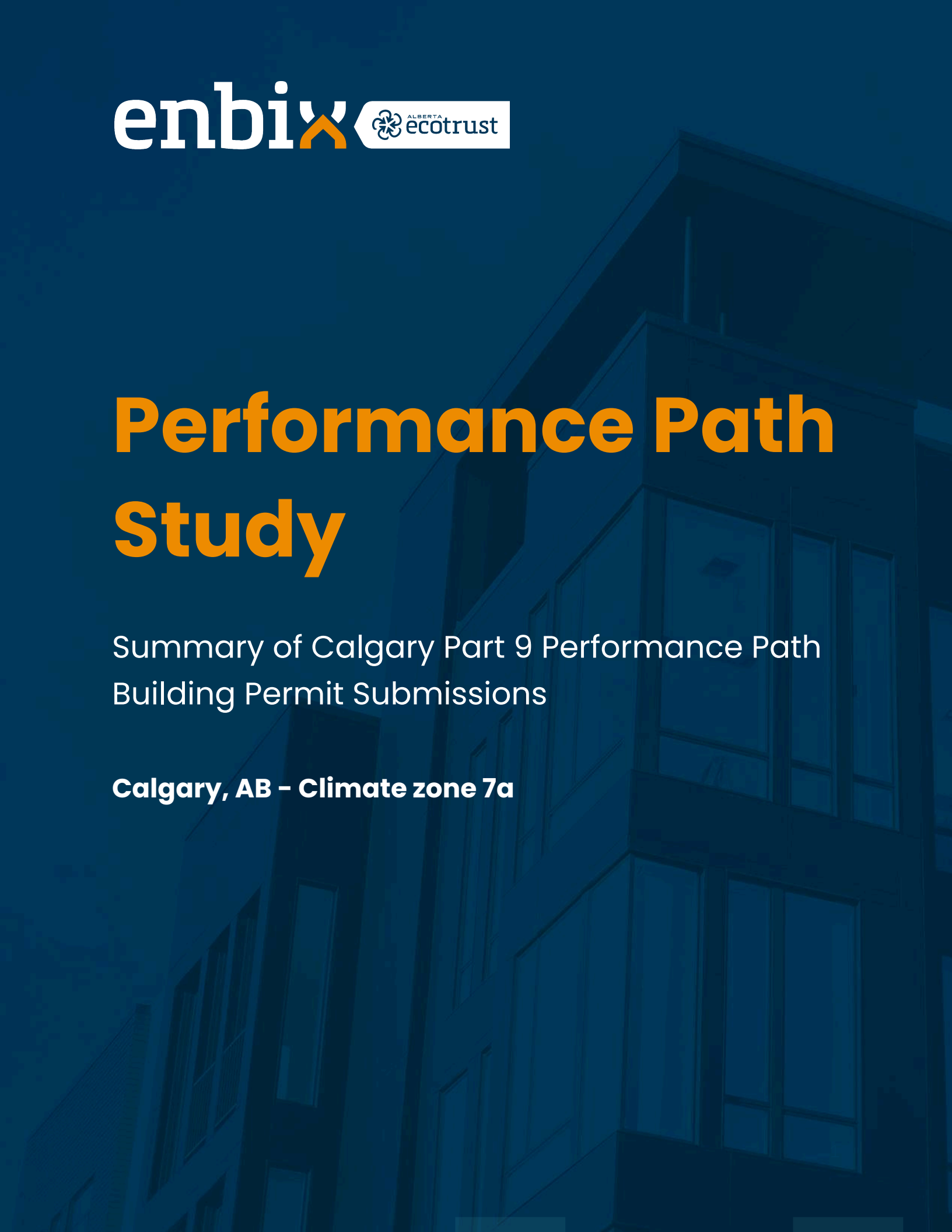


Performance Path Study

Summary of Calgary Part 9 Performance Path Building Permit Submissions

Calgary, AB - Climate zone 7a

PREFACE – DATA CONTEXT FOR Calgary

This report is based on 2024 residential building permit data submitted to the City of Calgary. The dataset includes information derived from energy compliance documentation, mechanical schedules, and permit-stage energy modeling, which were used to demonstrate compliance with Section 9.36 of the Alberta Building Code.

