

NECB Application Requirements

User Guide

The National Energy Code of Canada for Buildings (NECB) transition period ends May 1, 2016. All commercial Building Permit applications will be required to demonstrate compliance with the NECB on this date. As with other code documents, compliance must be demonstrated at the time of Building Permit application, with subsequent verification throughout construction ultimately resulting in an Occupancy Permit. To enable this process, The City of Calgary has compiled NECB forms and tools to help you demonstrate compliance with this document.

Energy code versus safety codes

To understand the compliance options below, it is important to understand the differences between the existing life safety code - the Alberta Building Code (ABC) - and the new energy code, the NECB.

The ABC is an objective-based prescriptive code. Compliance with this code may be demonstrated in one of two ways; either through meeting all the prescriptive requirements within the code, or by demonstrating that a proposed design has an equivalent level of performance for a specific article via an “alternative solution.” This has been well tried and understood in Alberta for several code cycles.

An energy code has significantly more options for compliance than the ABC. NECB, as a whole building energy standard, offers four distinct compliance paths plus the option of alternative solutions. This is significantly more complex than the ABC. The benefit of this complexity is greater design freedom for the applicant.

For these reasons, it is critical the applicant inform The City of how they intend to comply with the NECB. This information is communicated to The City via the **NECB Project Summary** form, required by all projects to demonstrate compliance with the NECB. Selecting a compliance path establishes the submissions requirements for the project. A flow chart illustrating this is found in Appendix A of this document.

Selecting a compliance path

One of the most important design decisions in demonstrating compliance with the NECB is selecting a compliance path. Building type, design features and budget are all factors in the choice of compliance and must be weighed by the consultant team as early as possible in the design process. This decision establishes submission requirements and determines what information must be communicated to The City to demonstrate compliance with the NECB.

Below are brief descriptions of the available compliance options found in the NECB and the submissions resources available for each.

Compliance options for the NECB

1) **Prescriptive path:**

Meeting all listed prescriptive requirements listed in NECB sections 3.2, 4.2, 5.2, 6.2 and 7.2. This compliance path has the advantage of simplicity, but has the least flexibility from a design perspective.

2) **Prescriptive with trade-off path**

For many designs, it is either not practically possible or economically sound to meet the prescriptive requirements in all building components. In these cases, simple trade-off allows certain performance elements **within any one part** to be traded off against another. Overall, the proposed trade-offs represent an equivalent or superior level of efficiency, while allowing individual components in the system to either exceed or reduce the performance values described in the prescriptive sections. The limitations and calculations required are found in the NECB sections 3.3, 4.3, 5.3, and 6.3.

3) **Prescriptive/trade-off with detailed trade-off path for the envelope**

This hybrid compliance path employs the rules the rules for modeling the building envelope as found in “performance compliance” (see below), but uses the prescriptive mechanical and electrical systems. This effectively eliminates the restrictions placed on envelope simple trade-off, but does not allow you to capitalize on improved mechanical and electrical systems and trade these off against the envelope. This compliance path is described in subsection 3.3.4 of the NECB.

4) **Performance compliance path**

This is a whole building energy simulation compliance model of all the building systems. It offers by far the most design flexibility, but does require professional review to be accepted by The City. Part 8 of the NECB contains all the rules and limitations associated with this compliance path. It allows full trade-off between all building systems.

Submission requirements

A primary concern for consultants and owners is what is required to be submitted at the time of your Building Permit application. Given the wide range of compliance paths available in the NECB, it should not be surprising that there will also be a range of submission requirements corresponding to the different compliance paths. The greater the flexibility the chosen compliance path affords a consultant, the more onerous the submission requirements and corresponding professional obligations.

Declaring a compliance path

The **NECB project summary** form outlines the common information required to evaluate a project for NECB compliance, including general information on the applicant and building, who is responsible for the various compliance calculations/submittals, and a description of how the project will seek NECB compliance. The latter is indicated on the form through the compliance summary portion of the document.

Compliance Summary			
Indicate the compliance path for each Part below. Please note that only one means of compliance is possible per part.			
Part 3: Building Envelope			
Detailed Trade-Off (refer to Part 8)	<input checked="" type="checkbox"/>	Trade-Off	<input type="checkbox"/>
		Prescriptive	<input type="checkbox"/>
Part 4: Lighting			
		Trade-Off	<input type="checkbox"/>
		Prescriptive	<input type="checkbox"/>
Part 5: Heating, Ventilation and Air Conditioning Systems			
		Trade-Off	<input type="checkbox"/>
		Prescriptive	<input type="checkbox"/>
Part 6: Service Water Heating Systems			
		Trade-Off	<input type="checkbox"/>
		Prescriptive	<input type="checkbox"/>
Part 7: Electrical Power Systems and Motors			
		Trade-Off	<input type="checkbox"/>
		Prescriptive	<input type="checkbox"/>
OR			
Part 8: Performance Energy Model			<input type="checkbox"/>

This information will communicate how the project seeks to comply and therefore determine the appropriate submittals for each part of the NECB. It is important to note that while Parts 3-7 can use any one of the options available, if a project seeks to use Part 8 Performance Energy Model compliance it must be used for all NECB Parts 3-8 (note the bolded “OR” criteria on the Compliance Summary above.). The submissions outlines for compliance are outlined below.

