Program Guidelines

FortisBC Commercial New Construction Program

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FORTIS BC™

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Issued June 2025

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Change Log

Version	Date Issued	Description
1	June 2025	Original version issued

1 Program Guidelines

1.1 Introduction and Intent

The latest version of the FortisBC Commercial New Construction (CNC) Program has been developed to align with the new Demand-Side Measure (DSM) regulation and other program requirements.

These Program Guidelines include sections that explain:

- **Modeller Qualifications:** A new process has been developed whereby FortisBC will approve modellers for participation within this program.
- **Project Eligibility**: New and updated program requirements for eligible projects are outlined with various compliance paths.
- **Program Process**: A summary of the overall program process is provided, outlining submittals and other requirements for each phase.
- **Technical Modelling Requirements**: Updated energy modelling guidelines outlining program-specific requirements and provide clarity around energy modelling inputs and methodologies for the purpose of participation in the CNC Program.

Important: This guideline is not intended to be an exhaustive set of technical or best practice requirements for energy modelling. The submitted energy studies must continue to follow applicable energy codes, guidelines, by-laws and best practice industry standards related to energy modelling as required. The guidelines are rather intended to serve as clarifications for the sole purpose of satisfying the requirements of the FortisBC CNC Program.

1.2 Tips for a Successful Submission

A smooth and quick energy model review and submission process is in the best interest of all parties. Keep in mind that the Technical Review Team's primary objective is to confirm that the model matches the design and meets the requirements of the CNC Program and relevant codes, standards and guidelines.

- Clear submissions that explain where inputs come from will expedite the review. For example:
    - Ensure consistency between reported and documented information in workbook, energy report and design document references.
    - Provide specifications, equipment cut sheets, or shop drawings as sources of inputs (if not already available in drawings)
    - List each architectural detail referenced for each entry in the BETBG calculations.
    - Note that it is the modeller's responsibility to inform the reviewers of any major changes in the design between submissions, and that results should be provided for each submission so that the reviewer can verify that results changes are in line with updated inputs.
- Be sure to work with the most recent program documents from the FortisBC website.
- Note that all submissions involve some level of back-and-forth with the Review Team, so plan your budget and timeline accordingly.

2 Energy Modeller Qualification Process

2.1 Qualification Criteria

To maintain high standards in the CNC Program, all energy modellers must meet the following base qualifications.

- Demonstrated minimum 3 years of experience with energy modelling for commercial new construction, including BC Energy Step Code compliance and FortisBC-specific modelling practices.
- Professional Engineer (P.Eng.), Architect (AIBC) or Building Energy Modelling Professional (BEMP) in good standing.
- Proficiency in recognized ASHRAE 140-compliant simulation tools (e.g., eQuest, IES-VE, EnergyPlus, DesignBuilder).
- Completion of FortisBC's mandatory orientation and program methodology training for energy modellers.
- Submission of:
    - A current resume detailing relevant project experience.
    - A sample energy model report from a comparable new construction project, meeting BCBC or VBBL.
- Acknowledgement of FortisBC's Code of Conduct for Energy Modellers, which includes expectations for professionalism, integrity, data transparency, and participant confidentiality.

Note: While FortisBC maintains the right to qualify and approve energy modellers for participation in the CNC Program, the contractual relationship exists directly between the program participant and their selected modeller. FortisBC is not responsible for the modeller's contractual obligations, fees, or liabilities.

Only the trained modeller is authorized to represent the firm. If this individual departs, the firm is temporarily suspended from the Approved CNC Energy Modeller List until another modeller completes the base qualifications.

2.2 Shortlisting Process

The application and approval process for energy modellers to work with the CNC program is outlined below.

1. **Application**: Interested parties must contact the CNC Program Team (see Section 6.2) to initiate the application process.
2. **Document Review**: Applicants must submit materials listed under Section 2.1for evaluation by the FortisBC team.
3. **Review of Prior Program Experience**: Performance will be reviewed.
    a. Performance will be evaluated based on model accuracy, responsiveness, adherence to project timelines, and alignment with FortisBC's modelling guidelines and quality expectations.
    b. If no quality or conduct concerns are identified, the modeller may proceed to the training and final approval step.
    a. If the modeller has prior experience with FortisBC's CNC program, their historical performance will be accounted for in the new program.
4. **Project Limitation for New or Flagged Modellers**:

a. Modellers who are new to the CNC program or flagged modellers who had previous quality or compliance issues will initially be limited to one project at a time.

b. This probationary status continues until they have successfully completed at least three (3) CNC projects to FortisBC's satisfaction.

5. Training & Final Approval:

    a. Upon passing all reviews and completing the mandatory training, the modeller and their firm are added to the Approved CNC Energy Modeller List.

    b. If deemed necessary by FortisBC—such as after program updates or recurring quality concerns—approved modellers may be asked to participate in a CNC training session.

In cases where a modeller is suspended or removed mid-project, FortisBC will ensure that incentive eligibility will be preserved provided the replacement modeller meets all program requirements and timelines.

2.3 Ongoing Performance Review

All approved modellers will be subject to performance reviews every two years, based on:

- Project outcomes
- Feedback from Participant, internal FortisBC team and Technical Reviewers
- Documentation quality, including energy model workbook completion and version control
- Timeliness and responsiveness
- Compliance with FortisBC guidelines and the Code of Conduct

FortisBC reserves the right to issue warnings and mandate performance improvement measures for modellers who do not meet established expectations.

2.4 Dispute Resolution and Quality Assurance

FortisBC reserves the right to suspend or remove energy modellers or their affiliated firms from the approved list under the following conditions:

- Submission of substandard, inconsistent, or non-compliant energy models.
- Repeated failure to meet program timelines, deliverables, or communication standards.
- Evidence of unethical behavior, data manipulation, or misrepresentation of results.

Dispute Resolution Process

1. **Issue Notification**: FortisBC will issue a formal written notice to the modeller or their firm outlining the identified issue and requesting a written response.

2. **Participant Notification**: Since the modeller is under contract with the program participant, FortisBC will also notify the impacted participant(s) that the modeller is under review. The notification will outline:

    a. The general nature of the concern (without disclosing sensitive or confidential information).
    b. Potential impacts on their project timeline or model acceptance.
    c. Options for proceeding, including identifying an alternate modeller if necessary.

3. **Response Period**: The modeller or firm will have 10 business days to provide a written explanation or proposed corrective action.

4. **FortisBC Decision**: Based on the review, FortisBC will decide to:

a. Accept the response and take no further action.
b. Place the modeller on probation with specified conditions.
c. Suspend or permanently remove the modeller/firm from the approved list.

5. **Documentation Expectations**:
   Energy modellers are expected to maintain transparent documentation, including up-to-date and complete energy model workbooks, and version control of all submitted models, assumptions, and revisions. These may be subject to audit or review at FortisBC's discretion.

2.5 Reinstatement and Appeal

The following processes are available for reinstatement and appeal.