It is important to note that this dataset:

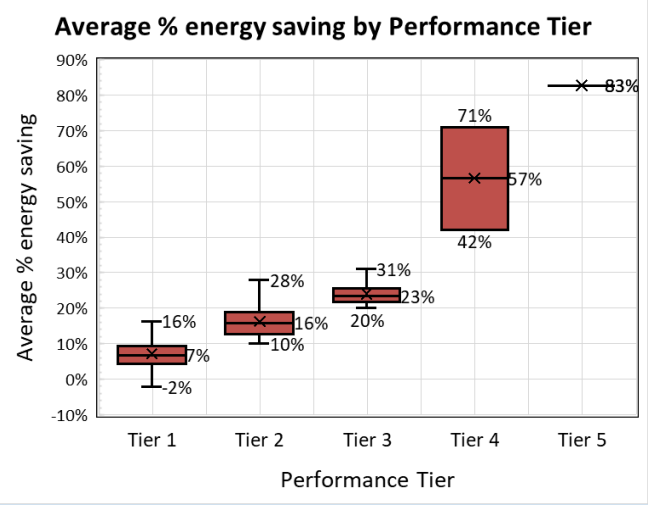
- Reflects design-intent performance based on submitted documentation rather than verified post-construction testing.
- Represents new housing projects for which detailed energy modeling or performance documentation was required as part of the permitting process.
- Provides a snapshot of building permit data of typical building envelope characteristics and equipment efficiencies for Calgary's 2024 new residential sector.

While not based on field-verified results, the permit data offers a credible and conservative representation of the energy performance built into Calgary's residential designs under current minimum energy performance tier compliance pathways.

SINGLE DETACHED HOUSES

Energy Performance / Breakdown of Energy Tier

Below is a summary of energy performance and the energy performance tier breakdown for single detached houses, with a sample size of 1788 dwellings.



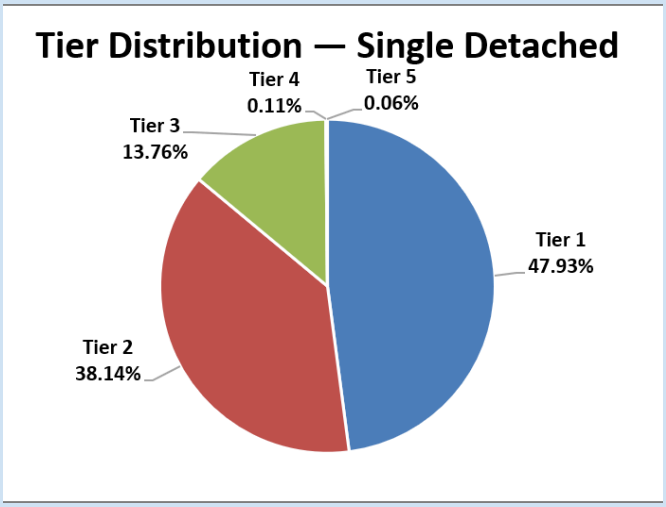


Figure 1 - Calgary Part 9 Single Detached homes Energy Performance Tier summary

Commentary on Energy Performance Trends

- The results show that more than half (52%) of homes exceed the minimum required performance level.
- Only a very small number of examples of tier 4 and 5 were observed.
- A breakdown of the building systems follows

Building envelope

Figure 2 below summarizes the significant building envelope characteristics.

