

Guidelines

Guidelines for Zero Emission Buildings in R1-1, RT
and RA Districts

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Background and Context

Removing barriers to zero emissions building is part of the City's emerging policy context. The Zero Emissions Building Plan, Vancouver's Renewable City Strategy, and the Climate Emergency Response all prioritize removing regulatory barriers to the development of zero emission buildings.

Intent

These guidelines explain the administration of variances to Zoning and Development By-law regulations and related processes for residential projects designed to zero emission standards in the R1-1, RT and RA districts. For other zones and uses, see the *Guidelines for Larger Zero Emission Buildings*.

Applicants must show how the building envelope and mechanical system have been designed to achieve the relevant standard before seeking related variances, and follow the process and requirements in this document.

These guidelines are to be used in conjunction with the relevant district schedule of the Zoning and Development By-law, as well as other applicable guidelines and bulletins. Because these guidelines primarily address zoning considerations, applicants are encouraged to obtain early advice on meeting the requirements of Vancouver's Building By-law from a registered professional.

Definitions

The following definitions apply in these guidelines:

- **Certified Passive House Consultant (CPHC) or Certified Passive House Designer (CPHD):** These qualifications are equivalent in these guidelines. A CPHC is a person certified by the Passive House Institute as a Passive House Consultant. A CPHD is a person with professional and educational experience in architecture or building who is certified by the Passive House Institute as a Passive House Designer. The CPHC is responsible for designing the building to meet the PH standard.
- **Energy Advisor (EA):** An EA is a licensed professional who conducts home energy evaluations. An EA can evaluate a home, and provide the modeling and testing required for the final certification of a home under EnerGuide. They are trained to use NRCAN's energy simulation software, HOT2000, and to perform blower door air leakage testing.
- **Heat Recovery Ventilator (HRV) or Energy Recovery Ventilator (ERV):** These terms are equivalent in these guidelines. An HRV is a mechanical device that exchanges stale indoor air with fresh outdoor air while recovering heat at the same time using a heat exchanger. An ERV performs the same function and also provides humidification or dehumidification.
- **Passive House (PH):** In these guidelines, a Passive House building is one that meets the standards established by Passive House International. For a general description, see section 3 of this document.
- **Passive House Building Certifier (Certifier):** In these guidelines, a Passive House Building Certifier is one that meets the definition in the Zoning and Development By-law. A general description is a person accredited by the Passive House Institute in Darmstadt, Germany for the purpose of certifying buildings as being designed in accordance with its Passive House standards.

- **Passive House Planning Package (PHPP):** PHPP is software used to determine whether a building meets Passive House standards. The package, available through the Passive House Institute, assists with building design and window planning to test how different designs will affect energy use.
- **Qualified Green Building Consultant:** A professional with knowledge and practical experience in high-performance building design who ideally has worked on ILFI Zero Energy projects in the past. Training and experience in high-performing building design, energy modeling, efficient building systems, renewable energy assemblies, or comparable is likely necessary for ensuring ILFI Zero Energy targets are achieved.
- **Qualified Net Zero Builder:** A builder who has met the requirements of the qualification as outlined in the Net Zero Administrative Requirements established by the Canadian Home Builders' Association (CHBA), which include: being a CHBA builder member, being a registered EnerGuide builder with NRCan, having successfully completed the CHBA NZ Builder Training, and having completed a Net Zero or Net Zero Ready labelled home.
- **Qualified Net Zero Energy Advisor (NZEA):** A professional who has met the requirements of the qualification as outlined in the CHBA Net Zero Administrative Requirements and registered with the CHBA. The NZEA is eligible to perform energy evaluations for homes pursuing the CHBA's Net Zero Home Label using energy modeling methods in accordance with EnerGuide Rating System (ERS) Technical Procedures.
- **Variations:** For readability, these guidelines refer to various allowances for zero emissions buildings in the Zoning and Development By-law as variations.

Guidelines

1 Zero Emissions Standards

In these guidelines, acceptable zero emission standards include Passive House, the CHBA Net Zero Home Labelling Program with electric equipment, ILFI Zero Energy, and PHI EnerPHit. Projects must achieve the standard using on-site, installed equipment. The Director of Planning can consider alternative rating and certification standards, but enquirers should confirm their acceptability with staff before making an application.

2 Regulation Variations

Achieving a zero emission building usually requires more insulation, advanced air tightness, renewable energy equipment, or other features that require changes to typical building designs.

