# National Energy Code for Buildings 2011

**GUIDE TO COMPLETING Energy Code Supplement for Building Permit Application (NECB2011)**

***Scope of NECB 2011***

National Energy Code for Buildings (NECB) 2011, developed by Natural Resources Canada and the National Research Council to improve energy efficiency of buildings, is Alberta's new minimum construction standard for energy-consuming spaces and components in new buildings and additions. It offers three distinct compliance paths—**Prescriptive**, **Prescriptive with Trade-Offs**, and **Performance**. Each path offers a level of design freedom that is mirrored by a commensurate level of permit application submission requirements and professional involvement. NECB applies to new Core and Shell projects and their subsequent tenant fit-up or build-out, as well as to complete buildings and additions.

If the project under consideration is purely Part 9 residential or a relatively small commercial building (less than 300m$^2$ total floor area of office, retail or low-hazard industrial occupancies), Alberta Building Code 2014 (ABC 9.36) should be consulted as it offers simplified paths to energy efficiency compliance, that may be appropriate. Note that projects governed under Part 9 of the ABC include new buildings, additions and alterations to existing buildings.

On the other hand, Part 9 new construction, additions or alterations beyond the limited scope of ABC 9.36 (e.g.: non-residential greater than 300m$^2$ of floor area, all F2 occupancies) must be constructed to NECB 2011. Finally, any new construction, addition or alteration within the scope of ABC 9.36 may be designed to NECB 2011, if so desired.

The NECB 2011 User's Guide (published 2014) features extensive and excellent guidance on calculation approaches.

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***Choosing a path***

**PRESCRIPTIVE PATH** to NECB 2011 compliance is through the strict construction of requirements prescribed or listed in NECB2011:B:3.2, 4.2, 5.2, 6.2 and 7.2. This path's simplicity affords the least flexibility from a design perspective. Size and occupancy of the project will govern in the first case whether the drawings must be authenticated per ABC2014:C:2.4.2.1. (3) – (5); where required, the NECB 2011 design must also be signed and sealed.

**TRADE-OFF PATH** may be appropriate for designs that may not otherwise be practically or economically achievable through fulfilling all prescriptive path requirements for some building components. Trade-offs allow prescriptive component U-values (thermal performance levels) to be traded off against others, only within each of Parts 3 to 6 of NECB 2011. An acceptable trade-off will be one that, despite one or more

individual components falling short of prescribed values, is demonstrated to represent an equivalent or better level of efficiency than following the strictly prescriptive path. Key limitations and the calculations to be performed are found in NECB2011:B:3.3., 4.3., 5.3., and 6.3.; there is no trade-off path option in NECB 2011 Part 7.

The **Trade-Off Path** may be exercised in simple or detailed fashion for NECB 2011 Part 3 (building envelope), but does not allow trade-offs between these assemblies and components and of other Parts of NECB 2011.

- **Simple Trade-Off Path – Building Envelope** (NECB2011:B:3.3.3) deals ONLY with above-ground envelope assemblies and components, grouped into horizontal and vertical categories, allowing trading within:
    - horizontal assemblies and components: roofs, floors and skylights
    - vertical assemblies and components: walls, doors and windows, including adjustment to allowable Fenestration+Door to Wall Ratio (FDWR) if desired.
- **Detailed Trade-Off Path – Building Envelope** (NECB2011:B:3.3.4.) allows even greater building envelope design flexibility, allowing trading between:
    - all assemblies and components: walls, doors and windows, including adjustment to allowable Fenestration+Door to Wall Ratio (FDWR) if desired.
- **Detailed Trade-Off Path – Lighting , HVAC or Service Water Heating** (NECB2011:B:4.3., 5.3., and 6.3.) Trade-off options are available within each of these Parts, but trading may not occur between Parts.

Calculators for verification that proposed trade-offs conform to NECB 2011 are provided by NRCan. Other software resources may be employed, provided calculations supporting the trade-offs are available for review upon AHJ request.

**PERFORMANCE PATH** is a whole-building energy simulation model of all building systems, with the goal of demonstrating through modeling that the proposed building would require no more energy to operate than a hypothetical, equivalent, prescriptively-designed building. While affording the most design flexibility, this path to NECB compliance requires professional involvement due to the complexity of rules and limitations in the exchange between all building systems.

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***Drawings, details and documents building permit application submissions***

**Professional Involvement**

Where the project **requires** professional involvement per ABC2014:C:2.4.2.1.(3),(4) and (5), then registered professionals shall be retained also for application of NECB 2011 as outlined on the A-1+ A-2, B-1+ B-2 and C-1+ C-2 schedules.

