

Proposed Change 2044

Code Reference(s):
NBC25 Div.B 9.36.12. (first printing)

Subject:

Energy Efficiency for Houses

Title:

Energy Performance Tier 3 of the Prescriptive Path

Description:

This proposed change provides energy-efficiency requirements for compliance with Tier 3 of the energy performance compliance prescriptive path.

This change could potentially affect the following topic areas:

- | | |
|---|---|
| ☐ Division A | ☐ Division B |
| ☐ Division C | ☒ Design and Construction |
| ☐ Building operations | ☒ Housing |
| ☒ Small Buildings | ☐ Large Buildings |
| ☐ Fire Protection | ☐ Occupant safety in use |
| ☐ Accessibility | ☐ Structural Requirements |
| ☒ Building Envelope | ☐ Energy Efficiency |
| ☒ Heating, Ventilating and Air Conditioning | ☐ Plumbing |
| ☐ Construction and Demolition Sites | |

Problem

The 2020 edition of the National Building Code of Canada (NBC) introduced energy efficiency performance tiers in Section 9.36. of Division B, with increasing levels of improvement for buildings and houses, to provide authorities having jurisdiction with the option to adopt the energy performance levels most suitable to their needs.

Although performance modeling is common in the industry, many Code users have requested that prescriptive compliance paths remain in the National Model Codes to provide simplicity in achieving energy compliance.

Failure to develop a prescriptive compliance path for Tier 3 could force Code users to rely on more complicated compliance paths.

Justification

The proposed prescriptive requirements for Tier 3 would provide acceptable solutions for different components of the building to improve the total energy performance. Together with the tiered energy performance path in Subsection 9.36.7. and the tiered points-based prescriptive trade-off path in Subsection 9.36.9., the prescriptive path is one of the compliance options that provide an acceptable means of achieving the performance goal of reducing energy consumption by at least 20% and percent heat loss by at least 10% for buildings with a volume of conditioned space (or "conditioned volume") greater than 300 m³, and by reducing energy consumption by at least 10% and percent heat loss by at least 5% for buildings with a conditioned volume less than or equal to 300 m³.

In developing the Tier 3 prescriptive solutions, many different possible solutions were considered. These possible solutions were compared against the points-based trade-off path to ensure compliance.

Building Envelope

A Tier 3 envelope package was developed for each climate zone. 240 building archetypes were modeled and categorized by volume, with 219 having a conditioned volume greater than 300 m³ and 21 having a volume of less than or equal to 300 m³.

For the applicable building volume and climate zone, two criteria were used to define acceptable Tier 3 building envelope package solutions:

1. At least 80% of the archetypes must comply with the Tier 3 requirement for percentage heat loss reduction.
2. On average, the archetypes must have a peak heating load less than their reference building.

There are numerous combinations of envelope measures that meet the above criteria. Therefore, additional selection criteria needed to be defined to reduce the number of prescriptive envelope package solutions to one for each climate and building volume.

The two additional criteria were as follows:

1. Solutions should minimize incremental costs.
2. Component performance of the building envelope must consistently increase across climate zones.

A fourth criterion was defined to ensure that, when going from a warmer to colder climate zone, the thermal performance of a building envelope component was not reduced. For example, a solution that uses 4.88 RSI for the effective thermal resistance of above-grade walls in climate zone 6 would not be used if the solution for climate zone 5 used 5.69 RSI for above-grade walls.

Airtightness

There is no mandatory airtightness level that must be met to achieve Tier 3.

HVAC and Service Water Heating System

Heat/energy recovery ventilators (HRVs/ERVs) are considered an economical way to save energy; it was proposed that all Tier 3 houses be equipped with HRVs/ERVs with a minimum 70% sensible recovery efficiency. As HRVs/ERVs are required for the Tier 1 and Tier 2 packages, the requirement is maintained in the Tier 3 package.

For buildings with a conditioned volume less than or equal to 300 m³, no upgrades beyond Code-minimum space heating systems are required to achieve Tier 3. For buildings with a conditioned volume greater than 300 m³, upgrades are required when heating with a gas- or oil-fired furnace.

For buildings with a conditioned volume less than or equal to 300 m³, no upgrades beyond Code-minimum service water heating systems are required to achieve Tier 3. For buildings with a conditioned volume greater than 300 m³, upgrades are required when the water heater is gas- or oil-fired.

PROPOSED CHANGE

[9.36.12.] 9.36.12. Tiered Energy Performance Compliance: Tier 3 Prescriptive Path**[9.36.12.1.] --- Scope and Application**

- [11 --]** This Subsection is concerned with achieving compliance with Energy Performance Tier 3, as specified in Table 9.36.7.2., through prescriptive requirements.
- [21 --]** This Subsection applies only to *buildings* that are equipped with a heat/energy-recovery ventilator conforming to Article 9.36.3.9. (See Note A-9.36.12.2.(1)(a).)

[9.36.12.2.] --- Compliance

- [11 --]** Compliance with this Subsection shall be achieved by
- (a) --) designing and constructing the *building* envelope in accordance with Articles 9.36.2.1. to 9.36.2.5., 9.36.2.9., 9.36.2.10., and 9.36.12.3. to 9.36.12.5. (see Note A-9.36.12.2.(1)(a)).
 - (b) --) designing and constructing or specifying systems and equipment for heating, ventilating or air-conditioning in accordance with Article 9.36.12.6., and
 - (c) --) designing and constructing or specifying systems and equipment for service water heating in accordance with Article 9.36.12.7.

[9.36.12.3.] --- Above-Ground Opaque Building Assemblies

- [11 --]** Except as provided in Article 9.36.2.5. and Sentence 9.36.2.6.(3), the effective thermal resistance of above-ground opaque *building* assemblies or portions thereof shall be not less than that shown for the applicable heating degree-days of the *building* location in
- (a) --) Table 9.36.12.3.-A, where the total volume of *conditioned space* within the *building* is less than or equal to 300 m³,
 - (b) --) Table 9.36.12.3.-B, where the total volume of *conditioned space* within the *building* is greater than 300 m³ or not determined, and
 - (i) --) the principal *space-heating appliance* is oil- or gas-fired or a heat pump, as specified in Table 9.36.12.6., and
 - (ii) --) the service water heating equipment is oil- or gas-fired or a heat pump, as specified in Table 9.36.12.7., or
 - (c) --) Table 9.36.12.3.-C.

Table [9.36.12.3.-A]

Tier 3 Effective Thermal Resistance of Above-Ground Opaque Building Assemblies Described in Clause 9.36.12.3.(1)(a)
Forming Part of Clause 9.36.12.3.(1)(a)

<u>Above-Ground Opaque Building Assembly</u>	<u>Heating Degree-Days of Building Location, ⁽¹⁾ in Celsius Degree-Days</u>					
	<u>Zone 4 ≤ 3000</u>	<u>Zone 5 3000 to 3999</u>	<u>Zone 6 4000 to 4999</u>	<u>Zone 7A 5000 to 5999</u>	<u>Zone 7B 6000 to 6999</u>	<u>Zone 8 ≥ 7000</u>
	<u>Minimum Effective Thermal Resistance (RSI), (m²×K)/W</u>					
<u>Ceilings below attics</u>	<u>6.91</u>	<u>8.67</u>	<u>8.67</u>	<u>10.43</u>	<u>10.43</u>	<u>10.43</u>
<u>Cathedral ceilings and flat roofs</u>	<u>4.67</u>	<u>4.67</u>	<u>4.67</u>	<u>5.02</u>	<u>5.02</u>	<u>5.02</u>
<u>Walls</u>	<u>3.08</u>	<u>3.08</u>	<u>3.28</u>	<u>3.28</u>	<u>3.85</u>	<u>3.85</u>
<u>Floors over unheated spaces</u>	<u>4.67</u>	<u>4.67</u>	<u>4.67</u>	<u>5.02</u>	<u>5.02</u>	<u>5.02</u>

Note to Table [9.36.12.3.-A] :

- (1) See Article 1.1.3.1.

Table [9.36.12.3.-B]

Tier 3 Effective Thermal Resistance of Above-Ground Opaque Building Assemblies Described in Clause 9.36.12.3.(1)(b)
Forming Part of Clause 9.36.12.3.(1)(b)

<u>Above-Ground Opaque Building Assembly</u>	<u>Heating Degree-Days of Building Location, ⁽¹⁾ in Celsius Degree-Days</u>					
	<u>Zone 4 ≤ 3000</u>	<u>Zone 5 3000 to 3999</u>	<u>Zone 6 4000 to 4999</u>	<u>Zone 7A 5000 to 5999</u>	<u>Zone 7B 6000 to 6999</u>	<u>Zone 8 ≥ 7000</u>
	<u>Minimum Effective Thermal Resistance (RSI), (m²×K)/W</u>					
<u>Ceilings below attics</u>	<u>6.91</u>	<u>8.67</u>	<u>10.43</u>	<u>10.43</u>	<u>10.43</u>	<u>10.43</u>
<u>Cathedral ceilings and flat roofs</u>	<u>4.67</u>	<u>4.67</u>	<u>5.02</u>	<u>5.02</u>	<u>5.02</u>	<u>5.02</u>
<u>Walls</u>	<u>3.28</u>	<u>3.28</u>	<u>3.58</u>	<u>3.69</u>	<u>4.29</u>	<u>4.57</u>
<u>Floors over unheated spaces</u>	<u>4.67</u>	<u>4.67</u>	<u>4.67</u>	<u>5.02</u>	<u>5.02</u>	<u>5.02</u>

Note to Table [9.36.12.3.-B] :

- (1) See Article 1.1.3.1.