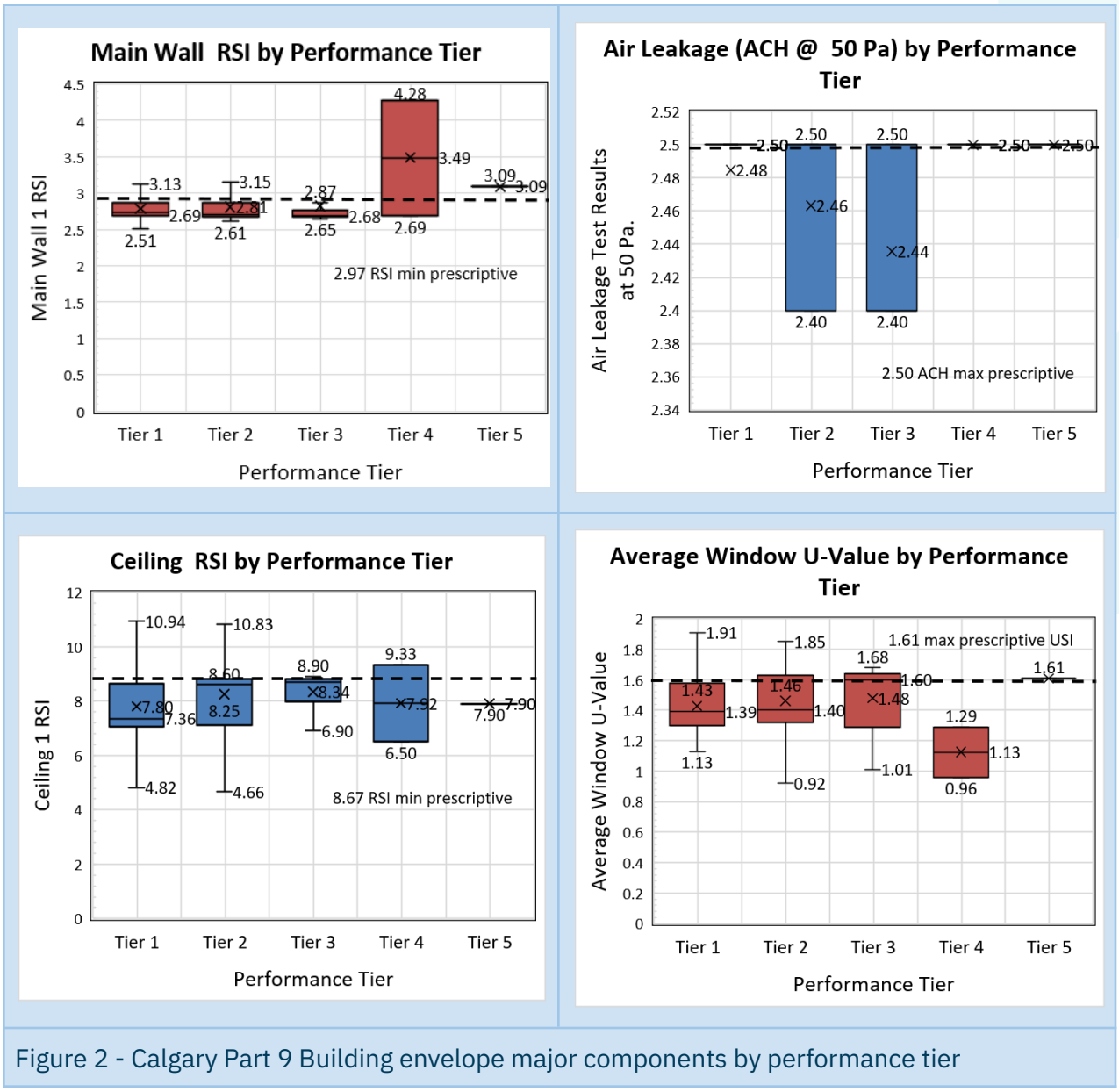


Figure 2 - Calgary Part 9 Building envelope major components by performance tier

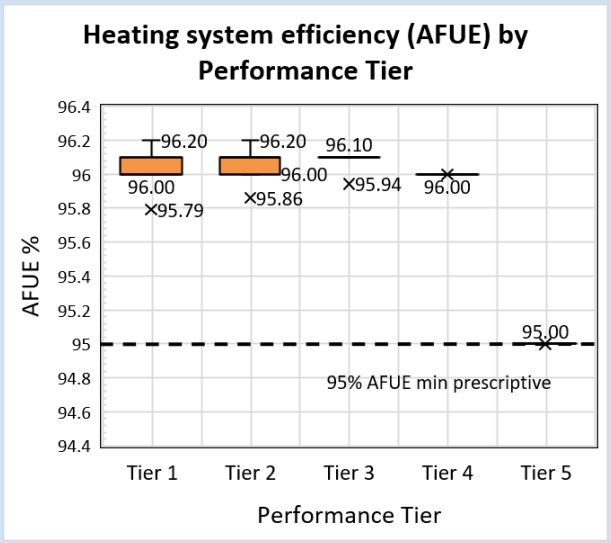
Commentary on Building Envelope

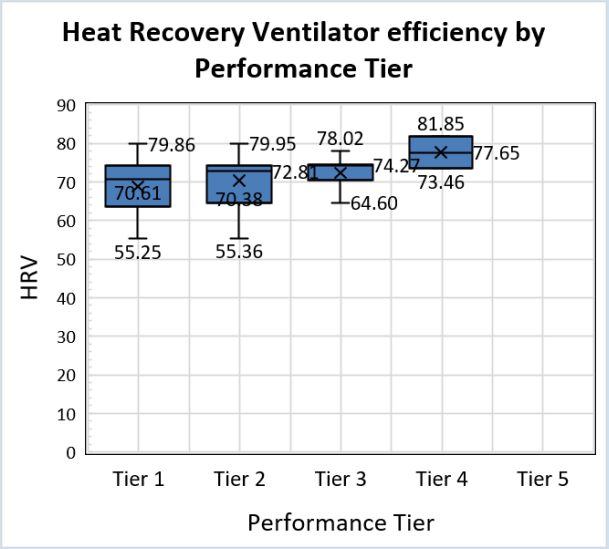
- **Wall insulation is below prescriptive code minimum.** This is consistent with other areas in the province. It indicates that envelope performance is being compensated from other components such as windows. The prescriptive minimum value used is for a house with an HRV, this is the most common arrangement.

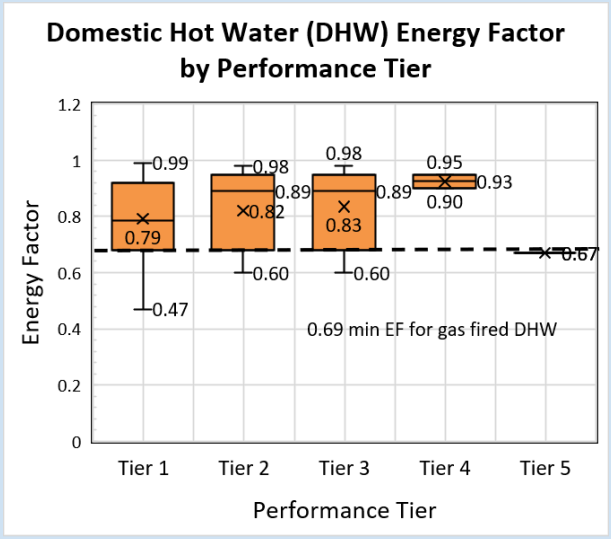
- **Airtightness levels remain similar across tiers** (ACH@50Pa ≈ 2.5), reflecting that builders are using code minimum requirements for permit compliance without blower door tests.
- **Window performance is consistently better than code minimum requirements**. This is consistent with other areas. The median performance of the windows does not appear to improve until tier 4.
- **Ceiling/attic insulation is consistently below the minimum prescriptive requirements**. Some of these values include cathedral ceilings, which have a lower prescriptive value; these are a small portion of the total data. The median values tend to increase from tier 1 to tier 3.
- **Overall, the envelope reflects designs that may be more cost-effective and/or simpler to execute**, i.e., improving windows and adding insulation in the attic does not require significant design changes.