- **Reinstatement due to Staff Departure**: Firms temporarily suspended due to the departure of a trained modeller may return once a new representative is trained and approved by FortisBC.
- **Reinstatement due to Quality or Conduct Improvements**: Firms must demonstrate appropriate corrective actions before reapplying. Reinstatement is subject to FortisBC's sole discretion.
- **Appeal Process**: Modellers or firms who disagree with a suspension or removal decision may submit a written appeal to FortisBC within 10 business days of receiving the decision. The appeal will be reviewed by an internal committee, and the outcome will be considered final. Neither the modeller nor the program Participant will be allowed to know the reason behind that final decision, even after the appeal process is completed.

2.6 Public Directory

FortisBC will maintain a public directory of approved CNC Program energy modellers. The Approved CNC Energy Modeller List will include:

- Firm name
- Approved representative(s)
- Contact information
- This Approved CNC Energy Modeller List will be made available on the CNC Program webpage to support participants in selecting qualified and vetted modellers.

If an energy modeller is not currently listed on the approved roster, they may still be eligible to participate by completing the qualification process. For more information or to begin the qualification process, please feel free to contact us per Section 6.2.

3 Project Eligibility

Please pay special attention to this section as eligibility has changed since the last version of the CNC program and requires careful review for each project.

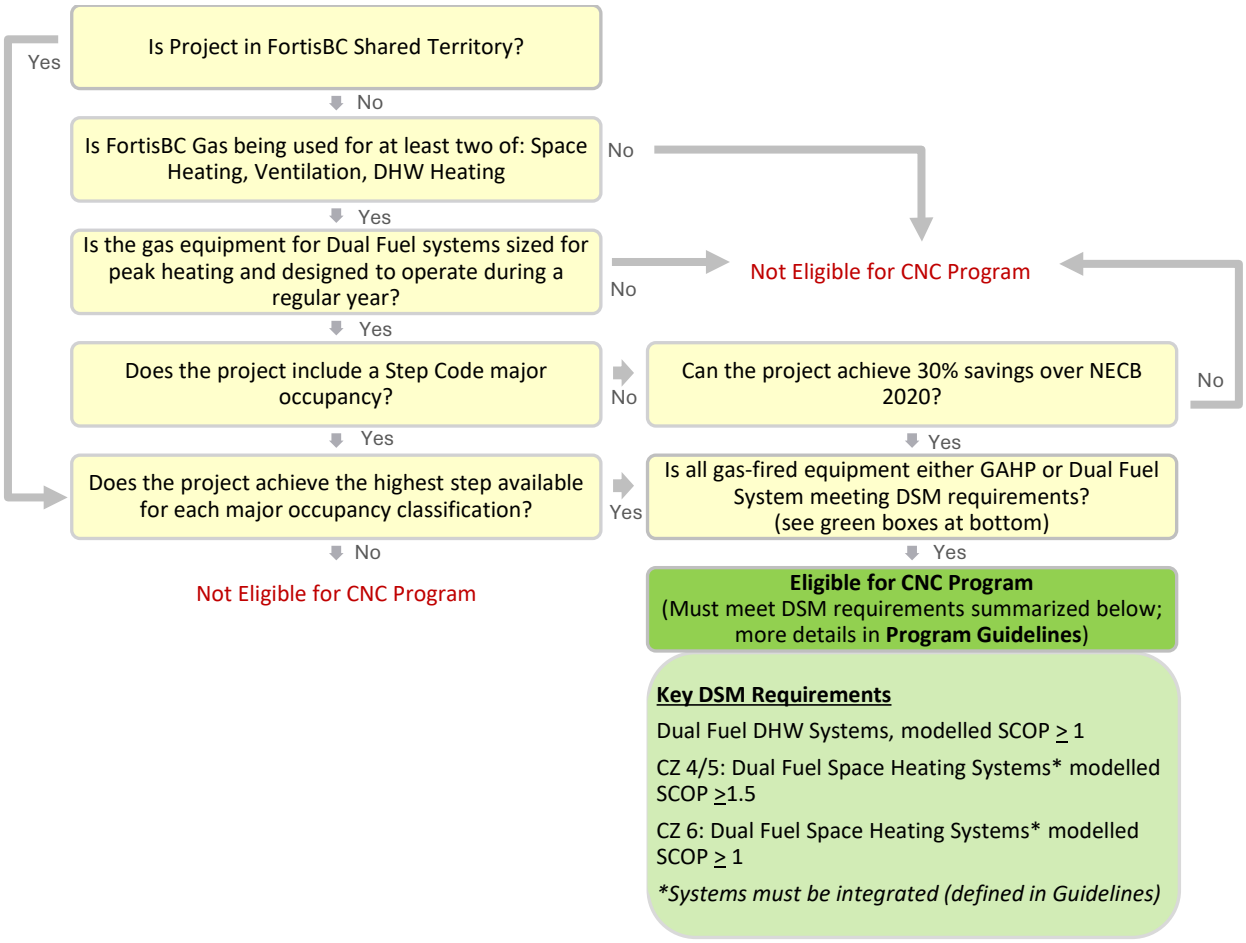
To participate in the CNC program, projects must meet the following criteria, described later in further detail:

- Will be a FortisBC customer (Section 3.1),
- Demonstrates the necessary energy efficiency (Section 3.2),
- Meets DSM regulation requirements (Section 3.3),
- Efficiency measures aren't being covered under other FortisBC incentive programs (Section 3.4),
- Models must be completed by a FortisBC-approved modeller (Section 2), and
- Program documents are provided in a timely manner, in accordance with program rules (meets all requirements of these Guidelines).

The flowchart in Figure 1 should be used to help determine a project's eligibility for the program. Subsequent sections 3.2 and 3.2 provide additional definitions and further information on the eligibility criteria. Because of the complexity of some of the criteria (e.g. requiring systems to meet certain modelled seasonal COP (SCOP), per the DSM requirements), ***the Modeller's knowledge will be required to help with initial program eligibility assessment***.

In cases of uncertainty, please contact the FortisBC program representative (per Section 6.2).

Figure 1: Eligibility Flowchart



3.1 FortisBC Customer & Shared Service Territory (SST)

Projects must be customers of either the gas utility FortisBC Energy Inc. (FEI) or electric utility FortisBC Inc. (FBC). Projects where electricity will NOT be supplied by FortisBC must use natural gas for two or more of the following end-uses: Space heating, Ventilation, and Domestic hot water.

Use of natural gas systems can mean one of the following:

- If the only fuel is natural gas, it must be used in gas absorption heat pumps (GAHP) for heating, DHW, or ventilation (e.g. gas-fired heating or DHW boilers, MUA, AHUs, etc.), OR
- For dual fuel systems (electricity and natural gas hybrid systems), then:
    - Natural gas heating equipment must be sized to be capable of operating the building/ facility in absence of the other system, i.e. natural gas energy systems are sized for peak load; and
    - Under the assumption of a normal weather year the natural gas-based heating system will be required to operate to some capacity.
- In both cases:
    - For multi-unit residential buildings (MURBs), corridor ventilation may serve as the ventilation end use.
    - All other program requirements and modelling rules outlined in these Guidelines must be met.