Table [9.36.12.3.-C]
Tier 3 Effective Thermal Resistance of Above-Ground Opaque Building Assemblies Described in Clause 9.36.12.3.(1)(c)
Forming Part of Clause 9.36.12.3.(1)(c)

Above-Ground Opaque Building Assembly	Heating Degree-Days of Building Location, ⁽¹⁾ in Celsius Degree-Days					
	Zone 4 < 3000	Zone 5 3000 to 3999	Zone 6 4000 to 4999	Zone 7A 5000 to 5999	Zone 7B 6000 to 6999	Zone 8 ≥ 7000
	Minimum Effective Thermal Resistance (RSI), (m ² ×K)/W					
Ceilings below attics	6.91	10.43	12.19	12.19	12.19	12.19
Cathedral ceilings and flat roofs	4.67	4.67	5.02	5.02	5.02	5.02
Walls	4.40	4.40	4.57	4.57	5.45	5.45
Floors over unheated spaces	4.67	4.67	4.67	5.02	5.02	5.02

Note to Table [9.36.12.3.-C]:

(1) See Article 1.1.3.1.

- [21] --) Where the top of a section of *foundation* wall is on average greater than or equal to 600 mm above the adjoining ground level, the effective thermal resistance of the above-ground portion of that section of wall shall be not less than that of the above-ground walls.
- [31] --) Except for tubular daylighting devices, the effective thermal resistance of skylight shafts shall be not less than that of the above-ground walls.

[9.36.12.4.] --- Fenestration, Doors and Skylights

- [11] --) Except as provided in Sentences (2) to (8), fenestration and doors shall have an overall thermal transmittance (U-value) not greater than, or an Energy Rating not less than, that shown in Table 9.36.12.4. for the applicable heating-degree days of the *building* location. (See Note A-9.36.2.7.(1) and (3).)

Table [9.36.12.4.]
Tier 3 Thermal Characteristics of Fenestration and Doors
Forming Part of Sentence 9.36.12.4.(1)

Component	Thermal Characteristics ⁽¹⁾	Heating Degree-Days of Building Location, ⁽²⁾ in Celsius Degree-Days					
		Zone 4 < 3000	Zone 5 3000 to 3999	Zone 6 4000 to 4999	Zone 7A 5000 to 5999	Zone 7B 6000 to 6999	Zone 8 ≥ 7000
Windows and doors	Max. U-value, W/(m ² ×K)	1.44	1.22	1.22	1.22	1.05	1.05
	Min. Energy Rating	29	34	34	34	40	40

Notes to Table [9.36.12.4.]:

(1) See Note A-Table 9.36.2.7.-A.

(2) See Article 1.1.3.1.

- [21] --) The solar heat gain coefficient of fenestration and doors shall comply with Sentence 9.36.2.7.(2).
- [31] --) Skylights shall have a U-value not greater than that shown in Table 9.36.2.7.-C for the applicable heating-degree days of the *building* location. (See Note A-9.36.2.7.(1) and (3).)
- [41] --) Glass block assemblies separating *conditioned space* from unconditioned space or the exterior shall have
- [a] --) a U-value of not more than 2.9 W/(m²×K), and
- [b] --) a total aggregate area of not more than 1.85 m².
- [51] --) One door separating a *conditioned space* from an unconditioned space or the exterior is permitted to have a U-value up to 2.6 W/(m²×K).
- [61] --) Storm windows and storm doors need not comply with Sentence (1).
- [71] --) Vehicular access doors separating a *conditioned space* from an unconditioned space or the exterior shall have a nominal thermal resistance of not less than 1.1 (m²×K)/W.
- [81] --) Access hatches separating a *conditioned space* from an unconditioned space shall be insulated to a nominal thermal resistance of not less than 2.6 (m²×K)/W.

[9.36.12.5.] --- Opaque Building Assemblies Below-Grade or in Contact with the Ground

- [11] --) Opaque *building* assemblies below-grade or in contact with the ground shall be designed and constructed in accordance with Sentences 9.36.2.8.(2) to (10) and this Article.
- [21] --) Except as provided in Article 9.36.2.5., the effective thermal resistance of *foundation* walls shall be not less than that shown for the applicable heating degree-days of the *building* location in
- [a] --) Table 9.36.12.5.-A, where the total volume of *conditioned space* within the *building* is less than or equal to 300 m³,
- [b] --) Table 9.36.12.5.-B, where the total volume of *conditioned space* within the *building* is greater than 300 m³ or not determined, and
- [i] --) the principal *space-heating appliance* is gas- or oil-fired or a heat pump, as specified in Table 9.36.12.6., and
- [ii] --) the service water heating equipment is gas- or oil-fired or a heat pump, as specified in Table 9.36.12.7., or
- [c] --) Table 9.36.12.5.-C.

Table [9.36.12.5.-A]

Tier 3 Effective Thermal Resistance of Building Assemblies Below-Grade or in Contact with the Ground Described in Clause 9.36.12.5.(2)(a) Forming Part of Clause 9.36.12.5.(2)(a)

<u>Building Assembly Below-Grade or in Contact with the Ground ⁽¹⁾</u>	<u>Heating Degree-Days of Building Location, ⁽²⁾ in Celsius Degree-Days</u>					
	<u>Zone 4 < 3000</u>	<u>Zone 5 3000 to 3999</u>	<u>Zone 6 4000 to 4999</u>	<u>Zone 7A 5000 to 5999</u>	<u>Zone 7B 6000 to 6999</u>	<u>Zone 8 ≥ 7000</u>
	<u>Minimum Effective Thermal Resistance (RSI), (m²×K)/W</u>					
<u>Foundation walls</u>	<u>1.99</u>	<u>2.98</u>	<u>2.98</u>	<u>3.46</u>	<u>3.46</u>	<u>3.97</u>
<u>Unheated floors ⁽³⁾ below frost line ⁽⁴⁾ ⁽⁵⁾</u>	<u>uninsulated</u>	<u>uninsulated</u>	<u>uninsulated</u>	<u>uninsulated</u>	<u>uninsulated</u>	<u>uninsulated</u>
<u>Unheated floors ⁽³⁾ above frost line ⁽⁵⁾</u>	<u>1.96</u>	<u>1.96</u>	<u>1.96</u>	<u>1.96</u>	<u>1.96</u>	<u>1.96</u>
<u>Heated and unheated floors on permafrost</u>	<u>n/a</u>	<u>n/a</u>	<u>n/a</u>	<u>n/a</u>	<u>4.44</u>	<u>4.44</u>
<u>Heated floors ⁽⁶⁾</u>	<u>2.32</u>	<u>2.32</u>	<u>2.32</u>	<u>2.84</u>	<u>2.84</u>	<u>2.84</u>
<u>Slabs-on-grade with an integral footing ⁽⁶⁾</u>	<u>1.96</u>	<u>1.96</u>	<u>1.96</u>	<u>3.72</u>	<u>3.72</u>	<u>4.59</u>

Notes to Table [9.36.12.5.-A] :

- (1) See Note A-Tables 9.36.2.8.-A and -B.
- (2) See Article 1.1.3.1.
- (3) Does not apply to below-grade floors over heated crawl spaces.
- (4) Typically applies to floors-on-ground in full-height basements.
- (5) Refers to undisturbed frost line before house is constructed.
- (6) See Sentence 9.25.2.3.(5) for requirement on placement of insulation. The design of slabs-on-grade with an integral footing is addressed in Part 4 (see Article 9.16.1.2.).

Table [9.36.12.5.-B]

Tier 3 Effective Thermal Resistance of Building Assemblies Below-Grade or in Contact with the Ground Described in Clause 9.36.12.5.(2)(b) Forming Part of Clause 9.36.12.5.(2)(b)

<u>Building Assembly Below-Grade or in Contact with the Ground ⁽¹⁾</u>	<u>Heating Degree-Days of Building Location, ⁽²⁾ in Celsius Degree-Days</u>					
	<u>Zone 4 < 3000</u>	<u>Zone 5 3000 to 3999</u>	<u>Zone 6 4000 to 4999</u>	<u>Zone 7A 5000 to 5999</u>	<u>Zone 7B 6000 to 6999</u>	<u>Zone 8 ≥ 7000</u>
	<u>Minimum Effective Thermal Resistance (RSI), (m²×K)/W</u>					
<u>Foundation walls</u>	<u>2.98</u>	<u>3.46</u>	<u>3.46</u>	<u>4.78</u>	<u>4.78</u>	<u>4.78</u>
<u>Unheated floors ⁽³⁾ below frost line ⁽⁴⁾ ⁽⁵⁾</u>	<u>uninsulated</u>	<u>uninsulated</u>	<u>uninsulated</u>	<u>uninsulated</u>	<u>uninsulated</u>	<u>uninsulated</u>
<u>Unheated floors ⁽³⁾ above frost line ⁽⁵⁾</u>	<u>1.96</u>	<u>1.96</u>	<u>1.96</u>	<u>1.96</u>	<u>1.96</u>	<u>1.96</u>
<u>Heated and unheated floors on permafrost</u>	<u>n/a</u>	<u>n/a</u>	<u>n/a</u>	<u>n/a</u>	<u>4.44</u>	<u>4.44</u>
<u>Heated floors ⁽⁶⁾</u>	<u>2.32</u>	<u>2.32</u>	<u>2.32</u>	<u>2.84</u>	<u>2.84</u>	<u>2.84</u>
<u>Slabs-on-grade with an integral footing ⁽⁶⁾</u>	<u>1.96</u>	<u>1.96</u>	<u>2.84</u>	<u>3.72</u>	<u>3.72</u>	<u>4.59</u>

Notes to Table [9.36.12.5.-B] :

- (1) See Note A-Tables 9.36.2.8.-A and -B.
- (2) See Article 1.1.3.1.
- (3) Does not apply to below-grade floors over heated crawl spaces.

- (4) Typically applies to floors-on-ground in full-height *basements*.
- (5) Refers to undisturbed frost line before house is constructed.
- (6) See Sentence 9.25.2.3.(5) for requirement on placement of insulation. The design of slabs-on-grade with an integral footing is addressed in Part 4 (see Article 9.16.1.2.).