Prescriptive compliance path

For all of NECB Parts 3-7, prescriptive compliance submission(s) consists of calculations that confirm the performance requirements of the NECB. These may include effective thermal transmittance of walls, roofs, and floors, FDWR, and lighting power density calculations, as well as information on equipment and components utilized in the design such as heating equipment efficiencies, lighting fixture schedules, insulation specifications and more, depending on the compliance path(s) selected.

Forms and tools

No specific forms are required forms are required to demonstrate prescriptive compliance **provided the required information is accurate and complete on the construction documents.**

To help applicants convey prescriptive NECB compliance, The City of Calgary has created a list of code articles considered critical to demonstrate NECB compliance. While not an exhaustive list, it indicates the basic articles that must be addressed on all NECB compliance documents. The list is available on the calgary.ca/energycodes website, and includes appropriate means to convey the required information in the construction documents.



Recommended Minimum Prescriptive Reference Table

Table 1: Minimum Articles Required to demonstrate Compliance with NECB

NECB Reference	Article Title/Component	Submissions	Submission Notes
3.2.1.4.	Maximum FDWR allowed - Refer to 3.1.1.6. for calculation requirements	Entered on NECB Project Summary Sheet	FDWR entered on project summary sheet, calculation table should be available on request
3.2.2.2.	Overall Thermal Transmittance, Above-ground Opaque Building Assemblies	Effective U-value Included in assembly descriptions/wall sections	Calculations should be available on request. If software was used, output sheets may be submitted
3.2.2.3. + 3.2.2.4.	Overall Thermal Transmittance of Fenestration and Doors	Included in window schedules or specifications. NOTE: Framing type and spacing must be included in effective thermal transmittance calculation	Calculations should be available on request. If software was used, output sheets may be submitted
3.2.3.1. + 3.2.3.2. + 3.2.3.3.	Overall Thermal Transmittance of Building Assemblies in Contact with the Ground	Effective U-value Included in assembly descriptions/wall sections	Calculations should be available on request. If software was used, output sheets may be submitted
3.2.4.1.	Air Leakage - General	Building envelope shall be designed with a continuous air barrier system	Indicated on wall sections, details, and/or specifications
4.2.1.4.	Determination of Installed Interior Lighting Power	Refer to notes below	See below
4.2.1.5./4.2.1.6.	Calculation of the above using building area OR space-by-space methodology	Designer to indicate calculation methodology (Building Area Method or Space-by-Space Method to be indicated) and summary table of calculated wattages/Lighting Power Density	Table indicating number of fixtures and wattages along with total Lighting Power to be included in drawings.
4.2.2.2.	Lighting Controls in Enclosed Spaces	Lighting controls (including type of sensor/control) to be indicated on construction documents	Lighting controls to be indicated on drawings, including type of sensor, complete with legend
4.2.2.8.	Automatic Daylighting Controls for Primary Side lighted Areas	Applicant to indicate areas employing required daylight sensors on construction documents	Lighting controls to be indicated on drawings, including type of sensor, complete with legend
4.2.3.1.	Exterior Lighting	Lighting schedules to indicate exterior lighting wattages. Refer to Table 4.2.3.1.D. for compliance values	Table indicating number of fixtures and wattages along with total Lighting Power to be included in drawings
4.2.4.1.	Exterior Lighting Controls	Applicant to indicate required controls for exterior lighting on construction documents	Lighting controls to be indicated on drawings, including type of sensor, complete with legend
5.2.2.5.	Duct and Plenum Insulation	Pipe Schedules or specs to conform to Table 5.2.2.5.	Insulation schedule to be indicated on duct and plenum insulation values. Ducts not requiring insulation to be indicated on drawings
5.2.2.7.	Cooling with Outdoor Air	Outlines requirements for air or water economizer	Economizer to be indicated on drawings. If not required, notes indicating why to be provided on drawings
5.2.4.1.	Required Dampers	Designer to indicate location of required dampers	Dampers to be indicated on drawings
5.2.5.3.	Piping Insulation	Pipe Schedules or specs to conform to Table 5.2.5.3.	Insulation schedule to be included indicating piping insulation values
5.2.12.1.	Equipment Efficiency	All mechanical components used in the proposed design to have associated performance efficiencies indicated on mechanical schedule. Refer to Table 5.2.12.1. for component efficiency values	Mechanical component efficiency (individual components to be identified in mechanical equipment schedule found on drawings)
6.2.2.1.	Equipment Efficiency	Mechanical components used in the proposed design to have associated performance efficiencies indicated on mechanical schedule. Refer to Table 6.2.2.1. for efficiency values	Service water heating to be identified in mechanical equipment schedule found on drawings
6.2.3.1.	Insulation	Pipe Schedules or specs to conform to Table 6.2.3.1.	Insulation schedule to be included indicating piping insulation values.
7.2.1.1.	Monitoring	Drawing notes	For applicable systems (i.e. > 250 kVA), monitoring installation to be described and indicated on drawings

NOTE: While the above list is a common list of information required to demonstrate prescriptive compliance with the NECB, it is also required to complete Trade-Off or Performance Compliance Modeling submissions as well.