3.2 Energy Compliance Requirements

Buildings will be eligible for the CNC program if they demonstrate energy savings according to the following requirements based on their Major Occupancy Classification (per BCBC 2024).

- **Energy Step Code**: Projects must achieve the highest step available for each major occupancy classification within the building (Retail/ Office = Step 3, MURB/Hotel/Motel = Step 4).
- **Non-Energy Step Code**: Projects must demonstrate at least 30% energy savings over NECB 2020 performance.
- **Mixed-use Buildings**: Projects must demonstrate that they meet or exceed the weighted average limits using the highest step for each Step Code major occupancy, with non-Step Code occupancies modelled demonstrating at least 30% energy savings over a NECB 2020 Reference, modelled per *CoV EM Guidelines*.

More details for each classification are described in Sections 3.2.1 to 3.2.3.

3.2.1 Energy Step Code

Residential and commercial building types subject to the BC Energy Step Code (“Step Code”) are:

- High-Rise Multi-Unit Residential Buildings (MURBs)
- Low-Rise MURBs
- Offices
- Retail Buildings
- Hotels and Motels, and
- Public Sector Buildings (schools, colleges, libraries, recreation centres, hospitals, and care centres).

The first 5 types of projects will use Step Code modelling and metrics: Total Energy Use Intensity (TEUI), Thermal Energy Demand Intensity (TEDI), and Overheating Hours (for MURBs only) requirements to demonstrate compliance with the highest Step available for the project’s major occupancies.

Public sector buildings are do not have intensity limits under the step code and are instead required to demonstrate compliance with NECB 2020 and include airtightness testing at a minimum. For the purposes of this program, they are treated as “non-energy step code” buildings, per Section 3.2.2.

3.2.2 Non-Energy Step Code

Other projects will demonstrate min. 30% energy performance improvements over a base BC Building Code Reference building, described in further sections. A building can be submitted if it demonstrates min. 30% savings over NECB 2020 and:

- The major occupancy is not subject to the BC Energy Step Code per BCBC 2024 Revision 2, or
- It is a *public sector building* mandated to Step 2 (NECB), per BCBC Tables 10.2.3.3-A to 10.2.3.3-J.

3.2.3 Mixed-Use Buildings

The energy modelling methodology should align with the *City of Vancouver Energy Modelling Guidelines (CoV EM Guidelines) v2*. As per the City of Vancouver Energy Modelling Guidelines, in addition to the total building targets, the portions of the building that have a TEDI target must still meet their combined TEDI target. Be aware that Version 3 of the CoV EM Guidelines may be adopted later based on provincial, BCBC adoption.

Examples: Consider the following scenarios.

1. Multiple Step Code Occupancies (i.e., MURB + Retail). In this case, the building will be evaluated using blended Step Code targets based on residential (Step 4) and retail (Step 3). If the whole building meets the blended targets, then this should be acceptable to consider the whole building for incentive.
2. Multiple Non-Step Code Occupancies (i.e., Warehouse + Assembly area). In this case, the requirement would be that the whole building achieve 30% energy savings over the NECB 2020 reference building.
3. Step Code Occupancy + Non-Step Code Occupancy (i.e., Office + Warehouse).
    a. Develop a reference building only for the portion(s) of the building that do not have an absolute performance target, in this case the warehouse.
    b. Extract the TEUI and TEDI for that reference building.
    c. Reduce the TEUI by 30% for non-Step Code occupancy energy target value. The total building TEUI and TEDI, requirement will be based on an area-weighted average between the Step Code targets and non-Step Code reference building target.
    d. The Step Code occupancies must meet their individual TEDI requirements, in this case, the office, and the Non-Step Code occupancies must meet their requirements.

In all projects submitting to the program with multiple major occupancies, each occupancy must meet the minimum eligibility criteria (2/3 major end uses served by gas and also meeting DSM regulation dual fuel system definition) to be included within the project.

3.3 DSM Regulation Compliance

The DSM regulation released June 2023 requires equipment to meet the following criteria:

- Electric domestic hot water heat pumps paired with gas fired equipment must have a modelled seasonal coefficient of performance (“SCOP”) SCOP ≥ 1
- Gas-fired heat pumps must have a modelled SCOP ≥ 1
- CZ 4-5 Dual fuel space heating systems
    - Must have a modelled seasonal coefficient of performance SCOP ≥ 1.5
    - Integrated hybrid gas-fired heat pump systems must have a modelled SCOP ≥ 1
- CZ 6+ Dual fuel space heating systems
    - No SCOP requirement
    - Must be integrated; otherwise, the heat pump component of the system may still be incented by others as this program will not incentivize an air-source heat pump in isolation (i.e., BC Hydro) but the conventional gas component may not

The DSM regulation provides exemptions for:

- Conventional gas water heaters in ground-oriented dwellings for low income and Indigenous customers
- Space heating for Indigenous customers in climate zones 6 and above, only through 2027
- Radiant tube and unit heaters used in industrial building garages, warehouses, and farm buildings (no feasible heat pump alternative)

Important definitions that form a part of this regulation include:

- **Dual fuel**: Integrated system using both natural gas and electricity. If other fuel types are involved, please reach out to the Technical Review Team for an interpretation before proceeding.
- **Modelled SCOP**: Seasonal coefficient of performance, as determined by the hourly energy model results used for the submission.
- **Integrated**: Operated by a single system of controls, connected to single heat distribution system, and be designed, rated and sold together OR a packaged unit.

Key considerations:

- Because this incentive program is a ***whole building program***, all equipment must meet these requirements.
    - For example, if heating equipment meets the SCOP requirement but there is a gas-fired condensing MUA unit on site for ventilation, the building would not comply.
- If there are multiple types of systems, the SCOP for each will be evaluated in isolation.
    - For a mixed use building, each end use for each major occupancy classification needs to be evaluated.

3.4 Other Programs

Projects that do not meet all eligibility requirements of the CNC Program might still be eligible to participate in the Prescriptive Program or other FortisBC Programs.

Savings due to significant process loads, such as gas used for commercial kitchen appliances, patio heating, hot-tub heating, or other thermal loads not related to building space heating, ventilation heating, and domestic hot water heating, are generally excluded in the CNC Program, but may be eligible for other incentive opportunities. They must still be modelled, but "savings over typical performance" may not be claimed if the code doesn't specify minimum operating parameters. Some exceptions may apply, however, a "typical" or baseline performance must be agreed upon with the Technical Review team before modelling proceeds. In these cases contact the FortisBC program representative (per Section 6.2) for more information or visit https://www.fortisbc.com/rebates.

4 Process Overview

This section summarizes key considerations for the energy modeller during the CNC Program submission process. A larger scale overview representing the overall process including the energy modeller's role is included in Appendix A.