Table [9.36.12.5.-C]

Tier 3 Effective Thermal Resistance of Building Assemblies Below-Grade or in Contact with the Ground Described in Clause 9.36.12.5.(2)(c) Forming Part of Clause 9.36.12.5.(2)(c)

<u>Building Assembly Below-Grade or in Contact with the Ground ⁽¹⁾</u>	<u>Heating Degree-Days of Building Location, ⁽²⁾ in Celsius Degree-Days</u>					
	<u>Zone 4 < 3000</u>	<u>Zone 5 3000 to 3999</u>	<u>Zone 6 4000 to 4999</u>	<u>Zone 7A 5000 to 5999</u>	<u>Zone 7B 6000 to 6999</u>	<u>Zone 8 ≥ 7000</u>
	<u>Minimum Effective Thermal Resistance (RSI), (m²×K)/W</u>					
<i>Foundation walls</i>	3.46	3.46	3.90	4.78	4.78	5.22
<i>Unheated floors ⁽³⁾ below frost line ⁽⁴⁾ ⁽⁵⁾</i>	<i>uninsulated</i>	<i>uninsulated</i>	<i>uninsulated</i>	<i>uninsulated</i>	<i>uninsulated</i>	<i>uninsulated</i>
<i>Unheated floors ⁽³⁾ above frost line ⁽⁵⁾</i>	1.96	1.96	1.96	1.96	1.96	1.96
<i>Heated and unheated floors on permafrost</i>	n/a	n/a	n/a	n/a	4.44	4.44
<i>Heated floors ⁽⁶⁾</i>	2.32	2.32	2.32	2.84	2.84	2.84
<i>Slabs-on-grade with an integral footing ⁽⁶⁾</i>	1.96	1.96	3.72	3.72	4.59	4.59

Notes to Table [9.36.12.5.-C] :

- (1) See Note A-Tables 9.36.2.8.-A and -B.
- (2) See Article 1.1.3.1.
- (3) Does not apply to below-grade floors over heated crawl spaces.
- (4) Typically applies to floors-on-ground in full-height *basements*.
- (5) Refers to undisturbed frost line before house is constructed.
- (6) See Sentence 9.25.2.3.(5) for requirement on placement of insulation. The design of slabs-on-grade with an integral footing is addressed in Part 4 (see Article 9.16.1.2.).

[9.36.12.6.] --- HVAC Systems

- [1] --)** HVAC systems, equipment and installations shall be designed and constructed or specified in accordance with Articles 9.36.3.2. to 9.36.3.8. and 9.36.3.11. and this Article.
- [2] --)** Where HVAC systems, equipment or techniques other than those described in Articles 9.36.3.2. to 9.36.3.8. and 9.36.3.11. and this Article are used, the *building* shall be designed and constructed in accordance with the energy efficiency requirements of the NECB.
- [3] --)** Ventilation systems serving *buildings* to which this Subsection applies shall be equipped with a heat/energy recovery ventilator conforming to Article 9.36.3.9.
- [4] --)** The sensible recovery efficiency (SRE) measured at an outside air test temperature of 0°C of the heat/energy recovery ventilator described in Sentence (3) shall be not less than 70%.
- [5] --)** Heat pumps shall have an output capacity tested at the standard test temperature of 8.3°C that is equivalent to at least 60% of the design heat loss of the *building*.
- [6] --)** HVAC equipment and components shall comply with the performance requirements stated in
- [a] --) Table 9.36.12.6., where the total volume of *conditioned space* within the *building* is greater than 300 m³ or not determined, or
- [b] --) Table 9.36.3.10., where the total volume of *conditioned space* within the *building* is less than or equal to 300 m³.

Table [9.36.12.6.]

Tier 3 Performance Requirements for HVAC Equipment in Buildings Where Total Volume of Conditioned Space > 300 m³ or Not Determined Forming Part of Clause 9.36.12.6.(6)(a)

<u>Principal Heating System ⁽¹⁾</u>	<u>Performance Requirement ⁽²⁾</u>
Gas-fired combined space- and service water heating systems (combos) ⁽³⁾	TPF ≥ 0.85

<u>Gas-fired warm-air furnaces</u> ⁽³⁾	AFUE ≥ 98%
<u>Oil-fired appliances</u>	AFUE ≥ 87%
<u>Heat pumps</u>	See Table 9.36.3.10.
<u>Other space-heating appliances</u>	See Table 9.36.3.10.

Notes to Table [9.36.12.6.1]:

- (1) See Table 9.36.3.10. for the corresponding performance testing standard.
- (2) The symbols and abbreviations used in this column have the following meanings:
- | | | |
|---|------|--------------------------------------|
| - | AFUE | = annual fuel utilization efficiency |
| | TPF | = thermal performance factor |
- (3) Includes propane.

[71 --] Natural gas and propane fireplaces shall comply with Sentence 9.36.3.10.(2).

[9.36.12.7.] --- Service Water Heating Equipment

- [11 --] Service water heating equipment and components shall be designed and constructed or specified in accordance with Subsection 9.36.4. and this Article.
- [21 --] Where service water heating equipment or techniques other than those described in Subsection 9.36.4. and this Article are used, the building shall be designed and constructed in accordance with the energy efficiency requirements of the NECB.
- [31 --] Service water heating equipment and components shall comply with the performance requirements stated in
- [a] --) Table 9.36.12.7., where the total volume of conditioned space within the building is greater than 300 m³ or not determined, or
- [b] --) Table 9.36.4.2., where the total volume of conditioned space within the building is less than or equal to 300 m³.

Table [9.36.12.7.]

Tier 3 Performance Requirements for Service Water Heating Equipment in Buildings Where Total Volume of Conditioned Space > 300 m³ or Not Determined

Forming Part of Subclause 9.36.12.3.(1)(a)(ii) and Clause 9.36.12.7.(3)(a)

<u>Type of Equipment</u> ⁽¹⁾	<u>Performance Requirement</u> ⁽²⁾
<u>Storage type service water heaters</u>	
<u>Gas-fired</u> ⁽³⁾	UEF ≥ 0.83 or EF ≥ 0.8
<u>Oil-fired</u>	UEF ≥ 0.83 or EF ≥ 0.8
<u>Gas-fired combined space- and service water heating systems (combos)</u> ⁽³⁾	TPF ≥ 0.85
<u>Other service water heating equipment</u>	See Table 9.36.4.2.

Notes to Table [9.36.12.7.]:

- (1) See Table 9.36.4.2. for the corresponding performance testing standard.
- (2) The symbols and abbreviations used in this column have the following meanings:
- | | | |
|---|-----|------------------------------|
| - | UEF | = uniform energy factor |
| | EF | = energy factor |
| | TPF | = thermal performance factor |
- (3) Includes propane.

Note A-9.36.12.2.(1)(a) Other Compliance Options.

Buildings that do not comply with requirements of the Tier 3 prescriptive path set out in Subsection 9.36.12. are permitted to meet the requirements of the performance paths (Subsection 9.36.7. or 9.36.8.) or the points-based prescriptive trade-off path (Subsection 9.36.9.) to achieve the Tier 3 energy performance target provided in Table 9.36.7.2.

Impact analysis

This proposed change would improve energy performance by providing the prescriptive requirements for building envelopes, service water heating systems and HVAC systems to achieve Energy Performance Tier 3.

Buildings with a total volume of conditioned space of less than or equal to 300 m³ have the following energy performance targets: a percent improvement of ≥10%, a percent energy target of ≤90% and a percent heat loss reduction of ≥5%.

Buildings with a total volume of conditioned space of greater than 300 m³ have the following energy performance targets: a percent improvement of $\geq 20\%$, a percent energy target of $\leq 80\%$ and a percent heat loss reduction of $\geq 10\%$.

The incremental costing below is derived from the specifications and detailed costing data found in the supporting document. Total costs by archetype have been rounded to the nearest \$10.

Incremental Costing for Tier 3 by Archetype

Archetype A1 — Apartment/condominium unit, one bedroom

Table 1. Total Area of Building Envelope Components and Total Volume of Conditioned Space of Archetype A1

Area Part of or Surrounded by Building Envelope	Total Area, m ²
Above-grade walls	13.93
Floor area	46.30
Insulated attic area	46.30
Window area	2.36
Conditioned Space	Total Volume, m³
Conditioned space	105.45

Tier 1 and Tier 2 are identical for Archetype A1, as its conditioned volume is $\leq 300\text{m}^3$.

Table 2. Incremental Cost to Achieve Tier 3 Compared to Tier 1 in Archetype A1

Building Component	Incremental Cost, \$					
	Climate Zone					
	4	5	6	7A	7B	8
Above-grade walls	-51.35*	-51.35*	-34.44*	-34.44*	136.14	136.14
Windows and sliding glass doors	172.76	243.79	243.79	138.86	125.95	125.95
HRV/ERV	200.00	200.00	200.00	200.00	200.00	200.00
HVAC	0.00	0.00	0.00	0.00	0.00	0.00
SWH	0.00	0.00	0.00	0.00	0.00	0.00
Total	320	390	410	300	460	460

*See supplemental document Section 3.4.

Archetype A2 — Bungalow, detached without basement or garage

Table 3. Total Area of Building Envelope Components and Total Volume of Conditioned Space of Archetype A2

Area Part of or Surrounded by Building Envelope	Total Area, m ²
Above-grade walls	126.05
Ground floor area	95.00
Slab in contact with the ground	101.7
Insulated attic area	95.00
Window area	10.75
Conditioned Space	Total Volume, m³
Conditioned space	217.44

Tier 1 and Tier 2 are identical for Archetype A2, as its conditioned volume is $\leq 300\text{m}^3$.

