ARCHITECTURAL INSTITUTE OF BRITISH COLUMBIA

Practice Guideline: BC Energy Step Code – Application

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IMPORTANT:

The AIBC transitioned to the Professional Governance Act effective February 10, 2023. **This document has not yet been updated to reflect the new legislation and updated Bylaws**. Although there may be outdated terms and references in this document, note that the **general concepts and requirements remain the same**. If you have any concerns or questions, please contact practiceadvice@aibc.ca. For more information about the transition, go to aibc.ca/PGA.

1.0 INTRODUCTION

1.1 The BC Energy Step Code

The BC Energy Step Code (ESC) is a performance-based approach to meeting code-mandated energy targets. The performance approach establishes a desired outcome and leaves it to the design team to decide how to achieve it. Compliance with the ESC requires the utilization of energy modelling and air tightness testing of the building enclosure to demonstrate that the design and the constructed building meet the requirements of the code. This Guideline discusses some ESC considerations for architects. Although the ESC applies to both Part 3/Part 10 and Part 9 buildings, the primary focus of this guideline is Part 3/Part 10 buildings.

1.2 For this Practice Guideline, the BC Building Code convention of italicizing BC Building Code defined terms will be used.

1.3 Part 10 of the BC Building Code, Energy Efficiency

Energy utilization provisions in the BC Building Code are found in Division B, Part 10, Energy Efficiency. The attributes of Part 10 include:

- To minimize thermal loss or gain and to minimize the use of energy for building systems
- To limit the amount of uncontrolled air leakage and thermal transfer
- To limit the unnecessary demand and/or consumption of energy for lighting and electrical equipment and devices
- To limit the unnecessary demand and/or consumption of energy for heating and cooling, and service water heating.
- To limit the inefficiency of equipment and systems

- To limit the unnecessary rejection of reusable waste energy

Architects are primarily responsible for control of air leakage and thermal transfer through the design of the building enclosure, while engineers are primarily responsible for the use of energy by electrical and mechanical systems. Coordination of energy efficiency design between all disciplines is the responsibility of the architect. Expertise in the design of higher performing buildings may be developed in-house by architectural firms or may be obtained from consulting architects or engineers.

1.4 Compliance Pathways

Within Part 10, there are three pathways for compliance:

- ANSI/ASHRAE/IES 90.1, Energy Standard for Buildings Except Low-Rise Residential Buildings (ASHRAE 90.1)
- National Energy Code for Buildings (NECB)
- Division B, Subsection 10.2.3., known as the BC Energy Step Code (energystepcode.ca)

The ESC is optional for adoption by local governments, but if adopted, mandatory for designers. If the local government has implemented the ESC, then the ESC provisions of Subsection 10.2.3. must be used, as they become the required compliance pathway. If local government implementation applies to one or more *major occupancies* in a *building*, the building is an ESC building, even if it has not been implemented for every *major occupancy* (see 3.3. below).

Where the ESC has not been adopted by local government, it remains an optional pathway for designers. Architects are encouraged to consider the ESC pathway on any building, even if it is not required, as its objective is to create higher performing buildings, which benefits both owners, the community, and the environment.

2.0 ARCHITECT RESPONSIBILITIES FOR COORDINATION

2.1 Consultant Coordination

Coordination is a mandatory service for architects, whether the architect is performing the code-mandated *Coordinating Registered Professional* role or not. Minimum required services for architects can be found in **Bulletin 90: Minimum Scope of Architectural Services** (aibc.ca/?file=11785).

2.2 Building Envelope Coordination

Bulletin 68: Building Envelope (aibc.ca/?file=11781) discusses fundamental responsibilities of architects for the design of the building envelope. An architect is responsible for building envelope design requirements under Part 3, Part 5, and Part 10 of the code. The Part 10 ESC requirements must be coordinated with the design requirements in these other Parts of the code.

2.3 Information Required on Drawings

Division C, Subsection 2.2.2. Information Required for Proposed Work has minimum requirements for information on drawings. It requires sufficient information be provided to show that the proposed work will conform to the code, and the nature and extent of the work. Note this requires code-compliance information be included that may be beyond that which would be required to simply construct a building.