4.1 Energy Modeller Steps

The key program related steps for the energy modeller within each project include:

1. Early-Stage Analysis
    - During early design while evaluating program options, best practice is to complete an energy analysis to inform design direction and advise on efficiency strategies for the project. While this is not required as part of the program, it is highly recommended.
2. CNC Program Kickoff Meeting
    - The modeller and participant must attend the meeting prepared to discuss:
        - The building, its systems, general energy characteristics, and schedule,
        - Any unique features that may require workarounds,
        - Preliminary modelling results for the project (if available), and
        - CNC Program eligibility requirements, Energy Modelling Guidelines (this document) and applicable modelling variances.
3. Energy Model Submission
    - The modeller must submit documentation noted in Section 5.2.
    - As the program only requires a single energy model submission (unless project changes take place post-submission), the energy model should be based on the Building Permit (BP) or Issued for Construction (IFC) design, so that it most accurately reflects the final project design.
4. Energy Model Review
    - Several rounds of Q&A may be required with the Review Team to clarify the modelling inputs and results.
    - Timely responses from the energy modeller are required, or the project's eligibility could be impacted.
5. Study Approval
    - Upon approval, a Post-Model Review Letter will be sent to the FortisBC Customer.
    - A list of approved ECMs and other key inputs will be sent to energy modeller and the customer for tracking during construction.
    - The energy modeller will be required to submit their invoice for *additional work required for the CNC program submission* only, to FortisBC.
6. Construction Mobilization Approval
    - To obtain construction mobilization approval, the Customer must submit the required documents as outlined in the Construction Mobilization Submittal section. Once these documents are reviewed and approved, the construction mobilization incentive, equal to 10% of the eligible capital incentive, can be processed.
    - The energy modeller should check in with the Customer at this point, to check that the project remains on track.
7. Construction
    - The energy modeller should be aware of any major changes during construction that could impact energy performance.
    - The energy modeller is required to track shop-drawings for the approved ECMs and other key inputs as verified upon study approval.
    - Upon construction completion:

        - The energy modeller will submit to FortisBC approved shop-drawings of the incentivized ECMs, including the *Phase 5 Envelope Confirmation Letter* from the architect or building envelope engineer (template will be provided in Step 5, above), and
        - A FortisBC representative will visit the site to verify that the program requirements have been meet.
8. Post-Construction Updates
    - Based on the site visit, post-construction updates to the model may be requested if major changes have occurred since study submission and approval, or if shop drawings are not provided for all ECMs.

4.2 Quality of Work

While the CNC Program only requires one pre-construction model to be submitted, best practice recommends that energy modelling begins at earlier stages of design (bullet point 1 in Section 4.1) to check that the project is on track for energy efficiency targets and advise on appropriate design strategies.

Energy modellers submitting to this program must conform to the practice requirements outlined in the *Joint Professional Practice Guidelines: Whole Building Energy Modelling Services* released by Engineers & Geoscientists BC (EGBC) and the Architectural Institute of British Columbia (AIBC), referenced in Section 6.

In the event that an energy modeller consistently fails to meet the expected quality of work, it could have serious repercussions. Repeated shortcomings in performance may jeopardize the energy modeller's eligibility to remain on the FortisBC approved energy modeller list. Maintaining high standards is crucial, as any deviation from the required quality can undermine the credibility and reliability of the energy modeling work, ultimately affecting the project's success and compliance with FortisBC's stringent requirements. Therefore, it is imperative for energy modellers to adhere to the established quality benchmarks to ensure their continued approval and participation in FortisBC programs.

4.3 Response Time

Please note that the technical review (including any follow-up reviews) must be wrapped up before the start of above grade construction. As such, timely responses from the energy modeller are necessary for the project to remain eligible.

If the project has been sitting idle with no response for more than 6 months, the project may be subject to eligibility review by FortisBC.

5 Energy Modelling Technical Guidelines

5.1 Governing Documents

Energy modelling for the FortisBC CNC Incentive Program shall conform to:

1. BCBC 2024 Section 10.2.3 Energy Step Code, including:
    a. Part 8 of the National Energy Code for Buildings (NECB) 2020,
2. Vancouver Building Bylaw 2019 including:
    a. Part 8 of the National Energy Code for Buildings (NECB) 2020
    b. Noting that these guidelines are released in June 2025 and VBBL 2019 with NECB 2020 officially comes into effect in September 2025, NECB 2020 is still required in anticipation of this change.
3. The City of Vancouver (CoV) Energy Modelling Guidelines v.2, and
4. These CNC Program Guidelines.

In case of conflicting requirements, these CNC Program Guidelines shall govern for the purpose of this program only, followed by the *CoV EM Guidelines*.

Other versions of the NECB may be permitted, only if applicable to the project at the time of Building Permit. This will need to be confirmed during the kickoff meeting.

5.2 Submission Requirements

Documents that are required for submission at various program phases are outlined in Table 1.

Table 1: Submission Requirements

Document	Notes
Phase 2 Energy Model Review	
Energy Model Report	An energy modelling report should be completed in accordance with the *Joint Professional Practice Guidelines: Whole Building Energy Modelling Services* referred to in *Section 6.1*. The energy model report should include an eligibility criteria section outlining which systems are considered *integrated* based on DSM regulation definitions (see section above). These systems will require individual SCOP reporting as laid out in the workbook and Section 3.
CNC Energy Model Workbook	The following sections must be completed: • Tabs 1 Overview, 2 ECMs & Key Inputs, 3.1 Proposed Bld Inputs, 4.1 Results, and 4.2 Hourly Results ○ Note that on tab 4.2 hourly load must be provided for each space / DHW system (as identified on tab 3.1). This will help in checking DSM equipment modelled SCOP requirements. • Tab 3.2 Reference Bld Inputs, if applicable to the project. • Once review comments are sent, these must be responded to on Tab 5. The document is available at the link provided in Section 6.
Thermal Bridging Calculation Sheet(s)	Projects may use: • The BETBG calculator provided at the link in Section 6, or • A custom version that includes the same process.

	Notes: • If a custom calculator is used, it must be clearly summarized in the report so that the Review Team can interpret the calculations and results. • If an external envelope consultant is reporting on envelope performance, their report must reference the same architectural drawings as provided in the submission. • When entering in clear field values in the BETBG calculator, the "Transmittance Description" must reference the envelope item number per assembly schedule from the provided architectural drawings. • When entering in psi- or chi-values in the calculator, the "Transmittance Description" must reference the architectural detail number as listed in the provided architectural drawings. • Complete the 'Source Reference' for all details selected from BETBG (or other source), and check that each selection is representative of the architectural details submitted. • Ensure consistency (R-values and areas) between BETBG and envelope items reported in the workbook before submitting.
Design Documents	The documents upon which the model is based must be provided, including at least: • Architectural drawings with building envelope performance • Mechanical drawings • Electrical drawings ***Specifications that contain information not represented elsewhere on the drawings*** (for example, glazing U-values, mechanical efficiencies, etc.) ***must also be included***. Lighting within the energy model is expected to be based on the design documents. Mechanical drawings should include a design sequence of operation for major mechanical systems, including ***switchover temperatures for dual fuel systems***. Rated equipment COPs must also be provided. Modelled seasonal COPs are to be reported in the workbook but is to be based on the rated equipment performance.
Phase 3 Construction Mobilization/ Start To proceed with the construction mobilization incentive, which is equal to 10% of the eligible capital incentive (to a maximum of $25,000), certain documents must be submitted by the participant.	
Attestation Letter	A signed attestation letter to verify the commencement of the above-ground construction work.
Site review report	Any Structural Engineering or Architectural site review report confirming professional review of some above-grade site activity.
Site Photos	Photos must be provided showing above-grade site progress including: • Depending on the size of the site, a minimum of one photo from each direction (N, E, S, W) • A photo with the construction site address on display