Table 4. Incremental Cost to Achieve Tier 3 Compared to Tier 1 in Archetype A2

Building Component	Incremental Cost, \$					
	Climate Zone					
	4	5	6	7A	7B	8
Ceiling below attic	0.00	754.30	754.18	922.45	0.00	0.00
Above-grade walls	-464.66*	-464.66*	-311.61*	-311.61*	1,231.92	1,231.92
Floors over unheated spaces	0.00	0.00	0.00	0.00	0.00	0.00

Windows and sliding glass doors	786.95	1,110.48	1,110.48	632.53	573.73	573.73
HRV/ERV	200.00	200.00	200.00	200.00	200.00	200.00
HVAC	0.00	0.00	0.00	0.00	0.00	0.00
SWH	0.00	0.00	0.00	0.00	0.00	0.00
Total	520	1,600	1,750	1,440	2,010	2,010

*See supplemental document Section 3.4.

Archetype A3 – Bungalow, detached with basement and garage

Table 5. Total Area of Building Envelope Components and Total Volume of Conditioned Space of Archetype A3

Area Part of or Surrounded by Building Envelope	Total Area, m ²
Above-grade walls	69.49
Foundation walls	46.10
Ground floor area	90.45
Insulated attic area	90.45
Window area	19.74
Conditioned Space	Total Volume, m³
Conditioned space	411.36

Table 6. Incremental Cost to Achieve Tier 3 Compared to Tier 1 in Archetype A3 – Gas-Fired

Building Component	Incremental Cost, \$					
	Climate Zone					
	4	5	6	7A	7B	8
Ceiling below attic	0.00	718.06	1,596.34	878.28	0.00	0.00
Above-grade walls	-171.79*	-171.79*	5.59	422.98	1,069.67	1,335.99
Foundation walls	1,318.41	239.78	1,558.19	2,005.82	2,005.82	2,005.82
Unheated floors above frost line	0.00	0.00	0.00	0.00	n/a	n/a
Heated and unheated floors on permafrost	n/a	n/a	n/a	n/a	0.00	0.00
Windows and glass doors	1,445.05	2,039.16	2,039.16	1,161.51	1,053.43	1,053.43
HRV/ERV	200.00	200.00	200.00	200.00	200.00	200.00
Gas-fired furnace	2,300.00	2,300.00	2,300.00	2,300.00	2,300.00	2,300.00
Gas-fired storage-type water heater	2,523.00	2,523.00	2,523.00	2,523.00	2,523.00	2,523.00
Total	7,410	7,850	10,220	9,490	9,150	9,420

*See supplemental document Section 3.4.

Table 7. Incremental Cost to Achieve Tier 3 Compared to Tier 2 in Archetype A3 – Gas-Fired

Building Component	Incremental Cost, \$					
	Climate Zone					
	4	5	6	7A	7B	8
Ceiling below attic	0.00	0.00	1,596.44	0.00	0.00	0.00
Above-grade walls	84.37	84.37	340.71	679.14	390.53	656.85
Foundation walls	0.00	239.72	239.78	527.81	527.81	527.81
Unheated floors above frost line	0.00	0.00	0.00	0.00	n/a	n/a
Heated and unheated floors on permafrost	n/a	n/a	n/a	n/a	0.00	0.00
Windows and sliding glass doors	567.40	0.00	0.00	0.00	0.00	0.00
HRV/ERV	200.00	200.00	0.00	0.00	0.00	0.00
Gas-fired furnace	2,300.00	2,300.00	2,300.00	2,300.00	2,300.00	2,300.00
Gas-fired storage-type water heater	2,523.00	2,523.00	2,523.00	2,523.00	2,523.00	2,523.00
Total	5,470	5,350	7,000	6,030	5,740	6,010

Table 8. Incremental Cost to Achieve Tier 3 Compared to Tier 1 in Archetype A3 – Oil-Fired

Building Component	Incremental Cost, \$					
	Climate Zone					
	4	5	6	7A	7B	8
Ceiling below attic	0.00	718.06	1,596.34	878.28	0.00	0.00
Above-grade walls	-171.79*	-171.79*	5.59	422.98	1,069.67	1,335.99
Foundation walls	1,318.41	239.78	1,558.19	2,005.82	2,005.82	2,005.82
Unheated floors above frost line	0.00	0.00	0.00	0.00	n/a	n/a
Heated and unheated floors on permafrost	n/a	n/a	n/a	n/a	0.00	0.00
Windows and glass doors	1,445.05	2,039.16	2,039.16	1,161.51	1,053.43	1,053.43

HRV/ERV	200.00	200.00	200.00	200.00	200.00	200.00
Oil-fired furnace	1,510.00	1,510.00	1,510.00	1,510.00	1,510.00	1,510.00
Oil-fired storage-type water heater	371.00	371.00	371.00	371.00	371.00	371.00
Total	4,670	4,910	7,280	6,550	6,210	6,480

*See supplemental document Section 3.4.

Table 9. Incremental Cost to Achieve Tier 3 Compared to Tier 2 in Archetype A3 – Oil-Fired

Building Component	Incremental Cost, \$					
	Climate Zone					
	4	5	6	7A	7B	8
Ceiling below attic	0.00	0.00	1,596.44	0.00	0.00	0.00
Above-grade walls	84.37	84.37	340.71	679.14	390.53	656.85
Foundation walls	0.00	239.72	239.78	527.81	527.81	527.81
Unheated floors above frost line	0.00	0.00	0.00	0.00	n/a	n/a
Heated and unheated floors on permafrost	n/a	n/a	n/a	n/a	0.00	0.00
Windows and sliding glass doors	567.40	0.00	0.00	0.00	0.00	0.00
HRV/ERV	200.00	200.00	0.00	0.00	0.00	0.00
Oil-fired furnace	1,510.00	1,510.00	1,510.00	1,510.00	1,510.00	1,510.00
Oil-fired storage-type water heater	371.00	371.00	371.00	371.00	371.00	371.00
Total	2,730	2,400	4,060	3,090	2,800	3,070

Table 10. Incremental Cost to Achieve Tier 3 Compared to Tier 1 in Archetype A3 – Heat Pump

Building Component	Incremental Cost, \$					
	Climate Zone					
	4	5	6	7A	7B	8
Ceiling below attic	0.00	718.06	1,596.34	878.28	0.00	0.00
Above-grade walls	-171.79*	-171.79*	5.59	422.98	1,069.67	1,335.99
Foundation walls	1,318.41	239.78	1,558.19	2,005.82	2,005.82	2,005.82
Unheated floors above frost line	0.00	0.00	0.00	0.00	n/a	n/a
Heated and unheated floors on permafrost	n/a	n/a	n/a	n/a	0.00	0.00
Windows and sliding glass doors	1,445.05	2,039.16	2,039.16	1,161.51	1,053.43	1,053.43
HRV/ERV	200.00	200.00	200.00	200.00	200.00	200.00
Heat pump	0.00	0.00	0.00	0.00	0.00	0.00
Code minimum storage-type water heater	0.00	0.00	0.00	0.00	0.00	0.00
Total	2,790	3,020	5,400	4,670	4,330	4,600

*See supplemental document Section 3.4.

Table 11. Incremental Cost to Achieve Tier 3 Compared to Tier 2 in Archetype A3 – Heat Pump

Building Component	Incremental Cost, \$					
	Climate Zone					
	4	5	6	7A	7B	8
Ceiling below attic	0.00	0.00	1,596.44	0.00	0.00	0.00
Above-grade walls	84.37	84.37	340.71	679.14	390.53	656.85
Foundation walls	0.00	239.72	239.78	527.81	527.81	527.81
Unheated floors above frost line	0.00	0.00	0.00	0.00	n/a	n/a
Heated and unheated floors on permafrost	n/a	n/a	n/a	n/a	0.00	0.00
Windows and sliding glass doors	567.40	0.00	0.00	0.00	0.00	0.00
HRV/ERV	200.00	200.00	0.00	0.00	0.00	0.00
Heat pump	0.00	0.00	0.00	0.00	0.00	0.00
Code minimum storage-type water heater	0.00	0.00	0.00	0.00	0.00	0.00
Total	2,790	3,020	5,200	4,470	4,130	4,400

Table 12. Incremental Cost to Achieve Tier 3 Compared to Tier 1 in Archetype A3 – Electric Resistance

Building Component	Incremental Cost, \$					
	Climate Zone					
	4	5	6	7A	7B	8
Ceiling below attic	0.00	1,596.34	2,394.51	1,676.45	798.17	798.17
Above-grade walls	1,079.83	1,079.83	1,079.83	1,079.83	2,937.28	2,937.28
Foundation walls	2,867.95	239.72	2,796.43	2,005.82	2,005.82	2,277.52
Unheated floors above frost line	0.00	0.00	0.00	0.00	n/a	n/a
Heated and unheated floors on permafrost	n/a	n/a	n/a	n/a	0.00	0.00
Windows and sliding glass doors	1,445.05	2,039.14	2,039.16	1,161.50	1,053.52	1,053.52
HRV/ERV	200.00	200.00	200.00	200.00	200.00	200.00

Electric resistance furnace	0.00	0.00	0.00	0.00	0.00	0.00
Electric resistance storage-type water heater	0.00	0.00	0.00	0.00	0.00	0.00
Total	5,590	5,150	8,510	6,120	6,990	7,270

Table 13. Incremental Cost to Achieve Tier 3 Compared to Tier 2 in Archetype A3 – Electric Resistance

Building Component	Incremental Cost, \$					
	Climate Zone					
	4	5	6	7A	7B	8
Ceiling below attic	0.00	730.85	2,394.21	798.17	797.77	797.77
Above-grade walls	1,335.99	1,335.99	1,335.99	1,335.99	2,258.14	2,258.14
Foundation walls	239.78	239.72	1,478.01	527.81	527.81	799.51
Unheated floors above frost line	0.00	0.00	0.00	0.00	n/a	n/a
Heated and unheated floors on permafrost	n/a	n/a	n/a	n/a	\$0.00	0.00
Windows and sliding glass doors	567.40	0.00	0.00	0.00	0.00	0.00
HRV/ERV	200.00	200.00	0.00	0.00	0.00	0.00
Electric resistance furnace	0.00	0.00	0.00	0.00	0.00	0.00
Electric resistance storage-type water heater	0.00	0.00	0.00	0.00	0.00	0.00
Total	2,340	2,510	5,210	2,660	3,580	3,850

