1. Background

What is the Climate Ready Rezoning Policy?

The Climate Ready Rezoning Policy accounts for embodied greenhouse gas emissions in new buildings and ensures minimum levels of air filtration and cooling to improve indoor air quality and reduce overheating. The embodied emissions and refrigerant emissions reporting and air filtration requirements apply to applications for all Part 3 buildings, while the cooling requirements only apply to residential dwelling units within Part 3 buildings. The policy applies to detailed rezoning applications submitted on or after August 1, 2022. The Climate Ready Rezoning Policy is available on the District of North Vancouver website.

What are Embodied Emissions?

Embodied emissions generally refer to greenhouse gas emissions associated with the life-cycle of a building, such as those associated with the production of materials used, like concrete or the refrigerants used for heating and cooling systems. These materials can significantly contribute to the overall emissions of a building. Detailed information on how to calculate embodied emissions is available in Section 3 below.

What are Refrigerant Emissions?

Refrigerants used in commercial chillers, air conditioners, mini- and multi-split heat pumps, and variable-refrigerant-flow (VRF) systems can be a significant contributor to building emissions due to refrigerant leakage. Addressing these emissions is needed as refrigerant use continues to grow from increased demand for cooling and electric heating systems. Detailed information on how to calculate refrigerant emissions is available in Section 3 below.

What are MERV 13 Filters?

MERV 13 filtration is emerging as the typical industry practice for outdoor air filtration in new buildings, particularly in urban contexts. MERV 13 filters have been shown to offer a degree of protection from particulate matter including traffic pollution and wildfire smoke..

What is Active Mechanical Cooling?

The Climate Ready Rezoning Policy defines active mechanical cooling as mechanical systems capable of maintaining an indoor temperature of 26°C, with windows closed. All residential dwelling units within new Part 3 buildings are expected to be served by active mechanical cooling.

What are Passive Cooling Strategies?

Passive cooling strategies are measures that can minimize cooling energy consumption and keep spaces below critical temperatures during a power outage. All projects shall include a description of passive design strategies employed (e.g. building orientation, reducing window-to-wall ratio, exterior shading devices, low Solar Heat Gain Coefficient glazing). Energy performance modelling should support the choice of passive cooling measures selected.

2. Submission Documents

This table below provides a summary of the submission documents required at different stages of development.

Table 1: Summary of submission documents required at different stages of development

Submission Documents	
Detailed Rezoning Application	
	Climate Ready Design Strategy describing sustainable design elements and includes:
	Preliminary embodied emissions calculations and strategies explored during design to reduce embodied emissions
	A commitment by the owner to meet the policy with documentation to be submitted at time of building permit application, including:
	• Complete refrigerant emissions calculations
	• The use of minimum MERV 13 filters
	• Active mechanical cooling for all residential dwelling units within Part 3 buildings
	• A description of passive design strategies employed to minimize cooling energy requirements and energy performance modelling to support the choice of passive cooling measures selected.
Building Permit Application	
	• Complete refrigerant emissions calculations
	• Updated embodied emissions calculations and description of what measures taken, if any, to reduce embodied emissions
	• Mechanical drawings showing a ventilation system accommodating minimum MERV 13 filtration and an active mechanical cooling system.

3. Requirements for Calculating Refrigerant and Embodied Emissions

The District's requirements for calculating refrigerant and embodied emissions are generally consistent with the City of Vancouver's guidelines and are described below.

Refrigerant Emissions

From the policy:

> *"Calculate and report the life-cycle equivalent annual carbon dioxide emissions of each building, in $kgCO_2e/m^2$, from the emissions of refrigerants."*

Emissions from refrigerants shall be calculated using the following formula:

$$kgCO_2e/m^2 = [GWPr * Rc * (0.02 * L + 0.1)] / (L * A)$$

Where:

GWPr: Global Warming Potential of the refrigerant, in kgCO2e per kg_r

Rc: Total Refrigerant Charge in the system, in kg_r

L: Life of the system, in years

A: Modelled Floor Area of the building, in m^2

0.02, 0.1: Assumes an annual leakage rate of 2%, with 10% end-of-life leakage

Table 2: Global Warming Potential of Refrigerants

Refrigerant	Global Warming Potential
CFCs	
CFC-11	4,680
CFC-12	10,720
CFC-114	9,800
CFC-500	7,900
CFC-502	4,600
HCFCs	
HCFC-22	1,780
HCFC-123	76
HFCs	
HFC-23	12,240
HFC-134a	1,320
HFC-245fa	1,020
HFC-404a	3,900
HFC-407c	1,700
HFC-410a	1,890
HFC-507a	3,900
Natural Refrigerants	
Carbon dioxide (CO2)	1
Ammonia (NH3)	0
Propane	3

Service life should be based on the system in question using the table below. A different service life may be used if supported by documentation.