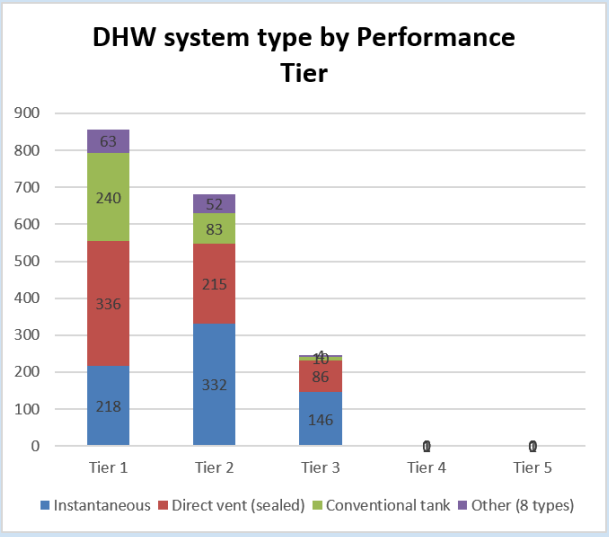
HVAC and DHW systems

Figure 3, below, is a summary of the significant building HVAC and DHW characteristics:









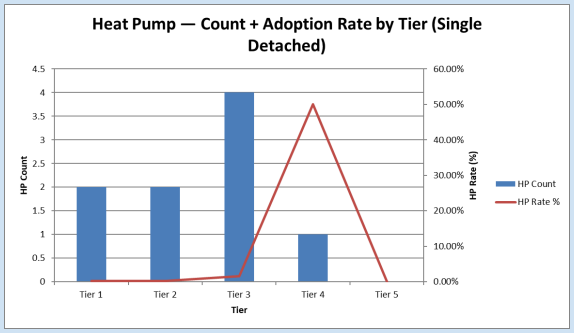


Figure 3 - Calgary, Part 9, Single detached, HVAC and DHW summary

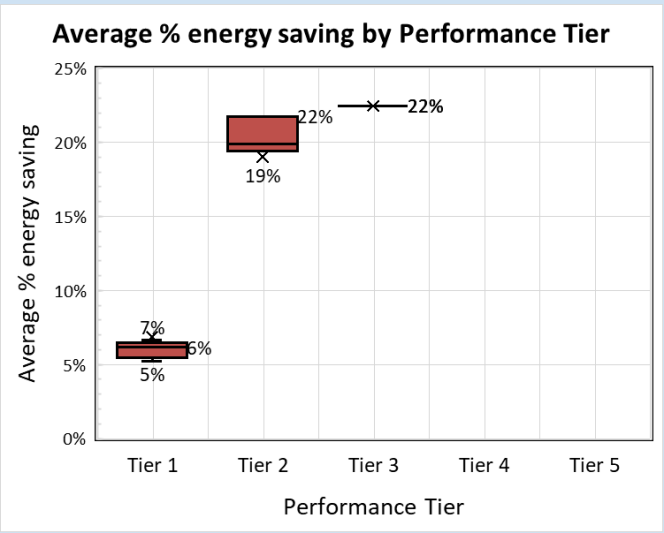
Mechanical commentary

- **Heating systems maintain consistent efficiency across all tiers.**
- **A small number of air source heat pumps (ASHP) are found at all tiers**. These are still a very small portion overall. These did not appear in the heating system efficiency summary chart. The last chart in Figure 3 shows the count of ASHPs in each tier, and the red lines show the relative percentage in each tier.
- **Heat recovery performance improves with energy performance tiers**. It is not clear if this is a significant part of the energy performance improvement or reflects a tendency toward higher-performing models.
- **Domestic hot water efficiency improves with energy performance tiers.** Improving domestic hot water efficiency is an important strategy for achieving higher energy performance tiers. Significant variation remains in DHW equipment.