Archetype A4 — 2-storey, detached

Table 14. Total Area of Building Envelope Components and Total Volume of Conditioned Space of Archetype A4

Area Part of or Surrounded by Building Envelope	Total Area, m ²
Above-grade walls	142.78
Foundation walls	22.69
Ground floor area	57.25
Insulated attic area	70.56
Window area	15.74
Conditioned Space	Total Volume, m³
Conditioned space	427.46

Table 15. Incremental Cost to Achieve Tier 3 Compared to Tier 1 in Archetype A4 – Gas-Fired

Building Component	Incremental Cost, \$					
	Climate Zone					
	4	5	6	7A	7B	8
Ceiling below attic	0.00	560.16	1,245.31	685.15	0.00	0.00
Floors over unheated spaces	0.00	0.00	0.00	0.00	0.00	0.00
Above-grade walls	-352.97*	-352.97*	11.50	869.09	2,197.84	2,745.05
Foundation walls	648.91	118.02	766.93	987.25	987.25	987.25
Unheated floors below frost line	0.00	0.00	0.00	0.00	n/a	n/a
Heated and unheated floors on permafrost	n/a	n/a	n/a	n/a	0.00	0.00
Windows and glass doors	1,152.23	1,625.95	1,625.95	926.15	839.97	839.97
HRV/ERV	200.00	200.00	200.00	200.00	200.00	200.00
Gas-fired furnace	2,300.00	2,300.00	2,300.00	2,300.00	2,300.00	2,300.00
Gas-fired storage-type water heater	2,523.00	2,523.00	2,523.00	2,523.00	2,523.00	2,523.00
Total	6,470	6,970	8,670	8,490	9,050	9,590

*See supplemental document Section 3.4.

Table 16. Incremental Cost to Achieve Tier 3 Compared to Tier 2 in Archetype A4 – Gas-Fired

Building Component	Incremental Cost, \$					
	Climate Zone					
	4	5	6	7A	7B	8
Ceiling below attic	0.00	0.00	1,245.38	0.00	0.00	0.00
Floors over unheated spaces	0.00	0.00	0.00	0.00	0.00	0.00
Above-grade walls	173.36	173.36	537.83	1,395.42	802.42	1,349.62
Foundation walls	0.00	117.99	118.02	259.78	259.78	259.78
Unheated floors below frost line	0.00	0.00	0.00	0.00	n/a	n/a
Heated and unheated floors on permafrost	n/a	n/a	n/a	n/a	0.00	0.00
Windows and glass doors	452.43	0.00	0.00	0.00	0.00	0.00
HRV/ERV	200.00	200.00	0.00	0.00	0.00	0.00

Gas-fired furnace	2,300.00	2,300.00	2,300.00	2,300.00	2,300.00	2,300.00
Gas-fired storage-type water heater	2,523.00	2,523.00	2,523.00	2,523.00	2,523.00	2,523.00
Total	5,650	5,310	6,720	6,480	5,880	6,430

Table 17. Incremental Cost to Achieve Tier 3 Compared to Tier 1 in Archetype A4 – Oil-Fired

Building Component	Incremental Cost, \$					
	Climate Zone					
	4	5	6	7A	7B	8
Ceiling below attic	0.00	560.16	1,245.31	685.15	0.00	0.00
Floors over unheated spaces	0.00	0.00	0.00	0.00	0.00	0.00
Above-grade walls	-352.97*	-352.97*	11.50	869.09	2,197.84	2,745.05
Foundation walls	648.91	118.02	766.93	987.25	987.25	987.25
Unheated floors below frost line	0.00	0.00	0.00	0.00	n/a	n/a
Heated and unheated floors on permafrost	n/a	n/a	n/a	n/a	0.00	0.00
Windows and glass doors	1,152.23	1,625.95	1,625.95	926.15	839.97	839.97
HRV/ERV	200.00	200.00	200.00	200.00	200.00	200.00
Oil-fired furnace	1,510.00	1,510.00	1,510.00	1,510.00	1,510.00	1,510.00
Oil-fired storage-type water heater	371.00	371.00	371.00	371.00	371.00	371.00
Total	3,530	4,030	5,730	5,550	6,110	6,650

*See supplemental document Section 3.4.

Table 18. Incremental Cost to Achieve Tier 3 Compared to Tier 2 in Archetype A4 – Oil-Fired

Building Component	Incremental Cost, \$					
	Climate Zone					
	4	5	6	7A	7B	8
Ceiling below attic	0.00	0.00	1,245.38	0.00	0.00	0.00
Floors over unheated spaces	0.00	0.00	0.00	0.00	0.00	0.00
Above-grade walls	173.36	173.36	537.83	1,395.42	802.42	1,349.62
Foundation walls	0.00	117.99	118.02	259.78	259.78	259.78
Unheated floors below frost line	0.00	0.00	0.00	0.00	n/a	n/a
Heated and unheated floors on permafrost	n/a	n/a	n/a	n/a	0.00	0.00
Windows and glass doors	452.43	0.00	0.00	0.00	0.00	0.00
HRV/ERV	200.00	200.00	0.00	0.00	0.00	0.00
Oil-fired furnace	1,510.00	1,510.00	1,510.00	1,510.00	1,510.00	1,510.00
Oil-fired storage-type water heater	371.00	371.00	371.00	371.00	371.00	371.00
Total	2,710	2,370	3,780	3,540	2,940	3,490

Table 19. Incremental Cost to Achieve Tier 3 Compared to Tier 1 in Archetype A4 – Heat Pump

Building Component	Incremental Cost, \$					
	Climate Zone					
	4	5	6	7A	7B	8
Ceiling below attic	0.00	560.16	1,245.31	685.15	0.00	0.00
Floors over unheated spaces	0.00	0.00	0.00	0.00	0.00	0.00
Above-grade walls	-352.97*	-352.97*	11.50	869.09	2,197.84	2,745.05
Foundation walls	648.91	118.02	766.93	987.25	987.25	987.25
Unheated floors below frost line	0.00	0.00	0.00	0.00	n/a	n/a
Heated and unheated floors on permafrost	n/a	n/a	n/a	n/a	0.00	0.00
Windows and glass doors	1,152.23	1,625.95	1,625.95	926.15	839.97	839.97
HRV/ERV	200.00	200.00	200.00	200.00	200.00	200.00
Heat pump	0.00	0.00	0.00	0.00	0.00	0.00
Code minimum storage-type water heater	0.00	0.00	0.00	0.00	0.00	0.00
Total	1,650	2,150	3,850	3,670	4,220	4,770

*See supplemental document Section 3.4.

Table 20. Incremental Cost to Achieve Tier 3 Compared to Tier 2 in Archetype A4 – Heat Pump

Building Component	Incremental Cost, \$					
	Climate Zone					
	4	5	6	7A	7B	8
Ceiling below attic	0.00	0.00	1,245.38	0.00	0.00	0.00
Floors over unheated spaces	0.00	0.00	0.00	0.00	0.00	0.00
Above-grade walls	173.36	173.36	537.83	1,395.42	802.42	1,349.62
Foundation walls	0.00	117.99	118.02	259.78	259.78	259.78
Unheated floors below frost line	0.00	0.00	0.00	0.00	n/a	n/a
Heated and unheated floors on permafrost	n/a	n/a	n/a	n/a	0.00	0.00
Windows and glass doors	452.43	0.00	0.00	0.00	0.00	0.00
HRV/ERV	200.00	200.00	0.00	0.00	0.00	0.00
Heat pump	0.00	0.00	0.00	0.00	0.00	0.00
Code minimum storage-type water heater	0.00	0.00	0.00	0.00	0.00	0.00
Total	830	490	1,900	1,650	1,060	1,610

Table 21. Incremental Cost to Achieve Tier 3 Compared to Tier 1 in Archetype A4 – Electric Resistance

Building Component	Incremental Cost, \$					
	Climate Zone					
	4	5	6	7A	7B	8
Ceiling below attic	0.00	1,245.31	1,867.96	1,307.80	622.65	622.65
Floors over unheated spaces	0.00	0.00	0.00	0.00	0.00	0.00
Above-grade walls	2,218.71	2,218.71	2,218.71	2,218.71	6,035.18	6,035.18
Foundation walls	766.93	117.99	1,376.37	987.25	987.25	1,120.98
Unheated floors below frost line	0.00	0.00	0.00	0.00	n/a	n/a
Heated and unheated floors on permafrost	n/a	n/a	n/a	n/a	0.00	0.00
Windows and glass doors	1,152.23	1,625.94	1,625.95	926.14	840.04	840.04
HRV/ERV	200.00	200.00	200.00	200.00	200.00	200.00
Electric resistance furnace	0.00	0.00	0.00	0.00	0.00	0.00
Electric resistance storage-type water heater	0.00	0.00	0.00	0.00	0.00	0.00
Total	4,340	5,410	7,290	5,640	8,690	8,820

Table 22. Incremental Cost to Achieve Tier 3 Compared to Tier 2 in Archetype A4 – Electric Resistance