Buildings in R1-1, RT or RA districts can access variations of building height, yard, and building depth regulations, and the exclusion of floor area, if they demonstrate that they will achieve Passive House certification or another accepted zero emission standard. Variations of design regulations can also be considered by the Director of Planning. In these cases, the design of the project should also show how impacts on the privacy, daylight, or sunlight of neighbouring properties will be avoided. Please see the regulations in Section 10.33 of the Zoning and Development By-law for the requirements of these variations.

Other regulations that control building size, such as site coverage or side yards, may still apply.

Proponents applying for variances to a multiplex project (multiple dwelling up to 8 units in R1-1 district), must certify all units on the site to an acceptable standard.

2.1 Floor Area – Fixed Rate Exclusion

Section 10.33.1 of the Zoning and Development By-law provides an exclusion equal to 19% of the permitted floor area for a zero emission building in the R1-1, RT and RA districts. This fixed exclusion can be used instead of multiple and more complex calculations for insulation and mechanical equipment. Floor area that is excluded from overall FSR may be located where it fits within the permitted development envelope. Where there is more than one FSR limit, calculate and locate each exclusion separately. The potential buildable area based on this regulation may be estimated with the formula:

$$\text{Permitted floor area} * 1.19 = \text{Potential buildable floor area}$$

For example, a house that is permitted to have a net floor area of 3,960 sq. ft. by the FSR limit in zoning would use the figures:

$$3,960 \text{ sq. ft.} * 1.19 = 4,712 \text{ sq. ft.}$$

Note that the potential area may not be achievable on all sites and for all designs. Applications under this exclusion cannot use other floor area exclusions in sections 10.15 or 10.33. Laneway houses must use the permitted area of the laneway house to calculate this exclusion, not the permitted area of the site.

2.2 Floor Area – Calculated Exclusions

Section 10.15 of the Zoning and Development By-law allows for the exclusion of floor area for insulation using two different calculations. For applications to exclude increased insulation under clause 10.15.2 in a conventional building, a Building Envelope Professional must be retained to calculate and verify the exclusion. In an application designed to the Passive House standard that provides a PHPP energy model, the Certified Passive House Designer or Certified Passive House Consultant may verify the exclusion instead. For more details on this exclusion, see the *Floor Area Exclusions for Improved Building Performance* bulletin.

The exclusion for heat recovery ventilators and connected shafts in section 10.33.3 allows a maximum exclusion of 2% of floor area being provided. This exclusion recognizes the additional floor area that may be required for high efficiency units or for additional units, within a Passive House project. An HRV that is a Passive House “Certified Component” should be specified. The exclusion does not apply to mechanical equipment that uses the same floor area as a conventional system.

Applications under section 10.15 or 10.33.3 cannot use the floor area exclusion in section 10.33.1.

2.3 Building Height, Yards, Building Depth, and Balconies

The permitted building height and building depth are increased by 0.6 m, and the required rear yard and building separation are decreased by 0.6 m for qualifying buildings in the section 10.33.1 of the Zoning and Development By-law. Zero emission buildings can also access a variance for balconies in section 10.8.1.

2.4 Summary Table

The following table provides a reference of zoning variances that are available for green buildings. Before making an application, please read the current regulation in the Zoning and Development By-law, along with related bulletins, guidelines and policies. These documents can be found on the City of Vancouver Zoning and Land Use Document Library web page. For example, more information on shading devices located in yards can be found in the *Shading Devices and Yard Projections* bulletin.

Table 1: Summary of Zoning and Development By-law Variances

Conditional Variance for Green Building Features	Zoning and Development By-law Section
Balcony projections into required yards	10.8.1(c)
Building depth	10.33.1(b)
Building height	10.33.1(a)
External design regulations	10.33.1(f)
Green roof access and infrastructure - height	10.1.1(d)
HRVs and connected shafts	10.33.3
Insulation	10.15.1 and 10.15.2
Mechanical rooms with zero emission equipment	10.18.1
Rear yard depth	10.33.1(c)
Roof-mounted energy equipment - height	10.1.1(d)
Shading devices, eaves, and overhangs - yards	10.8.1(f)
Venting skylights and clerestory window - external height	10.1.1(e)

3 Submission Requirements

This section describes the submission requirements at each project phase. These requirements are in **addition** to those of the development and building permit process for a conventional building.