ROW HOUSES

Energy Performance / Breakdown of Energy Tier

Figure 4, below, is a summary of energy performance and a breakdown of the energy tier of row houses with a sample size of 18 dwellings:



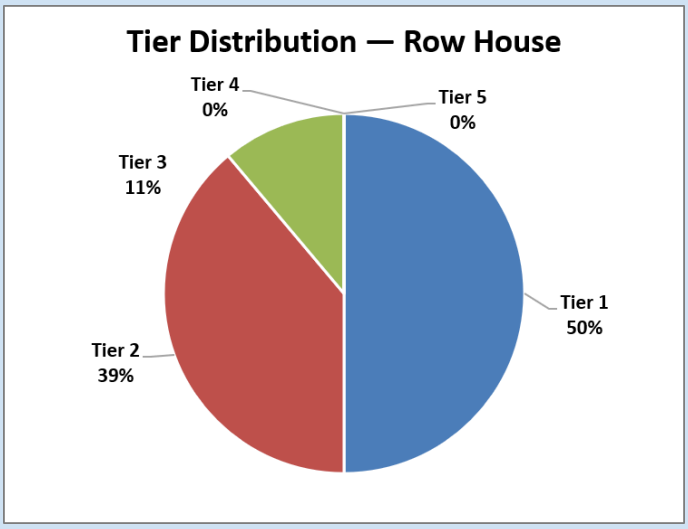


Figure 4 - Calgary Part 9 Row Houses Energy Performance Tier summary.

Commentary on Energy Performance Trends

- This is a small sample size. Exactly half of the units are better than code minimum. These met both performance tier 2 and tier 3.
- There is a significant gap between the performance of tier 1 and tier 2.

Building Envelope

Figure 5 below is a summary of the significant building envelope characteristics:

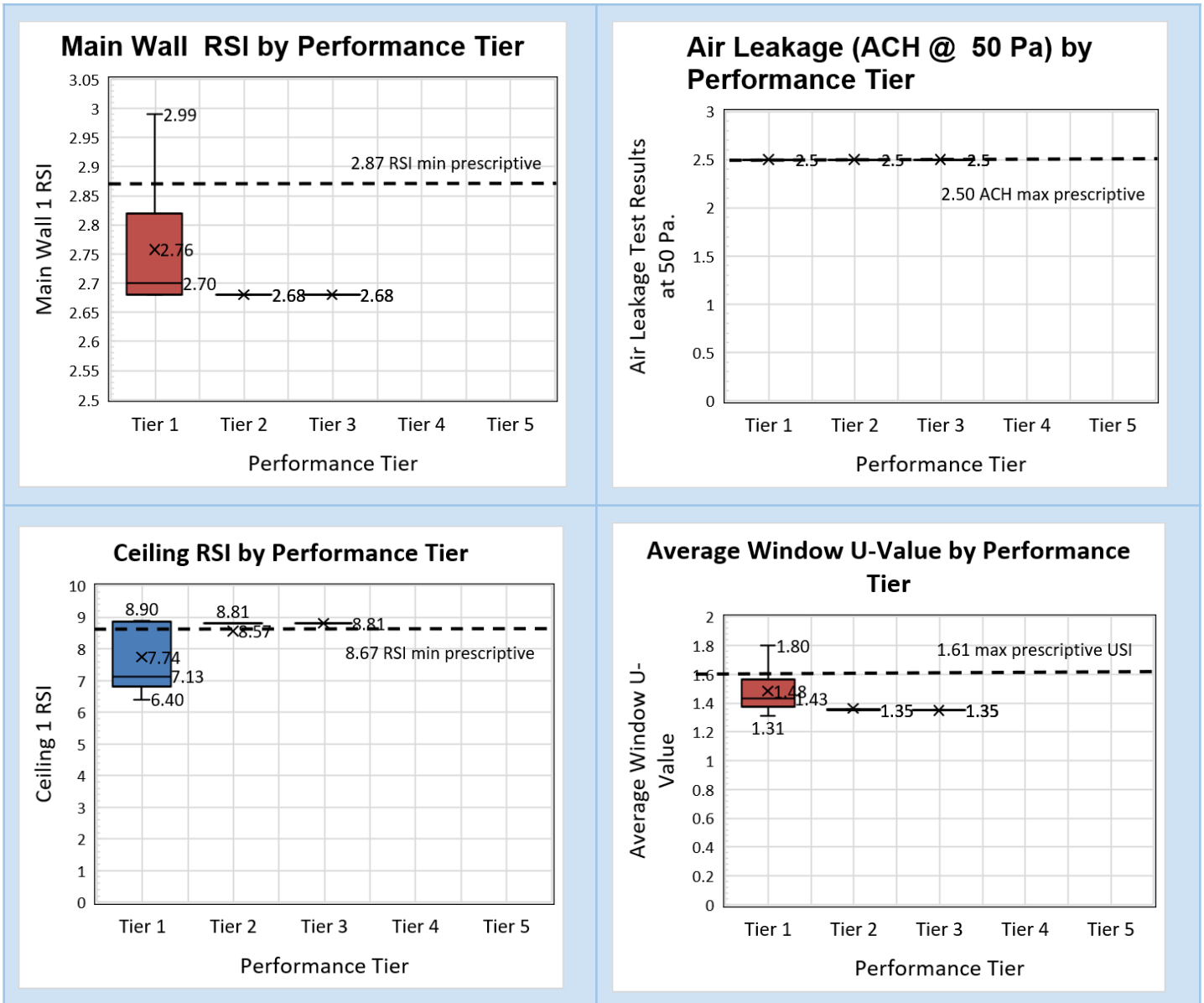


Figure 5 - Calgary, Part 9 Row Houses, building envelope major components by performance tier.

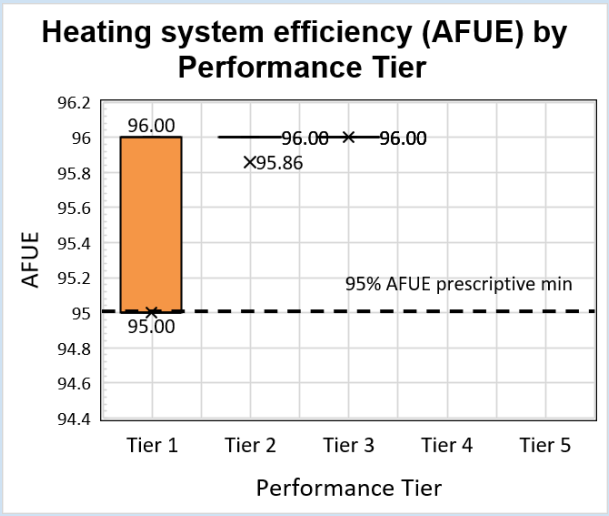
Commentary on Building Envelope

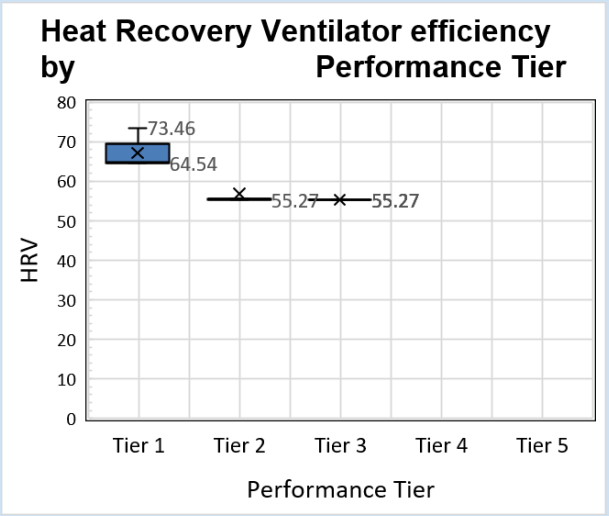
- **Wall insulation is below prescriptive minimum in all performance tiers**. This indicates that envelope improvements are coming from other components.
- **Ceiling insulation is below prescriptive minimum at tier 1**. There is an improvement in the median ceiling insulation as the units move from tier 1 to performance tiers 2 and 3.
- **Airtightness is not being used for compliance**.