Building Component	Incremental Cost, \$					
	Climate Zone					
	4	5	6	7A	7B	8
Ceiling below attic	0.00	570.14	1,867.72	622.65	622.34	622.34
Floors over unheated spaces	0.00	0.00	0.00	0.00	0.00	0.00
Above-grade walls	2,745.05	2,745.05	2,745.05	2,745.05	4,639.76	4,639.76
Foundation walls	118.02	117.99	727.47	259.78	259.78	393.51
Unheated floors below frost line	0.00	0.00	0.00	0.00	n/a	n/a
Heated and unheated floors on permafrost	n/a	n/a	n/a	n/a	0.00	0.00
Windows and glass doors	452.43	0.00	0.00	0.00	0.00	0.00
HRV/ERV	200.00	200.00	0.00	0.00	0.00	0.00
Electric resistance furnace	0.00	0.00	0.00	0.00	0.00	0.00
Electric resistance storage-type water heater	0.00	0.00	0.00	0.00	0.00	0.00
Total	3,510	3,630	5,340	3,630	5,520	5,660

Archetype A5 – Row house, 2-storey

Table 23. Total Area of Building Envelope Components and Total Volume of Conditioned Space of Archetype A5 (Mid-Unit)

Area Part of or Surrounded by Building Envelope	Total Area, m ²
Above-grade walls	38.44
Foundation walls	7.14
Ground floor area	54.50
Insulated attic area	74.05
Window area	12.12
Conditioned Space	Total Volume, m³
Conditioned space	425.35

Table 24. Incremental Cost to Achieve Tier 3 Compared to Tier 1 in Archetype A5 (Mid-Unit) – Gas-Fired

Building Component	Incremental Cost, \$					
	Climate Zone					
	4	5	6	7A	7B	8
Ceiling below attic	0.00	587.87	1,306.90	719.03	0.00	0.00
Floors over unheated spaces	0.00	0.00	0.00	0.00	0.00	0.00
Above-grade walls	-95.03*	-95.03*	3.09	233.98	591.71	739.04
Foundation walls	204.20	37.14	241.33	310.66	310.66	310.66
Unheated floors below frost line	0.00	0.00	0.00	0.00	n/a	n/a
Heated and unheated floors on permafrost	n/a	n/a	n/a	n/a	0.00	0.00
Windows and sliding glass doors	887.24	1,252.00	1,252.00	713.14	646.79	646.79
HRV/ERV	200.00	200.00	200.00	200.00	200.00	200.00
Gas-fired furnace	2,300.00	2,300.00	2,300.00	2,300.00	2,300.00	2,300.00
Gas-fired storage-type water heater	2,523.00	2,523.00	2,523.00	2,523.00	2,523.00	2,523.00
Total	6,020	6,810	7,830	7,000	6,570	6,730

*See supplemental document Section 3.4.

Table 25. Incremental Cost to Achieve Tier 3 Compared to Tier 2 in Archetype A5 (Mid-Unit) – Gas-Fired

Building Component	Incremental Cost, \$					
	Climate Zone					
	4	5	6	7A	7B	8
Ceiling below attic	0.00	0.00	1,306.98	0.00	0.00	0.00
Floors over unheated spaces	0.00	0.00	0.00	0.00	0.00	0.00
Above-grade walls	46.67	46.67	144.80	375.68	216.03	363.35
Foundation walls	0.00	37.13	37.14	81.75	81.75	81.75
Unheated floors below frost line	0.00	0.00	0.00	0.00	n/a	n/a
Heated and unheated floors on permafrost	n/a	n/a	n/a	n/a	0.00	0.00
Windows and sliding glass doors	348.38	0.00	0.00	0.00	0.00	0.00
HRV/ERV	200.00	200.00	0.00	0.00	0.00	0.00
Gas-fired furnace	2,300.00	2,300.00	2,300.00	2,300.00	2,300.00	2,300.00
Gas-fired storage-type water heater	2,523.00	2,523.00	2,523.00	2,523.00	2,523.00	2,523.00
Total	5,420	5,110	6,310	5,280	5,120	5,270

Table 26. Incremental Cost to Achieve Tier 3 Compared to Tier 1 in Archetype A5 (Mid-Unit) – Oil-Fired

Building Component	Incremental Cost, \$					
	Climate Zone					
	4	5	6	7A	7B	8
Ceiling below attic	0.00	587.87	1,306.90	719.03	0.00	0.00
Floors over unheated spaces	0.00	0.00	0.00	0.00	0.00	0.00
Above-grade walls	-95.03*	-95.03*	3.09	233.98	591.71	739.04
Foundation walls	204.20	37.14	241.33	310.66	310.66	310.66
Unheated floors below frost line	0.00	0.00	0.00	0.00	n/a	n/a
Heated and unheated floors on permafrost	n/a	n/a	n/a	n/a	0.00	0.00
Windows and sliding glass doors	887.24	1,252.00	1,252.00	713.14	646.79	646.79
HRV/ERV	200.00	200.00	200.00	200.00	200.00	200.00
Oil-fired furnace	1,510.00	1,510.00	1,510.00	1,510.00	1,510.00	1,510.00
Oil-fired storage-type water heater	371.00	371.00	371.00	371.00	371.00	371.00
Total	3,080	3,870	4,890	4,060	3,630	3,780

*See supplemental document Section 3.4.

Table 27. Incremental Cost to Achieve Tier 3 Compared to Tier 2 in Archetype A5 (Mid-Unit) – Oil-Fired

Building Component	Incremental Cost, \$					
	Climate Zone					
	4	5	6	7A	7B	8
Ceiling below attic	0.00	0.00	1,306.98	0.00	0.00	0.00
Floors over unheated spaces	0.00	0.00	0.00	0.00	0.00	0.00
Above-grade walls	46.67	46.67	144.80	375.68	216.03	363.35
Foundation walls	0.00	37.13	37.14	81.75	81.75	81.75
Unheated floors below frost line	0.00	0.00	0.00	0.00	n/a	n/a
Heated and unheated floors on permafrost	n/a	n/a	n/a	n/a	0.00	0.00
Windows and sliding glass doors	348.38	0.00	0.00	0.00	0.00	0.00
HRV/ERV	200.00	200.00	0.00	0.00	0.00	0.00
Oil-fired furnace	1,510.00	1,510.00	1,510.00	1,510.00	1,510.00	1,510.00
Oil-fired storage-type water heater	371.00	371.00	371.00	371.00	371.00	371.00
Total	2,480	2,160	3,370	2,340	2,180	2,330

Table 28. Incremental Cost to Achieve Tier 3 Compared to Tier 1 in Archetype A5 (Mid-Unit) – Heat Pump

Building Component	Incremental Cost, \$					
	Climate Zone					
	4	5	6	7A	7B	8
Ceiling below attic	0.00	587.87	1,306.90	719.03	0.00	0.00
Floors over unheated spaces	0.00	0.00	0.00	0.00	0.00	0.00
Above-grade walls	-95.03*	-95.03*	3.09	233.98	591.71	739.04
Foundation walls	204.20	37.14	241.33	310.66	310.66	310.66

Unheated floors below frost line	0.00	0.00	0.00	0.00	n/a	n/a
Heated and unheated floors on permafrost	n/a	n/a	n/a	n/a	0.00	0.00
Windows and sliding glass doors	887.24	1,252.00	1,252.00	713.14	646.79	646.79
HRV/ERV	200.00	200.00	200.00	200.00	200.00	200.00
Heat pump	0.00	0.00	0.00	0.00	0.00	0.00
Code minimum storage-type water heater	0.00	0.00	0.00	0.00	0.00	0.00
Total	1,200	1,990	3,010	2,180	1,750	1,900

*See supplemental document Section 3.4.

Table 29. Incremental Cost to Achieve Tier 3 Compared to Tier 2 in Archetype A5 (Mid-Unit) – Heat Pump

Building Component	Incremental Cost, \$					
	Climate Zone					
	4	5	6	7A	7B	8
Ceiling below attic	0.00	0.00	1,306.98	0.00	0.00	0.00
Floors over unheated spaces	0.00	0.00	0.00	0.00	0.00	0.00
Above-grade walls	46.67	46.67	144.80	375.68	216.03	363.35
Foundation walls	0.00	37.13	37.14	81.75	81.75	81.75
Unheated floors below frost line	0.00	0.00	0.00	0.00	n/a	n/a
Heated and unheated floors on permafrost	n/a	n/a	n/a	n/a	0.00	0.00
Windows and sliding glass doors	348.38	0.00	0.00	0.00	0.00	0.00
HRV/ERV	200.00	200.00	0.00	0.00	0.00	0.00
Heat pump	0.00	0.00	0.00	0.00	0.00	0.00
Code minimum storage-type water heater	0.00	0.00	0.00	0.00	0.00	0.00
Total	590	280	1,490	460	300	440

Table 30. Incremental Cost to Achieve Tier 3 Compared to Tier 1 in Archetype A5 (Mid-Unit) – Electric Resistance

Building Component	Incremental Cost, \$					
	Climate Zone					
	4	5	6	7A	7B	8
Ceiling below attic	0.00	1,306.90	1,960.35	1,372.48	653.45	653.45
Floors over unheated spaces	0.00	0.00	0.00	0.00	0.00	0.00
Above-grade walls	597.33	597.33	597.33	597.33	1,624.82	1,624.82
Foundation walls	241.33	37.13	433.11	310.66	310.66	352.74
Unheated floors below frost line	0.00	0.00	0.00	0.00	n/a	n/a
Heated and unheated floors on permafrost	n/a	n/a	n/a	n/a	0.00	0.00
Windows and sliding glass doors	887.24	1,252.00	1,252.00	713.14	646.84	646.84
HRV/ERV	200.00	200.00	200.00	200.00	200.00	200.00
Electric resistance furnace	0.00	0.00	0.00	0.00	0.00	0.00
Electric resistance storage-type water heater	0.00	0.00	0.00	0.00	0.00	0.00
Total	1,920	3,390	4,440	3,190	3,430	3,470

Table 31. Incremental Cost to Achieve Tier 3 Compared to Tier 2 in Archetype A5 (Mid-Unit) – Electric Resistance