For zero emission buildings pursuing standards other than Passive House, such as the ILFI's Zero Energy Certification or the CHBA's Net Zero Home Labelling Program, applicants are expected to provide a comparable level of material. For example, where a PHPP model is required for PHI sites, applications using an alternate standard should submit an energy or carbon balance, and an energy modelling report. For projects pursuing ILFI's Zero Energy Certification, twelve months of energy performance data is required. For questions about submittals for alternate standards, please contact green.buildings@vancouver.ca.

Please see the Definitions in these guidelines, and note the different roles and responsibilities. For Passive House projects, a CPHC who is also an EA can serve both roles.

Scheduling a Pre-Application Appointment

When requesting an appointment, applicants should note that the application will be for a building that meets a zero emission standard, and that the project team will be requesting related relaxations.

3.1 Pre-Application Meeting

At an enquiry or pre-submittal meeting, applicants must provide:

- A design strategy that identifies the zoning variances sought, describes the primary design elements intended to achieve the standard, and shows the elements on conceptual drawings.
- A letter from a consultant who is qualified to administer the proposed zero emission standard, confirming they have been engaged to advise on the project.

Passive House applications: Provide a letter from the CPHC confirming that they have been engaged to do energy modelling and advise on the project. A member of the project team may serve in this role if they are a CPHC.

CHBA Net Zero applications: Provide a letter from the CHBA of British Columbia to confirm that the project has been enrolled to obtain a Net Zero label with a Qualified Net Zero Builder. Provide a letter from an NZEA confirming that they have been engaged to advise on the project.

ILFI Zero Energy applications: Provide confirmation of registration with ILFI's Zero Energy Certification, and a letter from a Qualified Green Building Consultant confirming they have been engaged to advise on the project.

Proposals to vary external design regulations must show how potential effects on neighbouring houses such as privacy, massing, and shadowing have been considered in the design. Staff may provide feedback at the pre-application meeting to inform the application.

3.2 Following the Pre-Application Meeting

Prepare a preliminary energy model or other material as specified in the chosen zero emission standard, and revise the design as necessary to meet or exceed the standard.

Passive House applications: Applicants are advised to model the project using the current version of the Passive House Planning Package (PHPP) software, and to revise the design as necessary to meet or exceed the Passive House requirements.

If specific challenges to meeting Passive House targets are identified, these must be resolved before applying for a Development Permit.

Development Building (DB) Permit Application to Housing Review Branch: The applicant must engage an EA. The EA must review the proposed assemblies, submit a detailed copy of the City of Vancouver's "Pre-Permit Checklist", and otherwise comply with pre-permit requirements.

In addition to the PHPP file, applicants must provide the Housing Review Branch with a letter from a Certifier stating that the project design and specifications have been reviewed and, in the opinion of the Certifier, the project is capable of achieving Passive House certification if built to the design and specifications noted in the Certifier's letter.

Once the design, assemblies and components have been identified, and all of the above satisfied, applicants may submit their Development Building (DB) permit application to the Housing Review Branch.

CHBA Net Zero applications: Applicants should have the project modelled by an NZEA to confirm it can achieve a 0 (zero) GJ rating using modelling methods and calculation in conformance with the EnerGuide Rating System v15, using HOT2000.

3.3 Development Permit Application

Applicants must submit:

- An updated design strategy that:
 - identifies the proposed zero emission standard,
 - specifies the zoning variances being sought,
 - provides a rationale for any conditional variance, and
 - identifies the design elements proposed to meet the zero emission standard, including where these elements can found on the application drawings

ILFI Zero Energy applications: Applicants must provide proof of an established energy target and a narrative as to how this target will be achieved, including strategies around energy efficiency, electrification of building systems, and on-site renewable energy generation, from a Qualified Green Building Consultant.

CHBA Net Zero applications: Applicants must provide a Homeowner Information Sheet prepared by the NZEA showing a 0 (zero) GJ rating using modelling methods and calculation in conformance with the EnerGuide Rating System v15, using HOT2000. The design must meet all requirements as outlined in the most current version of the CHBA Net Zero Home Labelling Program Technical Requirements, show that the design is fully Net Zero and uses all electric equipment. The applicant must submit signed letter from the NZEA that confirms the project is enrolled in the CHBA Net Zero program.

Passive House applications: Applicants are not required to prepare a HOT2000 model or to submit a “P-file” number. Instead, the CPHC must submit:

- a compliant pre-construction PHPP model (electronic copy of the Excel file),
- a printout of the completed “verification” page with relevant notes, signed by a CPHC, and
- a memo providing modelling input values for the PHPP.

