



## Summary of Proposed Changes to Part 9 Buildings Climate Zone 6

September 14, 2018

The BC Energy Step Code in Part 9 of the BC Building Code can currently apply to the construction of houses and small residential buildings that have three above-ground storeys or less and have a building area no more than 600 square metres. This category of buildings includes single-detached dwellings, duplexes, townhouses, and small apartment buildings.

The Energy Step Code Council is considering technical amendments to the BC Energy Step Code. The amendments aim to level the playing field for different house sizes and make it practical for builders to meet the upper steps in colder climates, while reducing energy demand.

The specific technical changes, reasons for the changes, and their impact are described below. The current Code table for Climate Zone 6 (CZ6), which includes the Central Interior, the East Kootenays, Whistler and Terrace, is in Appendix A. The map of Climate Zones in BC is available in Appendix E. The proposed changes to targets are in Appendix B. When implemented, these proposed changes would level the playing field across the province for BC Energy Step Code compliance, facilitate Code compliance for smaller buildings, ensure improved energy performance, and provide an extra allowance for space cooling.

## Proposed Change 1: Update Thermal Energy Demand Intensity Targets

Thermal Energy Demand Intensity, or TEDI, is a measure of the amount of annual heating energy needed to maintain a building's stable interior temperature. It takes into account heat loss through the envelope and passive gains, such as the warmth generated by sunlight, body heat, and appliances.

### Issue:

Under the existing BC Step Code, builders working in cold climates will find it extremely difficult to meet the TEDI targets, especially at the upper steps. On the other hand, in certain scenarios large single-detached dwellings in warmer climates in B.C. could potentially consume more energy than those built to the minimum requirements of the BC Building Code.

### Recommendation:

Update the TEDI targets to ensure that all regions in British Columbia have a realistic and attainable roadmap to a net-zero energy ready future, and close identified loopholes for very large single-detached dwellings.

### Impact:

These changes will lead to more reasonable costs to reach the upper steps in colder climates and modest changes to the assumed compliance costs for lower steps in the province's milder regions (see Appendix D for costing tables). The recommended changes will ensure that all Step 2 and 3 buildings achieve improvements of roughly 10% for Step 2 and 20% for Step 3 over the BC Building Code, which will now involve modest costs for CZ6 in line with Step 2 and 3 in other regions. Appendix C shows strategies to meet Step 3 in CZ6. The construction cost premiums associated with delivering on the requirements of Steps 1 through 3 will remain generally consistent with the original costing assumptions for the BC Energy Step Code – below 2% lowest incremental capital cost for most building types to build to Step 3. Compared to the original targets, the proposed changes will result in a cost reduction for small houses, while very large houses will see an increase.

## **Proposed Change 2: Remove Peak Thermal Load as a Compliance Option**

Peak Thermal Load, or PTL, is a measure of the maximum amount of energy needed to heat a building on the coldest day of the year. The BC Energy Step Code currently allows builders to use either PTL or TEDI to demonstrate they have met the BC Energy Step Code envelope performance requirements.

### **Issue:**

In some cases, complying using PTL would result in significantly worse energy performance than would be achieved by complying with TEDI.

### **Recommendation:**

Remove PTL as a compliance option in the BC Energy Step Code. Following the change, builders may only use TEDI to demonstrate envelope performance requirements are met.

### **Impact:**

This change will not measurably affect builders or local government programs. It will instead ensure fairness across the board. TEDI remains a cost-effective compliance path for builders and yields more consistent energy efficiency improvements for homeowners.

## **Proposed Change 3: Introduce Relaxations to Mechanical Energy Use Intensity Targets for Small Houses**

Mechanical Energy Use Intensity, or MEUI, measures annual energy consumption for the building's mechanical systems. This metric includes space heating and cooling, ventilation, and domestic hot water.

### **Issue:**

Builders of small houses, such as small lot houses, laneway houses, coach houses, and row houses, are finding the current MEUI requirements difficult to achieve cost effectively. This has placed smaller houses at a disadvantage over larger ones and resulted in local governments instituting special requirements for small houses.

### **Recommendation:**

Adjust the MEUI target to increase the total annual energy consumption allowance for small buildings.