Building Component	Incremental Cost, \$					
	Climate Zone					
	4	5	6	7A	7B	8
Ceiling below attic	0.00	598.34	1,960.10	653.45	653.12	653.12
Floors over unheated spaces	0.00	0.00	0.00	0.00	0.00	0.00
Above-grade walls	739.04	739.04	739.04	739.04	1,249.14	1,249.14
Foundation walls	37.14	37.13	228.92	81.75	81.75	123.83
Unheated floors below frost line	0.00	0.00	0.00	0.00	n/a	n/a
Heated and unheated floors on permafrost	n/a	n/a	n/a	n/a	0.00	0.00
Windows and sliding glass doors	348.38	0.00	0.00	0.00	0.00	0.00

HRV/ERV	200.00	200.00	0.00	0.00	0.00	0.00
Electric resistance furnace	0.00	0.00	0.00	0.00	0.00	0.00
Electric resistance storage-type water heater	0.00	0.00	0.00	0.00	0.00	0.00
Total	1,320	1,570	2,930	1,470	1,980	2,030

Table 32. Total Area of Building Envelope Components and Total Volume of Conditioned Space of Archetype A5 (End-Unit)

Area Part of or Surrounded by Building Envelope	Total Area, m ²
Above-grade walls	90.34
Foundation walls	16.14
Ground floor area	54.50
Insulated attic area	74.05
Window area	13.59
Conditioned Space	Total Volume, m³
Conditioned space	425.35

Table 33. Incremental Cost to Achieve Tier 3 Compared to Tier 1 in Archetype A5 (End-Unit) – Gas-Fired

Building Component	Incremental Cost, \$					
	Climate Zone					
	4	5	6	7A	7B	8
Ceiling below attic	0.00	587.96	1,306.98	719.03	0.00	0.00
Floors over unheated spaces	0.00	0.00	0.00	0.00	0.00	0.00
Above-grade walls	-223.14*	-223.14*	7.23	550.17	1,390.33	1,737.24
Foundation walls	461.60	83.93	545.53	702.25	702.25	702.25
Unheated floors below frost line	0.00	0.00	0.00	0.00	n/a	n/a
Heated and unheated floors on permafrost	n/a	n/a	n/a	n/a	0.00	0.00
Windows and sliding glass doors	994.79	1,403.85	1,403.85	799.64	725.30	725.30
HRV/ERV	200.00	200.00	200.00	200.00	200.00	200.00
Gas-fired furnace	2,300.00	2,300.00	2,300.00	2,300.00	2,300.00	2,300.00
Gas-fired storage-type water heater	2,523.00	2,523.00	2,523.00	2,523.00	2,523.00	2,523.00
Total	6,260	6,880	8,290	7,790	7,840	8,190

*See supplemental document Section 3.4.

Table 34. Incremental Cost to Achieve Tier 3 Compared to Tier 2 in Archetype A5 (End-Unit) – Gas-Fired

Building Component	Incremental Cost, \$					
	Climate Zone					
	4	5	6	7A	7B	8
Ceiling below attic	0.00	0.00	1,306.98	0.00	0.00	0.00
Floors over unheated spaces	0.00	0.00	0.00	0.00	0.00	0.00
Above-grade walls	109.31	109.31	340.58	882.62	507.71	853.71
Foundation walls	0.00	83.93	85.54	184.80	184.80	184.80
Unheated floors below frost line	0.00	0.00	0.00	0.00	n/a	n/a
Heated and unheated floors on permafrost	n/a	n/a	n/a	n/a	0.00	0.00
Windows and sliding glass doors	390.58	0.00	0.00	0.00	0.00	0.00
HRV/ERV	200.00	200.00	0.00	0.00	0.00	0.00
Gas-fired furnace	2,300.00	2,300.00	2,300.00	2,300.00	2,300.00	2,300.00
Gas-fired storage-type water heater	2,523.00	2,523.00	2,523.00	2,523.00	2,523.00	2,523.00
Total	5,520	5,220	6,560	5,890	5,510	5,860

Table 35. Incremental Cost to Achieve Tier 3 Compared to Tier 1 in Archetype A5 (End-Unit) – Oil-Fired

Building Component	Incremental Cost, \$					
	Climate Zone					
	4	5	6	7A	7B	8
Ceiling below attic	0.00	587.96	1,306.98	719.03	0.00	0.00
Floors over unheated spaces	0.00	0.00	0.00	0.00	0.00	0.00
Above-grade walls	-223.14*	-223.14*	7.23	550.17	1,390.33	1,737.24
Foundation walls	461.60	83.93	545.53	702.25	702.25	702.25
Unheated floors below frost line	0.00	0.00	0.00	0.00	n/a	n/a
Heated and unheated floors on permafrost	n/a	n/a	n/a	n/a	0.00	0.00
Windows and sliding glass doors	994.79	1,403.85	1,403.85	799.64	725.30	725.30
HRV/ERV	200.00	200.00	200.00	200.00	200.00	200.00
Oil-fired furnace	1,510.00	1,510.00	1,510.00	1,510.00	1,510.00	1,510.00
Oil-fired storage-type water heater	371.00	371.00	371.00	371.00	371.00	371.00
Total	3,310	3,930	5,340	4,850	4,900	5,250

*See supplemental document Section 3.4.

Table 36. Incremental Cost to Achieve Tier 3 Compared to Tier 2 in Archetype A5 (End-Unit) – Oil-Fired

Building Component	Incremental Cost, \$					
	Climate Zone					
	4	5	6	7A	7B	8
Ceiling below attic	0.00	0.00	1,306.98	0.00	0.00	0.00
Floors over unheated spaces	0.00	0.00	0.00	0.00	0.00	0.00
Above-grade walls	109.31	109.31	340.58	882.62	507.71	853.71
Foundation walls	0.00	83.93	85.54	184.80	184.80	184.80
Unheated floors below frost line	0.00	0.00	0.00	0.00	n/a	n/a
Heated and unheated floors on permafrost	n/a	n/a	n/a	n/a	0.00	0.00
Windows and sliding glass doors	390.58	0.00	0.00	0.00	0.00	0.00
HRV/ERV	200.00	200.00	0.00	0.00	0.00	0.00
Oil-fired furnace	1,510.00	1,510.00	1,510.00	1,510.00	1,510.00	1,510.00
Oil-fired storage-type water heater	371.00	371.00	371.00	371.00	371.00	371.00
Total	2,580	2,270	3,610	2,950	2,570	2,920

Table 37. Incremental Cost to Achieve Tier 3 Compared to Tier 1 in Archetype A5 (End-Unit) – Heat Pump

Building Component	Incremental Cost, \$					
	Climate Zone					
	4	5	6	7A	7B	8
Ceiling below attic	0.00	587.96	1,306.98	719.03	0.00	0.00
Floors over unheated spaces	0.00	0.00	0.00	0.00	0.00	0.00
Above-grade walls	-223.14*	-223.14*	7.23	550.17	1,390.33	1,737.24
Foundation walls	461.60	83.93	545.53	702.25	702.25	702.25
Unheated floors below frost line	0.00	0.00	0.00	0.00	n/a	n/a
Heated and unheated floors on permafrost	n/a	n/a	n/a	n/a	0.00	0.00
Windows and sliding glass doors	994.79	1,403.85	1,403.85	799.64	725.30	725.30
HRV/ERV	200.00	200.00	200.00	200.00	200.00	200.00
Heat pump	0.00	0.00	0.00	0.00	0.00	0.00
Code minimum storage-type water heater	0.00	0.00	0.00	0.00	0.00	0.00
Total	1,430	2,050	3,460	2,970	3,020	3,360

*See supplemental document Section 3.4.

Table 38. Incremental Cost to Achieve Tier 3 Compared to Tier 2 in Archetype A5 (End-Unit) – Heat Pump

Building Component	Incremental Cost, \$					
	Climate Zone					
	4	5	6	7A	7B	8
Ceiling below attic	0.00	0.00	1,306.98	0.00	0.00	0.00
Floors over unheated spaces	0.00	0.00	0.00	0.00	0.00	0.00
Above-grade walls	109.31	109.31	340.58	882.62	507.71	853.71
Foundation walls	0.00	83.93	85.54	184.80	184.80	184.80
Unheated floors below frost line	0.00	0.00	0.00	0.00	n/a	n/a
Heated and unheated floors on permafrost	n/a	n/a	n/a	n/a	0.00	0.00
Windows and sliding glass doors	390.58	0.00	0.00	0.00	0.00	0.00
HRV/ERV	200.00	200.00	0.00	0.00	0.00	0.00

Heat pump	0.00	0.00	0.00	0.00	0.00	0.00
Code minimum storage-type water heater	0.00	0.00	0.00	0.00	0.00	0.00
Total	700	390	1,730	1,070	690	1,040

Table 39. Incremental Cost to Achieve Tier 3 Compared to Tier 1 in Archetype A5 (End-Unit) – Electric Resistance

Building Component	Incremental Cost, \$					
	Climate Zone					
	4	5	6	7A	7B	8
Ceiling below attic	0.00	1,306.98	1,960.10	1,372.15	653.12	653.12
Floors over unheated spaces	0.00	0.00	0.00	0.00	0.00	\$0.00
Above-grade walls	1,403.88	1,403.88	1,403.88	1,403.88	3,818.67	3,818.67
Foundation walls	545.53	83.93	979.05	702.25	702.25	797.32
Unheated floors below frost line	0.00	0.00	0.00	0.00	n/a	n/a
Heated and unheated floors on permafrost	n/a	n/a	n/a	n/a	0.00	0.00
Windows and sliding glass doors	994.79	1,403.85	1,403.85	799.64	725.30	725.30
HRV/ERV	200.00	200.00	200.00	200.00	200.00	200.00
Electric resistance furnace	0.00	0.00	0.00	0.00	0.00	0.00
Electric resistance storage-type water heater	0.00	0.00	0.00	0.00	0.00	0.00
Total	3,140	4,400	5,950	4,480	6,100	6,190