Phase 5: Construction Completion - Shop Drawing Submittals	
Shop drawings	The energy modeller is required to track shop drawings of the approved ECMs and key inputs from Phase 2 and submit to Fortis upon project completion prior to Fortis site visit takes place. The list of approved ECMs will be agreed to and verified at the study approval stage when the review process is completed (end of Phase 2). ECMs and requested shop drawings will be unique to each building but could include the following examples: • Glazing systems, • Opaque thermal envelope systems*, • Lighting fixtures and controls, • Domestic hot water fixtures, and • Mechanical equipment included in major mechanical systems (i.e., heating and cooling plant equipment, terminal equipment, heat recovery equipment, domestic hot water heating plant, air handlers). *For assemblies or opaque thermal envelope systems, the *Phase 5 Envelope Confirmation Letter* template signed by the architect or building envelope engineer can be used to confirm that the R-values per approved ECM's are met, based on their completed shop drawing review.

5.3 Proposed Model

The Proposed model at time of final energy study submission is to be based on Building Permit (BP) or later design documentation, per *Section 4.1*, Step 3.

5.4 Reference Model

The Reference building should conform with a *NECB Part 8* compliant energy model for the majority of project contexts and scenarios. There are however a few specific methodologies these guidelines will point to, including a few variances to be applied to the projects where certain criteria apply.

Examples of variances include changing Reference fuel source to align with proposed design to avoid fuel switching where this is not already covered in *NECB Part 8*, or, to clarify requirements for projects connected to a DES system. Each section below lists the applicable variances to include in the energy study.

For any specific circumstances that are not clearly covered within the NECB or in the following sections, please contact the Technical Review Team per *Section 6.2*.

5.5 Specific Requirements for CNC Program

As most projects already require energy modelling to be completed as part of the new construction building permitting process, the intent of the revised CNC Program requirements is to ***build on models already developed for this purpose***, with a few exceptions as outlined in this section.

Table 2 includes variances that are unique to the CNC Program and supersede the NECB and/or the *CoV EM Guidelines*. A few typical modelling methodologies and considerations are also provided with the intent of providing clarity around expectations for the energy study. Note that all NECB references are from the version of the standard outlined in *Section 6*.

Table 2: Energy Modelling Requirements

Design Element	Proposed Model	Reference Model
1. Building Envelope		
1.1 Thermal Performance	Include the effects of thermal bridging per *CoV EM Guidelines* and the *BETBG* referenced in *Section 6*. Be sure to provide Submission Requirements as outlined in *Section 5.2*.	
	Calculate effective assembly values based on design documentation.	Model as per *NECB Section 3.2* requirements.
1.2 Glazing Ratio	Model per design for all orientations.	FDWR to be modelled same as Proposed up to max % limit based on CZ per *NECB section 8.4.4.3 (3)*.
1.3 Infiltration Rate	For buildings with Step Code Limits: Modelled infiltration shall be based on a target tested envelope air leakage rate (EALR) at testing pressure 75 Pa. Modelled infiltration rate shall be converted as per *CoV EM Guideline, section 2.4*.	
	Projects with an NECB Reference Building: Proposed airtightness improvements may be accounted for, supported by successful airtightness results. Modelled infiltration rate should be converted as per *NECB section 8.4.2.9*.	Model as per *NECB section 3.2.4*. Modelled infiltration rate should be converted as per *NECB section 8.4.2.9*.
2. Lighting Systems		
2.1 Parkade Lighting	Include all parkade lighting and controls per design.	Include all parkade lighting and controls required in Reference models per *NECB section 4.2.2.2*.
2.2 Exterior Lighting	Include per design.	Include per NECB Section 4.2.3.
2.3 Interior Lighting	Include per design using *NECB section 4.2.1.6* methodology, with *CoV EM Guidelines* superseding as applicable. If a complete lighting design is provided, it must be used, rather than using prescriptive values.	Include per *NECB section 4.2.1.6*, with *CoV EM Guidelines* superseding as applicable.
2.4 Lighting Controls	Include as designed per *NECB section 8.4.3.4*, applying credit for occupancy sensor and modelling daylight sensors directly in software for each space.	Include as required per *NECB section 8.4.4.5*.

2.5 Suite Lighting (*for residential major occupancies only*)	Lighting should be modelled per the *CoV EM Guidelines* and *NECB section 4.2.1.6*, with the *CoV EM Guidelines* superseding as applicable. Please take note of the following:
	• If suite lighting has not yet been designed, either of the following is accepted to program:
	  ○ 5 W/m^2 may be used for suites as per the *CoV EM Guidelines*. Please note, if the final design does not reflect modelled values, this could be considered a major design change, and the project may be subject to re-evaluation of an updated energy model.
	  ○ A letter from the electrical engineer providing target design LPDs (preferred).	

	• If a partial suite lighting design has been provided, either of the following is accepted:
	  ○ Takeoffs completed in the areas where design is complete, and the default 5 W/m^2 can be used in other spaces, to provide a weighted-average LPD per suite.
	  ▪ For example, if the design is complete with the exception of a rosette over the dining space, this method should be used.
	  ○ A letter from the electrical engineer providing target design LPDs.
	• If a complete suite lighting design is provided:
	  ○ If the resulting LPD < 5 W/m^2, the actual lighting value must be used.
	  ○ If the resulting LPD > 5 W/m^2, the modelled LPD must be set to 5 W/m^2, as per the *CoV EM Guidelines*.	

3. Other Loads		
3.1 Plug Loads	Include per NECB and *CoV EM Guidelines*.	
3.2 Elevator Loads	Elevator loads shall be modelled as per the *CoV EM Guidelines, section 2.3.1*.	
3.3 Process Loads	Include all process loads, per *CoV EM Guidelines* and treat the same in Proposed and Baseline model.	
3.4 Occupancy	Model as per NECB occupant density and *CoV EM Guidelines*.	
3.5 DHW Loads	Credit is allowed for reduced flow fixtures and faucets beyond current BCBC; model Proposed DHW per methodology outlined in the CNC Program Workbook.	Model DHW per BCBC or VBBL maximum allowed; include same number of usages and duration as Proposed per methodology outlined in the CNC Program Workbook.
	All other DHW calculation inputs must follow the *CoV EM Guidelines* and BC Plumbing Code requirements.	
4. Ventilation		
4.1 Minimum Ventilation Rates	Model ventilation rates from the design, per *CoV EM Guidelines Section 1.1*.	Set ventilation rates equal to Proposed.
4.2 Demand Control Ventilation	Model as per *CoV EM Guidelines Section 2.5.3*.	Model if required, per *NECB 8.4.4.15 (2)*.
4.3 Economizer	Include per design.	Model if required, per *NECB 8.4.4.12*.
4.4 Parkade Ventilation	Include parkade ventilation in both Reference and Proposed models referring to *CoV EM Guidelines* for parkade fan hours of operation.	
5.3 Corridor Pressurization Adjustment (*for residential major occupancies only*)	In calculating the corridor pressurization adjustment per *section 2.5.2 of the CoV EM Guidelines*, all ventilation ***supplied*** to the corridor should be used in the calculation, regardless of whether it is returned to an HRV/ERV for heat recovery, transferred to adjacent spaces and/or directly exhausted. However, only corridors that serve residential areas should be included i.e., ventilation air supplied to corridors that serve below-grade parking areas should not be included in the calculation.	
5. HVAC Systems		
5.1 General	Model systems, equipment, schedules, setpoints and controls as per design documentation, *CoV EM Guidelines* or *NECB section 8.4*, if not specified.	Model per *NECB section 8.4*, unless specified CNC Program variance below.