### **Impact:**

This update will only impact builders of small houses, such as laneway houses or coach houses, in jurisdictions where the standard is in place. It will help level the playing field between larger houses and smaller housing types.

## **Proposed Change 4: Establish improved MEUI Targets for all regions**

### **Issue:**

The current BC Energy Step Code applies the targets for MEUI for Climate Zone 6 to Zones 7A, 7B, and 8, making the BC Energy Step Code less achievable for those regions. For some steps in the warmer climate zones, targets may permit a lower level of efficiency than the prescriptive pathway in the BC Building Code.

### **Recommendation:**

Adjust the MEUI targets in all climate zones to ensure that all regions have a realistic roadmap to net-zero energy ready buildings. This adjustment also ensures that levels of effort are more comparable among the steps in all climate zones.

### **Impact:**

This update will have different impacts on builders in different areas of the province. Northern communities will have new targets that are achievable in very cold climates. The MEUI targets in CZ6 have been adjusted to ensure that outcomes are closer to the expected 10%, 20% and 40% energy efficiency improvements in Steps 2 through 4.

## **Proposed Change 5: Adjust MEUI Targets to Include Cooling**

### **Issue:**

The BC Energy Step Code does not currently address cooling needs. Builders that include cooling under the current BC Energy Step Code are at a disadvantage compared to builders that do not include cooling. Adding cooling to the MEUI targets described above ensures that efficient residential buildings remain comfortable should the need for active cooling arise in future.

### **Recommendation:**

Adjust the requirements for MEUI for dwellings that are being built and modelled with a cooling system and encourage energy efficient cooling equipment choices.


### **Impact:**

This change will offer builders an option to allow for the provision of mechanical cooling in the BC Energy Step Code without an energy penalty.

## Appendix A – Current British Columbia Building Code Requirements for Climate Zone 6

<p align="center"><b>Table 9.36.6.3.C</b>  <b>Requirements for Buildings Located Where the Degree-Days Below 18°C Value is greater than 3999<sup>(1)</sup></b>                      Forming part of <a href="#">Sentence 9.36.6.3.(1)</a></p>			
<b>Step</b>	<b>Airtightness (Air Changes per Hour at 50 Pa Pressure Differential)</b>	<b>Performance Requirement of <i>Building</i> Equipment and Systems</b>	<b>Performance Requirement of <i>Building</i> Envelope</b>
1	N/A	EnerGuide Rating % lower than EnerGuide Reference House: not less than 0% lower energy consumption or conform to <a href="#">Subsection 9.36.5</a> .	
2	≤ 3.0	EnerGuide Rating % lower than EnerGuide Reference House: not less than 10% lower energy consumption or mechanical energy use intensity ≤ 100 kWh/(m <sup>2</sup> ·year)	thermal energy demand intensity ≤ 70 kWh/(m <sup>2</sup> ·year) or peak thermal load ≤ 55 W/m <sup>2</sup>
3	≤ 2.5	EnerGuide Rating % lower than EnerGuide Reference House: not less than 20% lower energy consumption or mechanical energy use intensity ≤ 85 kWh/(m <sup>2</sup> ·year)	thermal energy demand intensity ≤ 60 kWh/(m <sup>2</sup> ·year) or peak thermal load ≤ 50 W/m <sup>2</sup>
4	≤ 1.5	EnerGuide Rating % lower than EnerGuide Reference House: not less than 40% lower energy consumption or mechanical energy use intensity ≤ 55 kWh/(m <sup>2</sup> ·year)	thermal energy demand intensity ≤ 50 kWh/(m <sup>2</sup> ·year) or peak thermal load ≤ 45 W/m <sup>2</sup>
5	≤ 1.0	mechanical energy use intensity ≤ 25 kWh/(m <sup>2</sup> ·year)	thermal energy demand intensity ≤ 15 kWh/(m <sup>2</sup> ·year) or peak thermal load ≤ 10 W/m <sup>2</sup>