This Subsection specifically requires the *major occupancy* classification be shown. This requirement applies to both Division B, Part 3, Use and Occupancy, as well as Division B, Part 10, Energy Efficiency. **It may be necessary to document the *major occupancies* for each Part of the code separately**.

Subsection 2.2.2. also requires drawings to show the energy compliance path, and if the ESC applies, the Step to which it conforms.

Coordination responsibilities for architects includes confirming that documents provided by engineers they are coordinating meet the minimum requirements of Subsection 2.2.2.

Architects must consider the data required by the energy modeler at each stage of modelling. Accurate and code-compliant models rely upon information provided by the architect. In addition to *major occupancy* in relation to the ESC, the energy modeler requires clear delineation of heated, semi-heated and unheated spaces; matrices of U-values for building enclosure components, plus solar heat gain coefficient (SHGC) and visible light transmission (VLT) for fenestration; identification of thermal bridges; identification of passive strategies such as shading devices.

2.4 Energy Modelling Professional Practice

The ESC requires energy modelling as a compliance tool, however architects who utilize energy modelling to quantify the impact of design decisions throughout all phases of service may achieve higher performance levels, better building design, and lower costs. Energy modelling supports meeting ambitious energy performance targets, whether set by the architect, the client, or the ESC. Architects are encouraged to discuss energy efficiency objectives with their clients, including consideration of voluntarily exceeding code-mandated minimum performance levels for air leakage, thermal transfer, mechanical and electrical systems, as well as greenhouse gas intensity limits.

Responsibilities for architects providing energy modelling services or coordinating energy compliance when energy modelling is utilized are discussed in the AIBC and EGBC **Joint Professional Practice Guidelines Whole Building Energy Modelling Services** (aibc.ca/?file=28931).

3.0 APPLICATION

3.1 To correctly apply the ESC, it is important to understand how the Code defines the use of space through the defined terms *'occupancy'* and *'major occupancy'*. Per Division A Article 1.4.1.2. 'Defined Terms':

***"Occupancy* means the use or intended use of a *building* or part thereof for the shelter or support of persons, animals or property."**

This means that what the space is used for, is the '*occupancy'*. Within all possible *occupancies*, the Code defines a specific classification of *occupancy* as a *'major occupancy'*, as per Article 1.4.1.2.

***Major occupancy* means the principal *occupancy* for which a *building* or part thereof is used or intended to be used, and shall be deemed to include the subsidiary *occupancies* that are an integral part of the principal *occupancy*. The major *occupancy* classifications used in this Code are as follows:**

A1 – *Assembly occupancies* intended for the production and viewing of the performing arts

A2 – *Assembly occupancies* not elsewhere classified in Group A

A3 – *Assembly occupancies* of the arena type

A4 – *Assembly occupancies* in which the occupants are gathered in the open air

B1 – *Detention occupancies* in which persons are under restraint or are incapable of self-preservation because of security measures not under their control

B2 – *Treatment occupancies*

B3 – *Care occupancies*

C – *Residential occupancies*

D – *Business and personal services occupancies*

E – *Mercantile occupancies*

F1 – *High-hazard industrial occupancies*

F2 – *Medium-hazard industrial occupancies*

F3 – *Low-hazard industrial occupancies*

3.2 'Major Occupancy' and 'Occupancy' and Part 10

The application of Division B, Part 10 varies by *major occupancy*, the 13 defined classifications of the use of space in the Code. Within a *major occupancy* there may be other uses of space that support the *major occupancy*. These are not, by definition, *major occupancies*, they are simply *occupancies*. Part 10 application does not vary by *occupancy*, the specific use of a particular space, it varies by *major occupancy*, the 13 general classifications (see Example 4.2 below). The one exception to this rule occurs when

two or more *suites* in the same *building* have the same *major occupancy*, but different ESC requirements (see Section 3.3 and Example 4.2 below).

3.3 Multiple Major Occupancies

For *buildings* with multiple *major occupancies* that all have ESC metrics, the ESC is applied to each *major occupancy* proportionately.

Division B Subsection 10.2.3. 'Energy Step Code' does not have metrics for all *major occupancies*. When a *building* has multiple *major occupancies*, but not all the *major occupancies* have ESC metrics, it is still an ESC *building,* and energy modelling and other ESC provisions apply to the whole building.

