36.6.2.(3), 9.36.6.3.(1), and 9.36.6.3.(4) of Division B

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### Problem

Results from the 2022 Metric Research Report found that smaller Part 9 homes constructed in climate zones 4 and above, with conditioned floor area of 210m<sup>2</sup> (2,260ft<sup>2</sup>) or less, needed to employ more energy conservation measures to meet the requirements of the Energy Step Code as compared to larger homes, resulting in disproportionately higher incremental capital cost (ICC) while impacting affordability. It was noted that the amount of cost and effort required to meet the Energy Step Code was affected by both the size of the home and the climate in which it was being built, so the smaller the home and the colder the climate, the more the incremental capital cost could be impacted. Smaller homes will typically use less energy and emit lesser amounts of greenhouse gases as compared to larger homes; however, this is not commensurate with the level of effort required to meet the upper Steps of the Energy Step Code.

In addition to this, when modelling domestic hot water (DHW) loads, the methodology in the Code assigns a set load for all Part 9 buildings which does not account for the size of the home. This means that a much higher percentage of the overall energy use can be attributed to DHW loads for smaller homes as compared to larger homes, which puts smaller homes at a disadvantage when complying with the Energy Step Code.

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### Justification

The proposed changes include modifications to the TEDI (Thermal Energy Demand Intensity) equations as found in Division B, 9.36.6.3.(4) for climate zone 5 and higher where a scaling factor is applied for homes equal to or less than 210 m<sup>2</sup> in floor area.

The values within the MEUI (Mechanical Energy Use Intensity) table as found in Division B, 9.36.6.3-H have been modified for all climate zones referenced within the table, which includes climate zone 4 and higher. The modifications in the table reflect relaxations in MEUI associated with space conditioning as well as domestic hot water loads. The

relaxations increase with each progress climate zone as well as with reduction in floor area.

Note that the proposed changes apply only when demonstrating compliance to the Energy Step Code when using the intensity metrics pathways. These proposed changes do not affect the % improvement compliance pathway.

When pursuing the upper steps of the Energy Step Code, these changes provide greater parity in the level of effort and cost for smaller homes as compared to larger homes, which can positively impact affordability for smaller homes.

## Proposed Change

<p>In this document:</p> <p>Black text represents content adopted in the British Columbia Building Code 2024</p> <p><u>Green text</u> represents proposed unique-to-British Columbia content</p> <p><del>Red text</del> represents content proposed for deletion</p> <p>Only excerpts of the British Columbia Building Code 2024 are reproduced</p>
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**Table 9.36.6.3.-H**  
**Mechanical Energy Use Intensity Requirements**  
Forming Part of Sentence 9.36.6.3.(1)

Heating Degree-Days of <i>Building Location</i> <sup>(1)</sup> , in Celsius Degree-Days	Amount of the <i>Building's</i> Conditioned Space Served by Space-Cooling Equipment	Step	Floor Area of <i>Conditioned Space</i> (m <sup>2</sup> )					
			≤ 50	51 to 75	76 to 120	121 to 165	166 to 210	> 210
Less than 3000	Not More than 50%	2	Reserved					
		3	<del>120</del> 130	<del>100</del> 108	<del>75</del> 81	<del>63</del> 67	<del>63</del> 55	50
		4	<del>90</del> 98	<del>80</del> 86	<del>60</del> 64	<del>48</del> 50	<del>40</del> 41	40
		5	<del>65</del> 70	<del>55</del> 59	<del>40</del> 43	<del>30</del> 32	<del>25</del> 26	25
		2	Reserved					



	More than 50%	3	155 165	128 136	93 99	73 77	60 62	55
		4	125 133	108 114	78 82	58 60	48 49	45
		5	100 105	83 87	58 61	40 42	33 34	30
3000 to 3999	Not More than 50%	2	Reserved					
		3	135 147	115 125	90 98	78 84	68 72	65
		4	100 110	90 98	70 76	58 62	40 53	50
		5	70 77	60 66	45 50	35 39	30 33	30
	More than 50%	2	Reserved					
		3	170 182	143 153	108 116	88 94	75 79	70
		4	135 145	118 126	88 94	68 72	58 61	55
		5	105 112	88 94	63 68	45 49	38 41	35
4000 to 4999	Not More than 50%	2	Reserved					
		3	145 161	125 139	100 112	88 98	78 86	75
		4	105 119	95 107	75 85	63 71	55 62	55
		5	80 91	70 80	55 64	45 53	40 47	40
	More than 50%	2	Reserved					
		3	180 196	153 167	118 130	98 108	85 93	80
		4	140 154	123 135	93 103	73 81	63 70	60
		5	115 126	98 108	73 82	55 63	48 55	45
5000 to 5999	Not More than 50%	2	Reserved					
		3	165 185	145 163	120 136	108 122	98 110	95
		4	120 138	110 126	90 104	78 90	70 81	70
		5	95 110	85 99	70 83	60 72	55 66	55
		2	Reserved					