5.2 Heat Pump Systems	For buildings where heat pumps are used for space heating, ventilation heating or DHW heating, ensure program eligibility requirements are met per Section 3.	
	Model proposed equipment types, efficiency rating and sequence of operation, including heat pump shut-off temperature, per design.	Model heat pump type, equipment efficiency rating and sizing per *NECB section 8.4.4.13*, but with same sequence of operation and shutoff temperature as per Proposed design (to avoid fuel switching).
5.2.1 GAHP Systems	Model GAHP per design.	Model GAHP in the same manner as proposed, using the same efficiency rating and part-load curve. Note that because some heating and DHW systems have different requirements this may necessitate representing multiple GAHP.
5.3 Hybrid Systems	For buildings where a hybrid system (multiple fuel types) is used for space heating, ventilation heating or DHW heating, ensure program eligibility requirements are met per Section 3.	
	Model proposed equipment types, efficiency rating, and sequence of operation per design.	All backup or peak systems modelled with same fuel source and sequence of operation as proposed, using efficiencies and part-load performance per NECB.
5.3.1 When Proposed heating plant is a central AWHP with peak/top up boilers, and Reference is NECB System 3	Model proposed per design. Model reference as follows: • Model single zone systems (per NECB System 3) however switch to RTUs with hydronic coils for heating + cooling, connected to a central baseline plant with AWHP+ peak boiler. • The baseboards per System 3 are also connected to this central plant (AWHP+boiler) for heating. • The baseline boiler equipment is sized based on the baseline peak heating load with the NECB oversizing criteria. • The baseline AWHP is sized to maintain to the same capacity ratio as per the Proposed plant AWHP vs Boiler peak capacities (refer to example below). It should be noted that this approach is a step away from *NECB 8.4.4.9* which is rather based on ratios of building total heating capacity. • The baseline sequence of operation (shut-off temperatures for AWHP, etc) is to follow proposed sequence of operation. It should be noted this is a step away from *NECB section 8.4.4.13* requirements for heat pump sizing and sequence modeling. • The baseline boiler equipment performance is to be based on NECB efficiencies and part-load curves. Where not regulated in NECB, such as for a central AWHP, apply the same AWHP efficiency and part-load curves as Proposed equipment. **Example:** If Proposed AWHP is sized for 100kW, shutoff scheduled at 5°C, and Backup boiler is sized for 125 kW; Proposed plant capacity ratio electric / fossil is 100/125, or = 0.8. This same ratio should be used for the NECB plant AWHP/Boiler based on the Reference peak heating load. The capacities will be different to Proposed case based on the NECB heat load differences and including NECB oversizing criteria. Shut off NECB AWHP at 5°C to align with Proposed.	

<table>
<tr><td rowspan="2">5.3.2 When NECB Reference is System 1</td><td>Model Proposed per design.

Model Reference building per options outlined below.

Because there are multiple interpretations for how to model the NECB System 1 Reference ventilation system, guidance has been provided for certain situations. If your scenario is not covered, please reach out to discuss before modelling.
Option 1: Proposed uses gas-fired GAHP MUA unit serving common spaces

Model reference ventilation system matching proposed with same efficiency and part load performance. For example, if a GAHP makeup air unit is used to serve Proposed corridors, use a GAHP unit for the Reference case. Airflow rates and setpoints should be equal, fan power should follow NECB (Reference equals Proposed to a max. W/L/s).</td></tr>
<tr><td>Option 2: Proposed uses in-suite HRVs

Model reference ventilation system matching proposed but with baseline efficiencies. For example, the reference building would use the same airflow rates as proposed, but with heat recovery type and efficiency as required by NECB section 5.2.10 and modelled with NECB prescriptive fan power.</td></tr>
<tr><td rowspan="2">5.4 District Energy System (DES) Scenarios</td><td colspan="2">Buildings where a district energy connection is used for space heating, ventilation heating or DHW heating, may still be eligible for this program, however, all requirements from Section 3 must still be met. This includes meeting modelled SCOP requirements from the DSM regulation for systems using natural gas.

If a project is connecting to a DES, this must be stated in the application and will be discussed during the kickoff meeting so that an approach is approved before modelling begins. Modellers may be requested to contact the DES operator to obtain recent performance information, or that may be provided by FortisBC based on other recent projects or correspondence. FortisBC reserves the right to request the modeller use DES performance criteria of their choosing.

Please reach out to the contact noted in Section 6.2 with any questions.</td></tr>
<tr><td>Proposed
Whether a single fuel or multi-fuel system, model the DES as a separate end use for each applicable system, assuming a 100% efficient heat exchanger.
For a hybrid plant with building heating equipment supplemented by DES, model the energy supplied to satisfy the load as separate end uses based on the proposed design sequence of operation.
Report all DES provided thermal heat as separate end use “DES” for each applicable end use.
Apply annual efficiencies for each equipment type used in the DES (heat pumps, boilers, GAHP and any other). Note that the efficiencies will</td><td>Reference
Model the same thermal zones supplied by DES as proposed. For NECB systems where electric fuel source is required, model as hydronic coils connected to DES to avoid fuel switching.
Model DES assuming 100% efficient heat exchanger, same as the proposed building.
For a hybrid plant, such as AWHP with DES for peak or top up, allocate the same load ratio as proposed design between heat pump and DES.
Apply the annual efficiencies for each equipment type used in the DES (same as proposed). Report the annual energy used for each fuel.
Report the modelled SCOP for each applicable system.</td></tr>
</table>

	either be provided by FortisBC or the modeller will need to obtain them from the DES operator, as instructed at project start. • Report the annual energy used for each fuel type. • Report modelled SCOP for <u>each applicable system</u> (as space heating and DHW may have different DSM requirements).	

	Example 1: The space heating system is entirely served by a DES that is using sewage heat recovery heat pump (COP 3.0) with condensing boilers (90%) for peak load that provide 30% of annual energy (as reported by DES operator). The building heating load is 100,000 kWh per year.
	