Where professional involvement is **not required** in relation to 2.4.2.1.(3), (4) and (5), NECB-related design will nevertheless require professional involvement for projects incorporating:

- Prescriptive with Trade-Off Path – except for Part 3 (Building Envelope) Simple Trade-Off Path
- Performance Path
- A proposal sufficiently complex that plans examination cannot readily confirm compliance.

Each professional is responsible for field reviews for their scope of work as it relates to NECB 2011, as is the case for Alberta Building Code (ABC). When the performance path is selected, such field reviews will typically be performed by the registered professionals of record for each discipline in lieu of field reviews by the Building Energy Modeler, to ensure NECB 2011 energy compliance is met. The submitted schedule letters of professional responsibility shall be completed in order to ensure clarity around who is responsible for reviews.

***Drawings, Details and Documents***

NECB Pre-Build Project Compliance Summary shall be submitted, outlining the elected path to compliance and appropriate NECB 2011 checklist submittals to accompany the application.

**PRESCRIPTIVE PATH** NECB 2011 application includes drawings, details and documents that demonstrate the minimum prescriptive requirements are being met:

- U-value overall thermal transmittance of all above-ground opaque building assemblies and assemblies in contact with the ground; provide assembly details and U-values in wall/floor/roof schedules on drawings
- U-value overall thermal transmittance of all fenestration and doors: provide in window schedule. Centre of glass value unacceptable; provide overall heat transfer for entire unit considering frame, glass edge and centre of glass
- Air Leakage: detail air barrier sequence, joints and penetrations
- Lighting Power Density (LPD) Requirements (interior and exterior); indicate space-by-space or building area method
- Exterior lighting power for fixture
- Lighting Controls: show controls in drawings with symbols for interior and exterior spaces
- HVAC Equipment and Efficiency; list in equipment schedules, including any Economizers
- Service Hot Water Equipment and Efficiency; list in equipment schedules
- Piping Insulation, to be included in drawings for HVAC and SHW details

Generally these will be the details required to be on the drawings in any event in order that it can be constructed according to plan. While not required to be submitted at the time of Building Permit application, supporting calculations for lighting power densities and fan power shall be available for review upon AHJ request. Recall that calculations necessarily derived for prescriptive compliance are used as basis for establishing the "reference" building in support of other compliance paths.

**TRADE-OFF PATH** NECB 2011 application includes the above and:

**Simple Trade-Off Path – Building Envelope** calculations summaries, authenticated (signed and sealed) by a registered professional where the project itself requires professional involvement under ABC. Some simple envelope trade-offs may be performed by hand, in which case all work should be shown and attached to the NECB 2011 Pre-Build Project Compliance Summary.

AND/OR

**Detailed Trade-Off Path – Building Envelope, Lighting , HVAC, or Service Water Heating** are each sufficiently complex that the trade-off calculation submissions shall be authenticated by a registered professional, and duly-signed schedules of professional involvement provided, whether the building itself requires professional involvement or not. Supporting calculations shall be available for review upon AHJ request.

**PERFORMANCE PATH** NECB 2011 application shall include the Part 8 Summary Page, NRCan checklist, consultant summary report and all necessary calculations, drawings, and tables required by NECB2011:.C: 2.2.2.8. that are additional to that provided above.

Modeling report submission shall illustrate 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. The performance model report shall be authenticated by a registered professional of record.

***Pre-occupancy submissions***

The NECB 2011 As-Built Project Summary for any chosen compliance path shall be submitted in conjunction with a request for final building inspection for occupancy. This is in addition to requirements for ABC 9.36 documentation, though C-schedules that may be required may pertain to both ABC and NECB.

If overall professional involvement is **NOT** required for the project per ABC, provide a Letter of Assurance of Compliance signed by both constructor and owner assuring that PRESCRIPTIVE PATH and/or Simple Trade-Off Path - Building Envelope requirements have been met. For Detailed Trade-Off Path - Building Envelope, Lighting , HVAC, or Service Water Heating OR PERFORMANCE PATH, provide applicable C-Schedule(s) of Assurance from the registered professional(s) responsible for the design.

If overall professional involvement is **required** for the project per ABC, the required C-Schedules of Assurance shall pertain to both ABC and NECB compliance.

For **PERFORMANCE PATH** submissions, the following documents are required with all permit applications:

- Part 8 Summary Form
- Performance Model Energy Consumption Report
- Performance Model Energy Model Compliance checklist