	More than 50%	3	<del>200</del> 220	<del>173</del> 191	<del>138</del> 154	<del>118</del> 132	<del>105</del> 117	100
		4	<del>155</del> 173	<del>138</del> 154	<del>108</del> 122	<del>88</del> 100	<del>78</del> 89	75
		5	<del>105</del> 145	<del>95</del> 127	<del>80</del> 101	<del>70</del> 82	<del>63</del> 74	60
6000 to 6999	Not More than 50%	2	Reserved					
		3	<del>185</del> 209	<del>165</del> 187	<del>140</del> 160	<del>128</del> 146	<del>118</del> 134	115
		4	<del>135</del> 157	<del>125</del> 145	<del>105</del> 123	<del>93</del> 109	<del>85</del> 100	85
		5	<del>105</del> 124	<del>95</del> 113	<del>80</del> 97	<del>70</del> 86	<del>65</del> 80	65
	More than 50%	2	Reserved					
		3	<del>220</del> 244	<del>193</del> 215	<del>158</del> 178	<del>138</del> 156	<del>125</del> 141	120
		4	<del>170</del> 192	<del>153</del> 173	<del>123</del> 141	<del>103</del> 119	<del>93</del> 108	90
		5	<del>140</del> 159	<del>123</del> 141	<del>98</del> 115	<del>80</del> 96	<del>73</del> 88	70
More than 6999	Not More than 50%	2	Reserved					
		3	<del>200</del> 228	<del>180</del> 206	<del>155</del> 179	<del>143</del> 165	<del>133</del> 153	130
		4	<del>150</del> 176	<del>140</del> 164	<del>120</del> 142	<del>108</del> 128	<del>100</del> 119	100
		5	<del>115</del> 138	<del>105</del> 127	<del>90</del> 111	<del>80</del> 100	<del>75</del> 94	75
	More than 50%	2	Reserved					
		3	<del>235</del> 263	<del>208</del> 234	<del>173</del> 197	<del>153</del> 157	<del>140</del> 160	135
		4	<del>185</del> 211	<del>168</del> 192	<del>138</del> 160	<del>118</del> 138	<del>108</del> 127	105
		5	<del>150</del> 173	<del>133</del> 155	<del>108</del> 129	<del>90</del> 110	<del>83</del> 102	80

**9.36.6.3.(4)** For *buildings* conforming to the requirements of any of Steps 3 to 5, thermal energy demand intensity requirements may be calculated using the applicable following formula

for *buildings* located where the degree-days below 18°C value is less than 3000

$$TEDI_{\text{adjusted}} = TEDI_{\text{step}} + (TEDI_{\text{higher}} - TEDI_{\text{step}})(HDD_{\text{actual}} - HDD_{\text{lowest}})/500$$

for *buildings* located where the degree-days below 18°C value is 3000 to 6999

$$TEDI_{adjusted} = TEDI_{step} + (TEDI_{higher} - TEDI_{step})(HDD_{actual} - HDD_{lowest})/1000$$

$$TEDI_{adjusted} = TEDI_{step} + (TEDI_{higher} - TEDI_{step})(HDD_{actual} - HDD_{lowest})/1000 + Small Home_{adj} \cdot (HDD_{actual} - 3000)$$

for *buildings* located where the degree-days below 18°C value is 7000 or greater

$$TEDI_{adjusted} = TEDI_{step} + (TEDI_{step} - TEDI_{lower})(HDD_{actual} - HDD_{lowest})/1000$$

$$TEDI_{adjusted} = TEDI_{step} + (TEDI_{higher} - TEDI_{step})(HDD_{actual} - HDD_{lowest})/1000 + Small Home_{adj} \cdot (HDD_{actual} - 3000)$$

where

Small Home<sub>adj</sub> is 0 for homes greater than 210 m<sup>2</sup>, otherwise 0.004.

TEDI<sub>adjusted</sub> = thermal energy demand intensity requirement adjusted by heating degree-days,

TEDI<sub>step</sub> = applicable maximum thermal energy demand intensity requirement in Tables 9.36.6.3.-A to 9.36.6.3.-F,

TEDI<sub>higher</sub> = maximum thermal energy demand intensity requirement for the same Step as stated in the subsequent Table of Tables 9.36.6.3.-A to 9.36.6.3.-F,

TEDI<sub>lower</sub> = maximum thermal energy demand intensity requirement for the same Step as stated in the preceding Table of Tables 9.36.6.3.-A to 9.36.6.3.-F,

HDD<sub>actual</sub> = actual degree-days below 18°C for the building location determined in accordance with Subsection 1.1.3.,

HDD<sub>lowest</sub> = lowest degree-days below 18°C value within the range of the applicable Table of Tables 9.36.6.3.-A to 9.36.6.3.-F.

(See Note 9.36.6.3.(4).)

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## Impact analysis and cost implications

The Province commissioned a study in 2024 to look at options for creating more parity in terms of %ICC and level of effort for smaller homes as compared to larger homes. The

2022 Metrics Research Report was used to inform the methodology for analysis and potential changes.

The proposed changes to both MEUI and TEDI were evaluated in comparison to the costing outcomes in the 2022 Metrics Research Report and it was found that the changes resulted in upwards of 42% reduction in %ICC. With these proposed adjustments, the %ICC for smaller homes approaches the %ICC for medium sized homes, reducing both cost and level of effort to achieve Step Code requirements.

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### **Enforcement implications**

Can be enforced through the existing enforcement regimes.

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### **Who is affected**

Designers and regulators

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### **Objective-based analysis of new or changed provisions**

No attributions proposed to be assigned.

Proposed Code Change DRAFT