	• Model the DES assuming 100% efficient heat exchanger.
	• Apply the thermal load ratio and fuel efficiencies to determine the DES annual electricity and natural gas required.
	• Report the results as:
	  ○ Thermal energy (DES) = 100,000 kWh
	  ○ DES Electricity = (100,000 x 70%) / 3 = 23,333 kWh
	  ○ DES Natural Gas = (100,000 x 30%) / 0.9 = 33,333 ekWh
	• Report the modelled SCOP as.
	  ○ Heating System SCOP = 100,000 / (23,333 + 33,333) = 1.76
		Example 1: Reference
		• Model the same thermal zones supplied by DES as proposed. Model DES assuming 100% efficient heat exchanger, same as the proposed building.
		• Apply the thermal load ratio and fuel efficiencies, same as proposed, to determine the DES annual electricity and natural gas required.
		• Report the annual DES electricity consumption and DES natural gas consumption as separate heating end-uses.
		• Report the modelled SCOP.

	Example 2: A DHW heating system is served by a central AWHP in the proposed building, supplemented by DES for top up and peak load . 60% of the annual DHW load is met by the building AWHP and 40% by the DES. The AWHP annual average COP is 2.8 (based on modelled efficiency rating and equipment part load). The DES uses a combination of HPs (COP 2.5) and condensing gas boilers (90%), providing 30% of annual energy, as reported by the DES operator. The annual DHW heating load is 200,000 kWh.	**Example 2**: Reference • Model the same ratio of DHW heating load being supplied by AWHP (60%) vs DES (40%) as proposed. For the AWHP COP, use efficiency rating as per the NECB. • Apply the thermal load ratio and fuel efficiencies, same as proposed, to determine the DES annual electricity and natural gas required. • Report the annual DES electricity consumption and DES natural gas consumption as separate DHW heating end uses. • Report the modelled SCOP.

	• Model the DHW portion met by DES vs AWHP as separate heating sources.
	• Apply the fuel efficiencies to the DES portion only to determine fuel consumption.
	• Report the results as:
	  ○ DHW Thermal Energy (DES) = 200,000 kWh
	  ○ DHW AWHP Electricity = (200,000 x 60%) / 2.8 = 42,857 kWh
	  ○ DHW DES Electricity = (200,000 x 40% x 70%) / 2.5 = 22,400 kWh
	  ○ DHW DES Natural Gas = (200,000 x 40% x 30%) / 0.9 = 26,667 ekWh
	• Report the modelled SCOP as:
	  ○ DHW SCOP = 200,000 / (42,857 + 22,400 + 26,667) = 2.18	

5.5 Hospital Reference Models	Model Proposed per design. The Reference systems are to be mapped on a one-to-one basis to the proposed systems and serve the same thermal blocks as the proposed design. • If the proposed design uses a multizone system for thermal zones defined as "Hospital Area" in *NECB Table 8.4.4.7.-A*, then simulate the NECB Reference air-side system as a multizone system (System – 6 from *NECB Table 8.4.4.7-B*). With this approach the "Hospital Area" space types in the Reference model could be grouped with a multizone system serving other areas of the Reference model (in alignment with zone grouping in the proposed design). • Use the same CSA minimum ventilation rates as the proposed design. Total supply air for each thermal block of the NECB Reference system is at a minimum CSA ACH requirement per space, or the supply air rate that is required to meet the thermal load, whichever is larger. If the proposed design has ventilation, airflow, or temperature setbacks applied to any thermal block, the same applies to the Reference thermal block. In all cases, the "type of heating system" and "type of cooling system" for the NECB Reference model would follow *Table 8.4.4.7-B*, and subsequent sections of the NECB as they apply.	
5.5.1 Hospital Process Loads	Process loads are expected to be included and modelled the same in proposed and reference cases.	
6. Results		
6.1 Overheating	All projects must report overheating hour results for spaces without mechanical cooling (both proposed and reference).	

6 Additional Resources

6.1 References

Documents referenced in this guideline are outlined in Table 3.

Table 3. Reference Documents

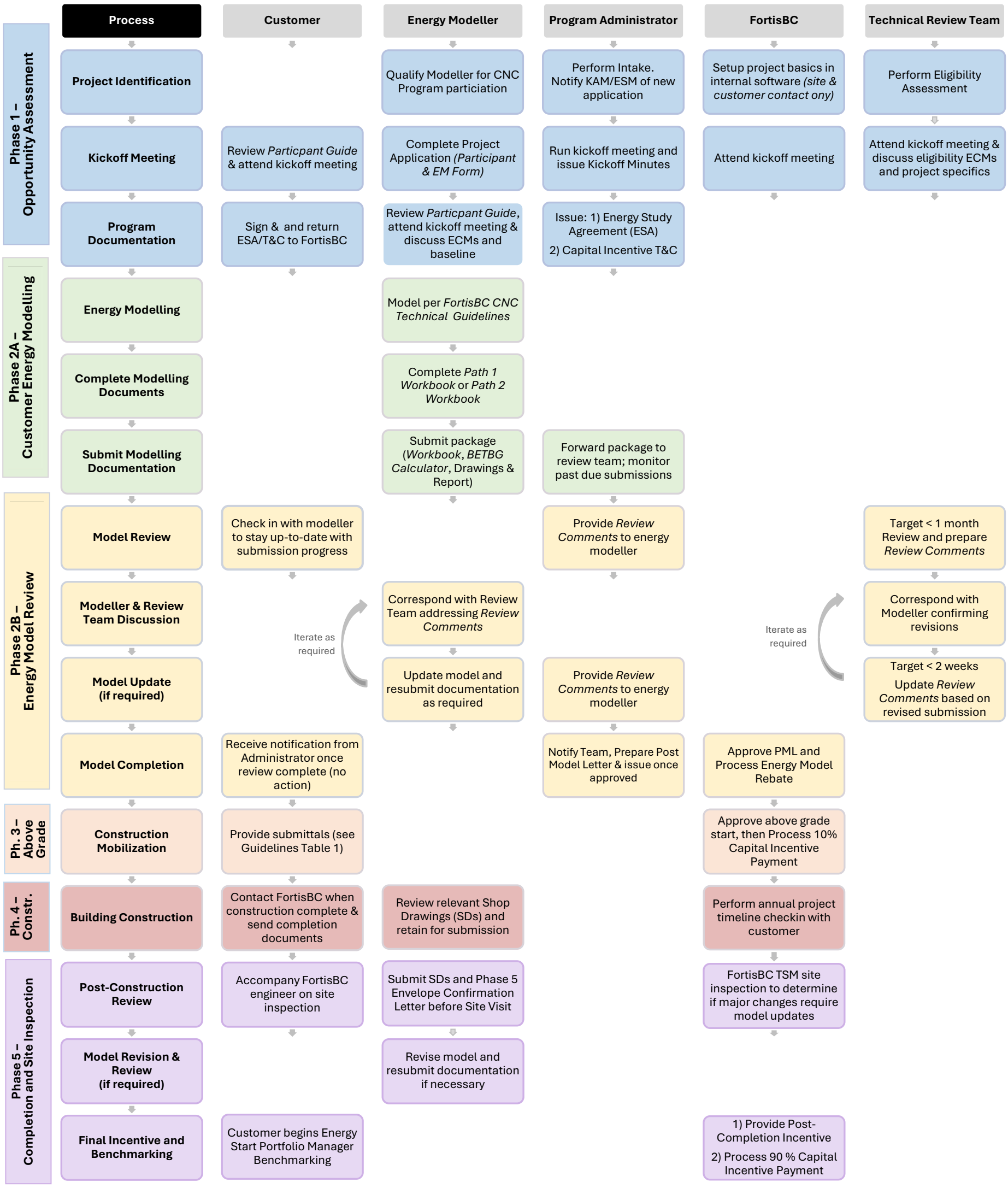
Document	Author	Link
Participant Guide: Commercial New Construction Program	FortisBC	Commercial New Construction Performance Program
CNC Program Workbook	FortisBC	Will be provided after kickoff meeting
Phase 5 Envelope Confirmation Letter	FortisBC	Will be sent with email confirming completion of Phase 2; required to be completed by architect or envelope engineer before Phase 5 site visit can be scheduled
City of Vancouver Energy Modelling Guidelines, Version 2	City of Vancouver	https://vancouver.ca/files/Vancouver/guidelines-energy-modelling.pdf
National Energy Code of Canada for Buildings (NECB) 2020	Natural Resources Canada (NRCan)	https://publications.gc.ca/collections/collection_2022/cnrc-nrc/NR24-24-2020-eng.pdf
Joint Professional Practice Guidelines: Whole Building Energy Modelling Services	EGBC and AIBC	https://www.egbc.ca/getmedia/8f8f0579-ca25-4cfd-a92c-e3c75900d1b6/EnergyModellingGuidelines_FINAL.pdf.aspx
Building Envelope Thermal Bridging Guide (BETBG), online version	BC Hydro	https://thermalenvelope.ca/