Table 3: Default Equipment Lifetime

Equipment	Default Equipment Life
Window air-conditioner, heat pump	10 years
Unitary, split, packaged air conditioner, package heat pump	15 years
Reciprocating and scroll compressor, reciprocating chiller	20 years
Absorption chiller	23 years
Water-cooled packaged air conditioner	24 years
Centrifugal chiller	25 years

For projects pursuing LEED v4, calculations created to demonstrate achievement of the Enhanced Refrigerant Management credit, Option 2, and reporting of the results, are acceptable to meet the intent of this requirement.

Requirements for Calculating Embodied Emissions

From the policy:

> *"Report the life-cycle equivalent annual carbon dioxide emissions (i.e. global warming potential impact, or 'embodied carbon') of each building, in kgCO_2e/m², as calculated by a whole-building life-cycle assessment (LCA)."*

In addition to reporting the embodied emissions intensity in kgCO2e/m², projects must also report the total lifecycle embodied emissions in kgCO2e, and the equivalent annual embodied emissions intensity in kgCO2e/m²/year.

There are design team LCA software tools currently available that can greatly streamline the workflow of LCA and that meet the technical requirements below, such as the free Canadian-based Athena Impact Estimator. For consistency in LCA calculations, projects shall use the following standard requirements:

1. The LCA must include all envelope and structural elements (including parking structure), including footings and foundations, and complete structural wall assemblies (from cladding to interior finishes, including basement), structural floors and ceilings (not including finishes), roof assemblies, and stairs construction, but exclude excavation and other site development, partitions, building services (electrical, mechanical, fire detection, alarm systems, elevators, etc.), and parking lots.

2. The LCA must assume a building lifetime of 60 years.

3. The life-cycle boundary must account for cradle-to-grave impacts, including resource extraction, product manufacturing and transportation, building construction, product maintenance and replacement, and building demolition/deconstruction/disposal (EN 15804/15978 modules A1-A5, B2-B4, and C1-C4). Operating energy and water consumption are excluded.

4. The Life-Cycle Inventory (LCI) database used must be ISO 14040, 14044, and 21930 compliant, and regionally specific, if possible.

5. The Life-Cycle Impact Assessment (LCIA) method used must be the US EPA's Tool for the Reduction and Assessment of Chemical and Other Environmental Impacts (TRACI);

6. If the service life of a product used in initial construction is greater than the building's assumed service life, the impacts associated with the product may not be discounted to reflect its remaining service life.

In addition to reporting the embodied carbon as detailed above, projects shall separately report, where readily available, the impacts and benefits beyond the system boundary (EN 15804/15978 module D). This is a quantification of environmental benefits or loads associated with reuse, recycling and energy recovery from flows exiting the system boundary. Note that these impacts are reported for information only and are not counted towards the embodied carbon of the building.

Projects are also encouraged, but not required, to report:

1. The lifecycle impacts associated with other building elements that are excluded from the mandatory Embodied Carbon reporting.

2. Other calculated life-cycle indicators and impacts, such as ozone layer depletion, acidification, eutrophication, photochemical ozone creation, primary renewable energy use, fresh water consumption, human toxicity, respiratory inorganics, eco-toxicity, and other impacts;

3. A breakdown of impacts by activity (materials/products, transportation, on-site activities, wastage, etc), life-cycle stages (extraction, manufacturing, construction, use/maintenance, end of life), product category (structure, foundation, wall, glazing, etc.), and material type (steel, wood, concrete, plastic, etc).

For projects pursuing LEED v4, calculations created to demonstrate achievement of the Life-cycle Impact Reduction credit, Option 4, and reporting of the proposed building results, are acceptable to meet the intent of this requirement.

Need more info?

This document has been prepared to provide applicants information to support the Climate Ready Rezoning Policy, though the policy shall take precedence in the case of any discrepancy. Additional questions can be submitted to planning@dnv.org.