

Developing a Covered Buildings List to Inform an Energy Reporting Bylaw in Whistler

EXECUTIVE SUMMARY

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Disclaimer

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Introduction & Background

Whistler adopted the Big Moves Climate Action Strategy in 2020, setting a plan in motion for reducing Whistler's greenhouse gas (GHG) emissions by 2030 (Resort Municipality of Whistler, 2016; Resort Municipality of Whistler, 2020; Resort Municipality of Whistler, 2022). Divided into six distinct initiatives, this strategy aims to lower GHG levels by 50% below 2007 levels by reducing emissions in the transportation, buildings, and waste management sectors. Numerically, this amounts to limiting annual emissions to 66,500 tCO₂e by 2030, approximately 50% less than Whistler's 2020 emission estimations of 131,166 tCO₂e.

As Whistler's second-largest emitter, buildings occupy 38% of the city's 2020 recorded emissions (Resort Municipality of Whistler, 2020). For this reason, steps 4 and 5 of the Big Moves Climate Action Strategy aim to reduce operational emissions in new and existing buildings respectively, with the latter being more challenging to address. This is due to the increasing use of natural gas to heat buildings in Whistler, and a lack of jurisdiction to regulate GHG emissions from buildings. Instead, change must be made indirectly through the introduction of other tools such as owner incentives, engagement, partnerships, and outreach.

Another effective means for stimulating change is through the implementation of policy, or bylaws, requiring property owners to report on their energy use and emissions. This data can be used to develop benchmarks and track progress towards meeting internal GHG emission targets, identify underperforming buildings, and inform future decision making. Determining the exact scope of buildings covered under an energy reporting bylaw, known as a "covered buildings list", is an important task requiring the detailed analysis and summation of existing building attributes (Westerhoff et al., 2024). Creating this list is the purpose of the project requested by the Resort Municipality of Whistler (RMOW), and it can be viewed as two connected components:

1. Create a master list of all residential and multi-family residential buildings in Whistler, providing detailed building metrics such as gross floor area (GFA), number of stories, and building code year to allow for accurate assessment of building decarbonization potential (Resort Municipality of Whistler, 2018).
2. Based on a literature review of similar energy reporting bylaws implemented by other municipalities, apply informed data thresholds to extract a covered building list for inclusion in Whistler's own energy reporting bylaw.

Methodology

Master Building List

An initial list of commercial and residential properties was provided by the RMOW for investigation. Properties were organized by address with some properties occupying multiple addresses. Though coordination with RMOW staff, it was determined that the attributes listed in Table 1 should be recorded for each property to ensure sufficient data is available to perform a rough assessment of the energy efficiency and carbon emissions of each building. Table 1 also lists the types of documents that were consulted, as well as their suitability for determining each building attribute.

Building Attribute	Permit Applications	Code Analyses	Occupancy Documentation	Construction Drawings
Part (3 or 9)		✓		✓
# of Stories		✓		✓
Roof height (m)		✓		✓
Mezzanine (Y/N)		✓		✓
Underground Parking (Y/N)		✓		✓
Basement (Y/N)		✓		✓
Sprinklers (Y/N)		✓	✓	✓
GFA (m ²)	✓	✓		✓
Building area (m ²)	✓	✓		✓
Initial Year Built			✓	✓
Initial Building Code Year			✓	✓
Envelope Restoration (Y/N)			✓	✓
Envelope Retrofit Code Year			✓	✓

Table 1: Summary of building attributes included in the master building list, as well as the types of documents used to retrieve each attribute.

While many more document types pertaining to buildings were stored in the RMOW's existing databases, permit applications, code analyses, occupancy documentation, and construction drawings were found to be the most effective and reliable for extracting useful information. A more detailed breakdown of these documents is provided below for context:

- **Permit Applications:** Forms required for filing zoning, development, or building permits with the RMOW. These forms contain owner information and rough details about the site

and future building to be constructed, including the building's GFA allowances and estimated area footprint.

- **Code Analyses:** Documents describing the building's properties as they relate to BC Building Code requirements. This could include indicating the presence of sprinklers, mezzanines, and basements, as well as detailed calculations of the building's individual floor areas, height, and area footprint.
- **Occupancy Documentation:** Includes documents submitted for the purpose of obtaining an occupancy permit. These documents are useful for determining the completion date of properties and implementation of life-safety systems such as the fire alarm and sprinkler systems, but otherwise limited.
- **Construction Drawings:** Any architectural, mechanical, electrical, civil, or structural building plans submitted to the RMOW throughout the course of construction. These can be used to determine any attribute of the building but require domain-specific knowledge to properly extract information from, making drawings effective but difficult to use.

Additionally, the following procedure was adhered to for locating and documenting the information for each property in the master building list:

1. Attempt to locate the property in the RMOW Building Department's file system containing digital-only files, documents scanned from physical binders, and old documents converted from microfiche format for long-term storage.
2. Identify properties with information gaps and search for them in the RMOW's digital archives using "Tempest" software.
3. In the event limited or no information on a property is available, make record of the property for future follow-up and investigation by RMOW staff.