## Appendix B – Proposed MEUI and TEDI Targets for the 2018 BC Building Code

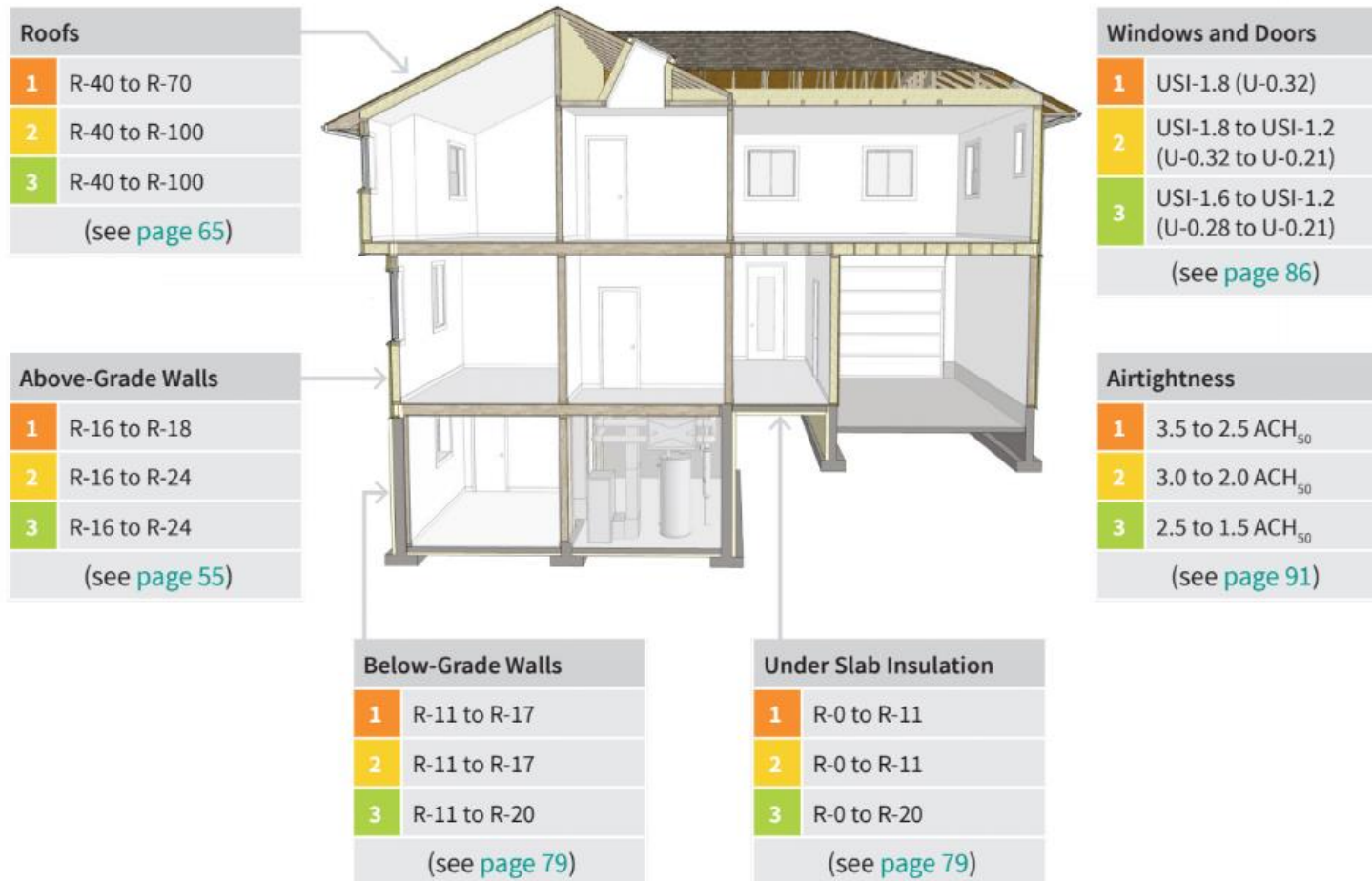
		Climate Zone 6 (Central Interior, the East Kootenays, Whistler and Terrace) Proposed MEUI and TEDI targets				
Step	Energy Model	Airtightness		Systems and Equipment		Building Envelope
		Blower Door Test	ACH <sub>50</sub>	% better than ERS reference house	MEUI <sup>(1)(2)</sup>	TEDI (kWh/m <sup>2</sup> ·year)
1	✓	✓	Report Score	0%	Report Score	Report Score
2	✓	✓	≤ 3.0	10%	OR See Below	60
3	✓	✓	≤ 2.5	20%	OR See Below	50
4	✓	✓	≤ 1.5	40%	OR See Below	40
5	✓	✓	≤ 1.0	n/a	See Below	25