For *buildings* with multiple *major occupancies* where some have ESC metrics and some do not, energy modelling per Division B Article 10.2.3.4. 'Energy Modelling' would be applied to the ESC *major occupancies*, and energy modelling per ASHRAE 90.1 or NECB would be applied to the *major occupancies* that do not have ESC metrics (see Example 4.3. below).

Division B Clause 10.2.3.4.(1)(b) requires ESC energy modelling to conform to the City of Vancouver Energy Modelling Guidelines, which has further guidance on modelling mixed use *buildings* with both ESC absolute targets and reference building targets. Although developed by the City of Vancouver, these guidelines are referenced in the BC Building Code and the Vancouver Building Bylaw, therefore are applicable when either code is used.

3.4 Multiple Occupancies of the Same Major Occupancy, but Different ESC Metrics

For a *building* with multiple *occupancies* of the same *major occupancy,* but different ESC metrics for separate *suites*, the ESC is applied to each *suite* or contiguous group of *suites* proportionately, as if each *suite* or group of *suites* were a *major occupancy* (see Example 4.5. below).

4.0 EXAMPLES

4.1 For each of the examples it is assumed that the ESC has been made a requirement by the local government, or has been chosen by the designer as the Part 10 compliance path.

4.2 Example – School, A2 Major Occupancy

A school is an A2 *major occupancy*. Within a school, there are typically some administrative offices, a D *occupancy*. These offices are subsidiary *occupancies* and are not *major occupancies*, therefore the entire school, regardless of the particular use of the individual spaces, is considered one *major occupancy* for purposes of application of Part 10. Alternately, if a single *building* was shared by a school and administrative offices for the school board, rather than offices related to the functioning of the school, the school and the school board offices would each be a *major occupancy*, and each of these two *major occupancies* would have to have Part 10 applied to each separately. Conversely, if a school and a library shared a single *building*, both are A2 *major occupancies*, therefore would be a single *major occupancy*.

4.3 Example – Warehouse, F Major Occupancy

A warehouse is an F *major occupancy*. Whether it is F1, F2 or F3 is determined by fire risk of what is being stored. Within a warehouse, there may be some administrative offices, a D *occupancy*; there may be lunchrooms or training rooms, both A2 *occupancies*. These offices and assembly use rooms are subsidiary *occupancies* and are not *major occupancies*, therefore the entire warehouse, regardless of the particular use of the individual spaces, should be considered one F *major occupancy* for purposes of application of Part 10.

Alternately, if a single *building* contains an F *occupancy* warehouse and a separate tenant space that is an A2 *occupancy* restaurant, rather than a lunchroom related to the functioning of the warehouse, the warehouse and the restaurant would each be a *major occupancy*, and each of these two *major occupancies* would have to have the Part 10 provisions applied to each separately.

If a single *building* contains an F *occupancy* warehouse and a separate tenant space that is a D *occupancy* insurance office, rather than an office related to the functioning of the warehouse, the warehouse and the office would each be a *major occupancy*, and each of these two *major occupancies* would have to have the ESC provisions applied. The F warehouse *major occupancy* would have the Part 10 provisions applied; the D office *major occupancy* would have the ESC provisions applied.

4.4 Example – Residential Tower over Retail and Parking, Multiple Major Occupancies

A *building* contains a residential tower (C *major occupancy*), a retail first *storey* (E *major occupancy*), and a below *grade* heated parking garage (*storage garage*) (F3 *major occupancy*). The ESC has metrics applicable to the C and E *major occupancies*, but not the F3 *major occupancy*. The applicable provisions in Part 10 are applied to each *major occupancy* proportionately, Part 10 to the F *major occupancy* and ESC provisions in Part 10 to the C and E *major occupancies*.

4.5 Example – Single Major Occupancy, Different ESC Requirements for C Occupancies

A *building* containing both hotel and residential *suites* is a single C *major occupancy;* however, these two uses have different ESC metrics. The ESC metric applicable to the different ESC uses of space would be applied to each use proportionately, as if the hotel and residential *suites* were separate *major occupancies*.

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