Literature Review

The primary source consulted for constructing a covered building list was an internal step-by-step guide created by Introba and BC Hydro to support local governments with implementing building energy benchmarks (Westerhoff et al., 2024). In addition to providing baseline metric thresholds and guidelines for composing covered building lists, this document also provided a roadmap for implementing building energy bylaws through the inclusion of similar initiatives undergone by the municipalities of Vancouver, Toronto, and Seattle. Review of the evolving threshold requirements implemented by these cities over multiple phases of development revealed the three following metrics as the most effective for preparing covered building lists (Resort Municipality of Whistler, 2018):

1. **Gross floor area (GFA):** As a building's effective floor area increases, so too does its operational energy consumption and carbon emissions. For this reason, GFA is used as a threshold by all three municipalities due to its effectiveness in measuring the carbon and energy reduction potential of a building.
2. **Building Type/Code Classification:** Used as a threshold by both Vancouver and Ontario, the classification of a building determines the code requirements imposed on its construction. In Whistler, outside of residential and commercial separations, buildings are generally classified as Part 9 unless their footprint exceeds either 3 stories in height or 600m² in area, in which case they are considered Part 3 constructions (Office of Housing and Construction Standards, 2015). Therefore, retrofitting Part 3 buildings is more valuable to pursue than Part 9 buildings.
3. **Year of Initial Construction:** The more buildings age, the less effective their existing infrastructure and systems become in conserving energy and reducing carbon emissions. The City of Seattle imposed an initial occupancy date before 2011 for their energy reporting bylaw, an initiative that holds promise for implementation in Whistler as well to accommodate the large number of older existing buildings.

Results

Building details were compiled and summarized in a master building list, with important attributes recorded for each property. Due to the age of some properties and the complex nature of building development, several challenges were encountered during this process:

- Older properties include mostly hand-drawn drawings and low-quality document scans, leading to difficulty in extracting useful and reliable information. To accommodate, assumptions and estimations of some metrics, such as GFA and building area, were used where appropriate.
- Information can conflict between sources, as can the date of submission for many drawing sets. For example, review drawings are much less reliable than construction drawings for obtaining relevant information. To mitigate this issue, property attributes were compared closely between documents to determine the most up-to-date information and ensure the existing state of properties was captured as accurately as possible.
- Large properties occupying several addresses often possessed thousands of records on file, making exhaustive comparison of information impossible. In these events, records were selectively filtered to extract only key documents with the highest concentration of relevant information for review.

Following the master building list's construction, it was then filtered into five different covered buildings lists for review by the RMOW. The thresholds imposed by these lists are presented in Table 2 for comparison.

List No.	Gross Floor Area (m ²)	Building Code Classification	Building Code Year
1	≥8000		
2	≥10000		
3	≥5000	3	
4	≥5000		≤2000
5	≥5000	3	≤2000

Table 2: Summary of covered building lists prepared for RMOW staff review.

Recommendations

With the need to continually iterate on the energy reporting bylaw by preparing new covered building lists, the master list will also need to be improved to ensure this process is as seamless and efficient as possible. For this reason, several recommendations to the master building list are provided:

- **Add additional building metrics:** While sufficient to produce covered buildings lists, the current selection of metrics can be further augmented to provide greater avenues of comparison between properties. Some examples include (but are not limited to): the number of streets bordering each property, the distribution of individual building units, and whether the building is made from combustible or non-combustible materials.
- **Allow for continued development and maintenance:** RMOW staff are recommended to continue building upon the master building list by applying the same methodology to new property developments as they are constructed. Making allowances for building officials to determine key building characteristics during final occupancy permit inspections and add the associated addresses to the master building list would help maintain it while improving both the reliability and accuracy of any recorded information.
- **Include “Mixed-Use” building classification:** Properties are currently separated into “Commercial” and “Residential” classifications within the building list; however, many properties include both commercial *and* residential area. Adding a proper “Mixed-use” property classification would allow for more detailed analysis of included properties.

Conclusion

This project involved the construction of a covered building list for the RMOW to use as a foundation for a proposed energy reporting bylaw. The bylaw would require existing building owners to report energy usage to the RMOW for the purpose of establishing GHG benchmarks and promoting low-energy retrofits. Following a literature review of other municipalities with existing energy reporting bylaws and a mass compilation of existing building data into a master list, several potential covered building lists were prepared for review by the RMOW.

A final selection of all properties possessing **8000m² or greater GFA** was agreed on to ensure the commercial buildings and hotels with the highest retrofitting potential are included in the initial phase of a proposed energy reporting bylaw. After inclusion, threshold requirements would then evolve over time to encompass more buildings as both awareness and adoption of the energy reporting bylaw increases.

References

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