MEUI Target for Buildings Designed and Constructed with NO Cooling System (kWh/m <sup>2</sup> ·year)						
Step	Floor Area					
	≤50m <sup>2</sup>	≤75m <sup>2</sup>	≤120m <sup>2</sup>	≤165m <sup>2</sup>	≤210m <sup>2</sup>	>210m <sup>2</sup>
2	160	145	115	100	90	85
3	145	125	100	88	78	75
4	105	95	75	63	55	55
5	80	70	55	45	40	40



<b>MEUI Target for Buildings Designed and Constructed with Cooling System (kWh/m<sup>2</sup>·year)</b>						
<b>Step</b>	<b>Floor Area</b>					
	<b>≤50m<sup>2</sup></b>	<b>≤75m<sup>2</sup></b>	<b>≤120m<sup>2</sup></b>	<b>≤165m<sup>2</sup></b>	<b>≤210m<sup>2</sup></b>	<b>&gt;210m<sup>2</sup></b>
<b>2</b>	<b>195</b>	<b>173</b>	<b>133</b>	<b>110</b>	<b>98</b>	<b>90</b>
<b>3</b>	<b>180</b>	<b>153</b>	<b>118</b>	<b>98</b>	<b>85</b>	<b>80</b>
<b>4</b>	<b>140</b>	<b>123</b>	<b>93</b>	<b>73</b>	<b>63</b>	<b>60</b>
<b>5</b>	<b>115</b>	<b>98</b>	<b>73</b>	<b>55</b>	<b>48</b>	<b>45</b>

## Appendix C – Step 3 Compliance for Climate Zone 6



Note: This illustration is from a draft builder's guide being developed by BC Housing. This information may be subject to change when the guide is published.

## Appendix D – Costing Tables for Climate Zone 6

Original Lowest Incremental Capital Cost (2017)

Archetype	Step	CZ6	Archetype	Step	CZ6
		Original			Original
10 Unit MURB	1	0.1%	Large SFD	1	0.2%
	2	0.2%		2	-0.5%
	3	0.0%		3	-0.9%
	4	0.2%		4	0.6%
	5	2.5%		5	--
6 Unit Row House	1	0.2%	Medium SFD	1	0.2%
	2	-0.1%		2	-0.4%
	3	-0.1%		3	-0.3%
	4	1.4%		4	1.3%
	5	5.3%		5	9.3%
Quadplex	1	0.3%	Small SFD	1	0.5%
	2	0.3%		2	1.9%
	3	0.9%		3	3.4%
	4	2.7%		4	7.7%
	5	--		5	18.1%

Updated Lowest Incremental Capital Cost (2018)

Archetype	Step	CZ6	Archetype	Step	CZ6
		Updated			Updated
10 Unit MURB	1	0.1%	Large SFD	1	0.2%
	2	0.6%		2	-0.1%
	3	0.4%		3	0.4%
	4	0.4%		4	1.3%
	5	1.2%		5	4.1%
6 Unit Row House	1	0.2%	Medium SFD	1	0.2%
	2	-0.1%		2	0.0%
	3	0.5%		3	0.7%
	4	1.4%		4	1.4%
	5	2.5%		5	3.9%
Quadplex	1	0.3%	Small SFD	1	0.5%
	2	0.2%		2	0.4%
	3	1.2%		3	1.6%
	4	2.7%		4	4.4%
	5	6.3%		5	10.8%

The updated 2018 Metrics Report with the new proposed targets for all building types and climates is available at [www.energystepcode.ca](http://www.energystepcode.ca).

## Appendix E – British Columbia Climate Zones Map