Many of the above requirements have specific calculation formulas listed within the NECB. Others have accepted engineering calculations associated with them. It is highly recommended that you consult the *NECB User's Guide* for specific information on calculation methodologies. While not typically required to be submitted at the time of Building Permit application, the calculations must be readily available for review at the request of the AHJ. It is worth noting that the calculations required for prescriptive compliance are used in ALL other compliance paths, and so must always be completed for a project.

For a more exhaustive checklist of prescriptive requirements, please consult the *Prescriptive Requirements Checklist* found on calgary.ca/energycodes.

Trade-off compliance paths

Trade-off compliance requires additional documentation above straight prescriptive compliance. The City requires complete trade-off calculations and summary reports at the time of Building Permit application verifying the performance equivalency of the proposed trade-off. For buildings requiring stamps and seals per the ABC, the reports must be signed and stamped by the consultant assuming responsibility as indicated on the *NECB Project Summary*.

Forms and tools

The NECB provides detailed information on trade-off compliance calculations. The City of Calgary has provided functional excel worksheets and trade-off reports for standardized reporting of trade-off calculations. Trade-off reports are applicable to Parts 3-6 of the NECB, and should be submitted with the Building Permit application. Alternatively, a consultancy may submit their calculations, appropriately signed and stamped.

These standardized forms are available at calgary.ca/energycodes.

Detailed trade-off compliance path

Submissions for detailed trade-off are a mix of other compliance paths; prescriptive and/or trade-off submittals for Parts 4, 5, 6, & 7, and Part 3 *Envelope Energy Model* form found in the Part 8 compliance tools and forms.

Note that the detailed trade-off has similar professional requirements to Part 8, requiring professional stamps, signatures and a verification model at schedule C submission.

Forms and tools

Detailed Trade-Off forms are a combination of the required compliance paths; Parts 3 and 8 for the building envelope, and Parts 4-7 for other building systems.

These forms are available at calgary.ca/energycodes.

Performance compliance/detailed trade-off path

With by far the most design flexibility, it is no surprise that performance compliance (energy simulation modeling) has the most rigorous submission requirements at your Building Permit application.

In order to provide the most flexibility to the consultants, we have provided templates to outline the modeling submissions; however, **they are not obligated to use them, and may submit reports containing all the required information found on the part 8 performance model energy model compliance summary document and NECB Division C, 2.2.2.8.**

We outline the Building Permit submissions requirements for both cases below.

Option 1: City of Calgary forms and summaries

If an applicant does not have a standard reporting template for NECB modeling compliance, they may submit reports and summary sheets as provided by The City. These include:

- *Summary reports for Parts 3-6*
- *Part 8 Performance Model Energy Consumption Report*
- *Part 8 Performance Model Energy Model Compliance Summary*

These documents must be accompanied by a modeling report submission illustrating thermal blocks used in the reference and proposed buildings (floor plans and sections as applicable) as well as verification of input data, such as effective thermal transmittance of assemblies, equipment efficiencies, and verification of prescriptive performance levels for omitted systems such as exterior lighting.

Option 2: Consultant report summary

If the applicant has a standard report template they are comfortable with, they may submit this in lieu of the reports for system performance for Parts 3, 4, 5, 6, and 7. This report must include all the relevant information as required in Article C.2.2.2.8 of the NECB and a modeling report submission as outlined above for thermal blocks and equipment

For a consultant authored report, the required submissions would include;

- *Part 8 Performance Model Energy Model Compliance Summary*
- All necessary calculations, drawings, and tables required by NECB Div.C 2.2.2.8

Additional requirements for part 3 detailed compliance/part 8

Given the difficulty in site verification for performance compliance solutions, The City requires the submission of a verification model to the us at the time of schedule C submittals or (for buildings without professional involvement) occupancy permit. This verification model should capture the changes that occurred during construction. The submittals are identical to those described above for the Building Permit application.

In addition, all part 3 detailed trade-off and part 8 performance modeling submissions must bear the stamps and signatures of a registered professional (engineer or architect). This is applicable to both Building Permit application models as well as verification models

Forms and tools

All applicable forms are available via calgary.ca/energycodes.

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Appendix A: Submissions Flow Chart – City of Calgary