6.2 Questions

For questions, please contact: CNCprogram@fortisbc.com.

Appendix A: CNC Program Process

This appendix provides a complete overview of the program process including major steps for key parties at each phase.



Appendix B: Qualified Energy Modellers for CNC Program

This appendix provides a complete list of all qualified Energy Modellers.

Firm Name	Approved Modeller(s) Name	Email	Phone Number	City	Province	Status
AME Group	Marc Trudeau	marctrudeau@amegroup.ca	604-684-5995	Vancouver	BC	Full
	Rocky Tam	rockytam@amegroup.ca	604-684-5995	Vancouver	BC	Full
	Brett Banadyga	brettbanadyga@amegroup.ca	403-252-2333	Vancouver	BC	Full
Aqua-Coast Engineering	Pat Cuthbert	pcuthbert@aqua-coast.ca	604-946-9910	Richmond	BC	Full
Arize Engineering Inc	Hardeep S Gill	Hardeep@arizeengineering.com	778-240-7781	Surrey	BC	Full
AUM Building Science and Engineering Ltd.	Nick Schock	nick@aumbuildingscience.com	778-873-3177	Surrey	BC	Full
Avalon Mechanical Consultants Ltd.	Andrew Melville	amelville@avalonmechanical.com	250-940-4837	Victoria	BC	Full
	Thomas Dwyre	tdwyre@avalonmechanical.com	778-401-7274	Victoria	BC	Full
BC Building Science Ltd.	Farshid Bagheri	farshid@bcbuildingscience.com	604-520-6456	New Westminister	BC	Full
Caneta Energy	Brian Crossman	bcrossman@canetaenergy.com	905-749-1832	Mississauga	BC	Full
	Raymond Gagnon	rgagnon@canetaenergy.com	289-326-3767	Mississauga	BC	Full
Delta-T Consultants Ltd.	Cathy (Ling) Chen	cathy@delta-t.ca	250-860-5550 x 104	Kelowna	BC	Full
Edge Sustainability	Donal Dignan	donal@edgec.ca	--	Vancouver	BC	Full
	Jake Towersey	jake@edgec.ca	778-588-5753 x 715	Vancouver	BC	Full
	Maira Bolanos	maira@edgec.ca	778-588-5753 x 712	Vancouver	BC	Full
	Marina Timmins	marina@edgec.ca	236-777-9605	Vancouver	BC	Full
Enersaver Solutions Inc.	Amir Ekhlasi	amir@enersaversolutions.ca	604-841-1717	Surrey	BC	Full
Englobe	Kamyar Pooyeh	Kamyar.Pooyeh@englobecorp.com	780-801-6228	Edmonton	AB	Full
Evoke Buildings Engineering Inc.	Alex Blue	ablue@EvokeBuildings.com	604-260-1124	Burnaby	BC	Full
Falcon Engineering	Hayley Shearer	Hayley.Shearer@falcon.ca	778-717-5919	Kelowna	BC	Full
Focal Engineering Inc.	Riley Beise	riley@focaleng.com	250-661-3817	Victoria	BC	Full
	Kristian Storgard	kristian@focaleng.com	250-801-7408	Victoria	BC	Full
Introba	Kevin Leung	kevin.leung@introba.com	604-687-1800 x2098	Vancouver	BC	Full
INVIRO Engineered Systems Ltd.	Victor Yeung	Victor@inviroenergy.com	416-491-4455	Toronto	ON	Full
MURi Consulting Group Inc.	Ayda Sahaf	asahaf@muriconsulting.com	778-318-2932	Vancouver	BC	Full
	Golshan Nazari	gnazari@muriconsulting.com	778-512-8455	Vancouver	BC	Full
RDH Building Science Inc.	Eric Catania	ecatania@rdh.com	604-873-1181	Burnaby	BC	Full
Reinbold Engineering Group	Luke Li	lli@reg-eng.com	403-509-1039	Vancouver/ Kelowna	BC	Full
	Richard Outtrim	routtrim@reg-eng.com	403-509-1039	Vancouver/ Kelowna	BC	Full
	Chi Zhang	czhang@reg-eng.com	403-509-1039	Vancouver/ Kelowna	BC	Full
reLoad Sustainable Design Inc.	Martina Soderlund	martina@reloadsustainable.com	778-861-5666	Vancouver	BC	Full
Rocky Point Engineering Limited	Arvin Wang	arvin.wang@rpeng.ca	604-559-8809	Vancouver	BC	Full
Rov Engineering Consulting	Bahar Reza	bahar@rovconsulting.ca	250-801-3901	Kelowna	BC	Full
Stantec	Merriam Vahidi	merriam.vahidi@stantec.com	604-454-0402	Burnaby	BC	Full
Straiton Engineering Ltd	John Buxton	jbuxton@straitoneng.com	778-752-5836	Abbotsford	BC	Full
4EA Building Science	Justin Unger	justinu@team4ea.com	604-803-4671	Vancouver	BC	Full
Ty Bob Consulting Ltd	Derek Whitehead	derek@tybobconsulting.com	604-849-0215	Salmon Arm	BC	Full