Table 40. Incremental Cost to Achieve Tier 3 Compared to Tier 2 in Archetype A5 (End-Unit) – Electric Resistance

Building Component	Incremental Cost, \$					
	Climate Zone					
	4	5	6	7A	7B	8
Ceiling below attic	0.00	598.32	1,960.10	653.12	653.12	653.12
Floors over unheated spaces	0.00	0.00	0.00	0.00	0.00	0.00
Above-grade walls	1,737.24	1,737.24	1,737.24	1,737.24	2,936.05	2,936.05
Foundation walls	83.93	83.93	517.45	184.80	184.80	279.87
Unheated floors below frost line	0.00	0.00	0.00	0.00	n/a	n/a
Heated and unheated floors on permafrost	n/a	n/a	n/a	n/a	0.00	0.00
Windows and sliding glass doors	390.58	0.00	0.00	0.00	0.00	0.00
HRV/ERV	200.00	200.00	0.00	0.00	0.00	0.00
Electric resistance furnace	0.00	0.00	0.00	0.00	0.00	0.00
Electric resistance storage-type water heater	0.00	0.00	0.00	0.00	0.00	0.00
Total	2,410	2,620	4,210	2,570	3,770	3,870

Archetype A6 — Row house, stacked 3-storey

Table 41. Total Area of Building Envelope Components and Total Volume of Conditioned Space of Archetype A6 (Lower Mid-Unit)

Area Part of or Surrounded by Building Envelope	Total Area, m ²
Above-grade walls	21.38
Foundation walls	11.28
Ground floor area	58.07
Window area	10.12
Conditioned Space	Total Volume, m³
Conditioned space	279.54

Tier 1 and Tier 2 are identical for archetype A6 as its conditioned volume is $\leq 300\text{m}^3$.

Table 42. Incremental Cost to Achieve Tier 3 Compared to Tier 1 in Archetype A6 (Lower Mid-Unit)

Building Component	Incremental Cost, \$					
	Climate Zone					
	4	5	6	7A	7B	8
Above-grade walls	-78.81*	-78.81*	-52.85*	-52.85*	208.95	208.95
Foundation walls	0.00	0.00	322.60	58.67	58.67	361.65
Unheated floors above frost line	0.00	0.00	0.00	0.00	n/a	n/a
Heated and unheated floors on permafrost	n/a	n/a	n/a	n/a	0.00	0.00
Windows and sliding glass doors	740.83	1,045.40	1,045.40	595.46	540.10	540.10
HRV/ERV	200.00	200.00	200.00	200.00	200.00	200.00
HVAC	0.00	0.00	0.00	0.00	0.00	0.00
Service water heating equipment	0.00	0.00	0.00	0.00	0.00	0.00
Total	860	1,170	1,510	800	1,010	1,310

*See supplemental document Section 3.4.

Table 43. Total Area of Building Envelope Components and Total Volume of Conditioned Space of Archetype A6 (Upper Mid-Unit)

Area Part of or Surrounded by Building Envelope	Total Area, m ²
Above-grade walls	44.13
Ground floor area	58.07
Insulated attic area	59.85
Window area	10.80
Conditioned Space	Total Volume, m³
Conditioned space	284.13

Tier 1 and Tier 2 are identical for archetype A6 as its conditioned volume is ≤ 300m³.

Table 44. Incremental Cost to Achieve Tier 3 Compared to Tier 1 in Archetype A6 (Upper Mid-Unit)

Building Component	Incremental Cost, \$					
	Climate Zone					
	4	5	6	7A	7B	8
Ceiling below attic	0.00	475.21	475.14	581.14	0.00	0.00
Above-grade walls	-162.68*	-162.68*	-109.10*	-109.10*	431.29	431.29
Windows and sliding glass doors	790.61	1,115.65	1,115.64	635.47	576.40	576.40
HRV/ERV	200.00	200.00	200.00	200.00	200.00	200.00
HVAC	0.00	0.00	0.00	0.00	0.00	0.00
Service water heating equipment	0.00	0.00	0.00	0.00	0.00	0.00
Total	830	1,630	1,680	1,310	1,210	1,210

*See supplemental document Section 3.4.

Table 45. Total Area of Building Envelope Components and Total Volume of Conditioned Space of Archetype A6 (Lower End-Unit)

Area Part of or Surrounded by Building Envelope	Total Area, m ²
Above-grade walls	50.32
Foundation walls	29.43
Ground floor area	58.07
Window area	11.91
Conditioned Space	Total Volume, m³
Conditioned space	279.54

Tier 1 and Tier 2 are identical for archetype A6 as its conditioned volume is ≤ 300m³.

Table 46. Incremental Cost to Achieve Tier 3 Compared to Tier 1 in Archetype A6 (Lower End-Unit)

Building Component	Incremental Cost, \$					
	Climate Zone					
	4	5	6	7A	7B	8
Above-grade walls	-185.50*	-185.50*	-124.40*	-124.40*	491.79	491.79
Foundation walls	0.00	0.00	841.67	153.07	153.07	943.56
Unheated floors above frost line	0.00	0.00	0.00	0.00	n/a	n/a
Heated and unheated floors on permafrost	n/a	n/a	n/a	n/a	0.00	0.00
Windows and sliding glass doors	871.86	1,230.31	1,230.30	700.78	635.64	635.64
HRV/ERV	200.00	200.00	200.00	200.00	200.00	\$200.00
HVAC	0.00	0.00	0.00	0.00	0.00	0.00
Service water heating equipment	0.00	0.00	0.00	0.00	0.00	0.00
Total	890	1,240	2,150	930	1,480	2,270

*See supplemental document Section 3.4.

Table 47. Total Area of Building Envelope Components and Total Volume of Conditioned Space of Archetype A6 (Upper End-Unit)

Area Part of or Surrounded by Building Envelope	Total Area, m ²
Above-grade walls	110.07
Ground floor area	58.07
Insulated attic area	59.85
Window area	12.59
Conditioned Space	Total Volume, m³
Conditioned space	284.13

Tier 1 and Tier 2 are identical for archetype A6 as its conditioned volume is ≤ 300m³.

Table 48. Incremental Cost to Achieve Tier 3 Compared to Tier 1 in Archetype A6 (Upper End-Unit)

Building Component	Incremental Cost, \$					
	Climate Zone					
	4	5	6	7A	7B	8
Ceiling below attic	0.00	475.21	475.14	581.14	0.00	0.00

Above-grade walls	–405.75*	–405.75*	–272.11*	–272.11*	1,075.74	1,075.74
Windows and sliding glass doors	921.64	1,300.56	360.06	740.80	671.93	671.93
HRV/ERV	200.00	200.00	200.00	200.00	200.00	200.00
HVAC	0.00	0.00	0.00	0.00	0.00	0.00
Service water heating equipment	0.00	0.00	0.00	0.00	0.00	0.00
Total	720	1,570	760	1,250	1,950	1,950

*See supplemental document Section 3.4.

Incremental Costing by Archetype by Region

Table 49. Climate Zones by Region

Degree-Days Below 18°C	BC	Alberta	Saskatchewan and Manitoba	Ontario	Quebec	Atlantic Canada	Northern Canada
Zone 4: HDD < 3000	Yes	No	No	No	No	No	No
Zone 5: HDD 3000 to 3999	Yes	No	No	Yes	No	Yes	No
Zone 6: HDD 4000 to 4999	Yes	Yes	Yes	Yes	Yes	Yes	No
Zone 7A: HDD 5000 to 5999	Yes	Yes	Yes	Yes	Yes	Yes	No
Zone 7B: HDD 6000 to 6999	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Zone 8: HDD ≥ 7000	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 50. Incremental Cost to Achieve Tier 3 Compared to Tier 2 for Each Archetype by Region

Archetype	Incremental Cost, \$						
	BC (Climate Zone 4–8)	AB (Climate Zone 6–8)	SK and MB (Climate Zone 6–8)	ON (Climate Zone 5–8)	QC (Climate Zone 6–8)	Atlantic Canada (Climate Zone 5–8)	Northern Canada (Climate Zone 7B–8)
A1	300–460	300–460	300–460	300–460	300–460	300–460	460
A2	520–2010	1440–2010	1440–2010	1440–2010	1440–2010	1440–2010	2010
A3	850–7000	920–7000	920–7000	525–7000	920–7000	525–7000	920–6010
A4	830–6720	1060–6720	1060–6720	490–6720	1060–6720	490–6720	1060–6430
A5 (Mid-Unit)	280–6310	460–6310	460–6310	280–6310	460–6310	280–6310	300–5270
A5 (End-Unit)	390–5860	1070–5860	1070–5860	390–5860	1070–5860	390–5860	690–5860
A6 (Lower Mid-Unit)	800–1510	800–1510	800–1510	800–1510	800–1510	800–1510	1010–1310
A6 (Upper Mid-Unit)	830–1680	1210–1680	1210–1680	1210–1680	1210–1680	1210–1680	1210
A6 (Lower End-Unit)	890–2270	930–2270	930–2270	930–2270	930–2270	930–2270	1480–2270
A6 (Upper End-Unit)	720–1950	760–1950	760–1950	760–1950	760–1950	760–1950	1950

Enforcement implications

This proposed change can be enforced by the infrastructure currently available to enforce the Code.

This proposed change facilitates effective enforcement of high-performance energy solutions in jurisdictions where complying with the performance path is problematic.

Who is affected

Regulators, builders, designers, engineers, architects, contractors and consultants in provinces and territories where Energy Performance Tier 3 for housing and small buildings is adopted.

Supporting Document(s)

[Incremental Cost Analysis \(pcf_2044_supporting_document.pdf\)](#)

OBJECTIVE-BASED ANALYSIS OF NEW OR CHANGED PROVISIONS

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