If applying for the exclusion of floor area occupied by heat recovery ventilators and connected shafts under section 10.33.3, additional material is required:

- a signed letter from a CPHC that recommends the proposed mechanical system and notes the dimensions required,
 - dimensioned drawings in the application set showing the additional floor area required for the Passive House system as compared to a conventional system, and
 - a summary table of the proposed exclusion for each building level.
- Application drawings that prominently state the proposed zero emission standard and identify the design elements proposed to meet the standard.
 - Confirmation letters required at the Pre-Application stages, if not already provided
 - A signed letter of commitment from the owner to complete the steps set out in the selected zero emissions standard, including registration, certification, or labeling.

Passive House applications: Provide a letter of commitment to certify the building through the Passive House Institute.

3.4 Mid-Construction

Before drywall has been installed, the consultant must conduct a site visit. In addition to typical mid-construction checks such as a blower door test, the consultant must verify that all assemblies, materials, and components are installed as required to meet the zero emission standard.

ILFI Zero Energy applications: Provide a letter from a Qualified Green Building Consultant that contains:

- a statement that the construction of the building and the installed assemblies and components match those specified in the consultant's narrative; and
- a statement that there are no known barriers to the project achieving Zero Energy certification.

Passive House applications: The EA will verify that all assemblies, insulation materials, and components (including windows, doors and ventilation equipment) are installed as per the specifications provided in the Certifier's letter. The EA will conduct a mid-construction blower door test to the EN 13829 protocol, with modifications as prescribed by the Passive House Institute, in lieu of the HOT2000 protocol. The EA will provide the applicant with documentation verifying the construction details and the EN 13829 blower door test results as attachments to the typical "Pre-Drywall Checklist", and this must be submitted to the City.

In addition to the typical EA review, the applicant must also provide the City with a letter from the retained CPHC that contains:

- a statement that the CPHC attended and inspected the construction of the building and that the installed assemblies and the doors and windows match those specified in the Certifier's letter;
- confirming there is no kitchen or dryer vent, unless modelled in the PHPP provided;
- bathroom and kitchen exhaust roughed in to the mechanical room;
- the results of the EA's mid-construction blower door test at 0.6 ACH; and
- a statement that there are no known barriers to the project achieving Passive House certification.

CHBA Net Zero Applications: The NZEA will provide a preliminary report with a predicted EnerGuide Rating based on the results of the mid-construction fan test to the City for review.

3.5 Prior to Final Inspection

In addition to typical requirements such as conducting a review and final door blower test, the EA should provide the applicant with a report on the mechanical and other construction details required to achieve the zero emission standard. The applicant must submit a copy of the report to the City.

Passive House applications:

- The EA must conduct a review and final door blower test. This test must be conducted to the EN 13829 protocol, with modifications as prescribed by the Passive House Institute (e.g. both pressurization and depressurization).

- The EA will provide the applicant with documentation of mechanical and other construction details, as well as a report on the results of the EN 13829/PHI blower door test, which must be submitted to the City.
- In addition to the EA review, applicants must provide the City with a letter from a Certifier stating that the final PHPP and relevant documentation have been received and are being reviewed for final certification. The Certifier's letter must include a suggested date by which the City may expect to be notified of final certification to the Passive House Institute standard.

Once the project is certified by the Passive House Institute, a copy of the certificate must be provided to the City of Vancouver

3.6 Building Certification

The project must complete the requirements of the zero emission standard, and provide a copy of the confirmation to the City of Vancouver.

Passive House applications: The project must meet the Passive House standard and achieve Certification to support the relaxations noted. The Certifier will review the project documentation, including the PHPP model, building envelope drawings, mechanical systems and other information. Once the project is certified by the Passive House Institute, a copy of the certificate must be provided to the City of Vancouver.

CHBA Net Zero applications: Once the project is labelled under the CHBA Net Zero Labelling Program, a copy of the Net Zero Label must be provided to the City of Vancouver.

ILFI Zero Energy applications: The project must meet the Zero Energy requirements and achieve Certification to support the relaxations noted. The ILFI Auditor will review the project documentation, including energy demand and production over 12 consecutive months, lack of combustion within the project, project drawings, site photographs, and other documentation. Once the project is certified by ILFI, a copy of the certification must be provided to the City of Vancouver.