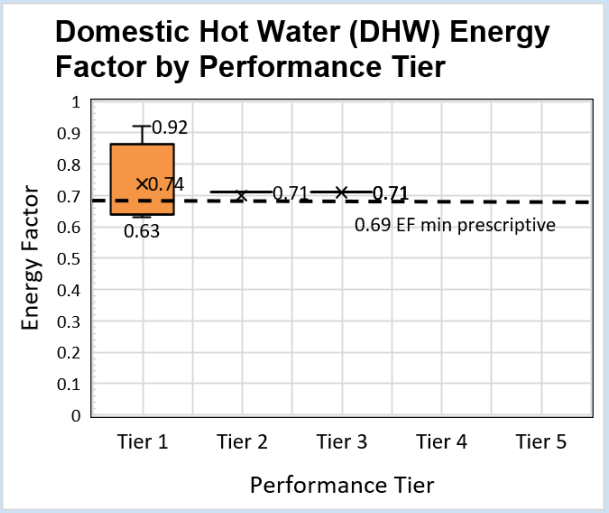
- **The window performance is consistently better than prescriptive code**. The window performance improves at higher energy performance tiers.

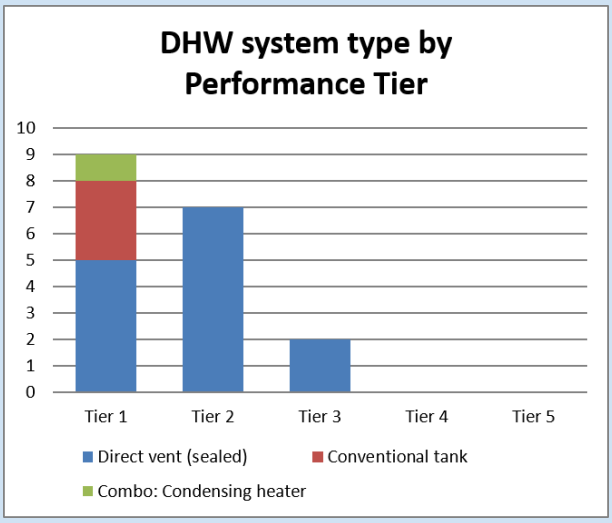
HVAC and DHW systems

Figure 6, below, is a summary of the significant building HVAC and DHW characteristics:









There were no heat pumps in this group

Figure 6 - Calgary, Part 9 Row Houses, HVAC and DHW summary

Mechanical Commentary

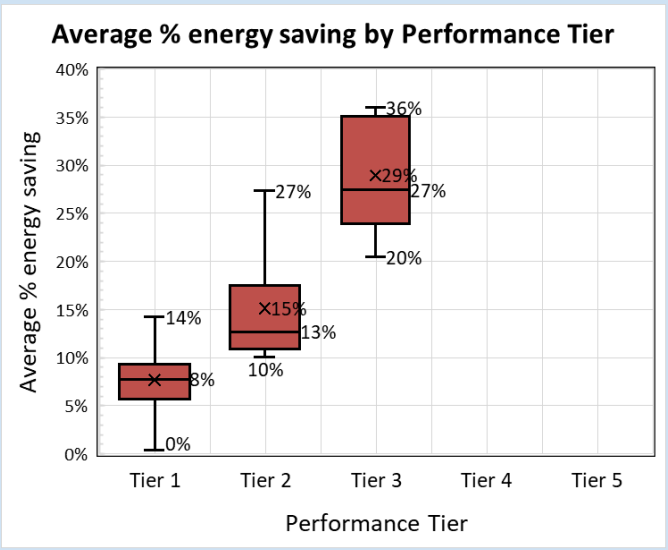
- **In this small sample, performance trends are unclear**.
- **The median energy efficiency of the heating systems improves above tier 1**.

- **Heat Recovery ventilator performance does not conform to the trend seen in single-family homes**. There is no clear pattern with improving energy performance.
- **The median domestic hot water heating efficiency is flat across the performance tiers**.
- **A variety of heating technologies are used, but direct-vent tanked** natural gas systems were the most common.

SEMI-DETACHED HOUSES

Energy Performance / Breakdown of Energy Tier

Below is a summary of energy performance and a breakdown of the energy tier of houses, with a sample size of 243 entries:



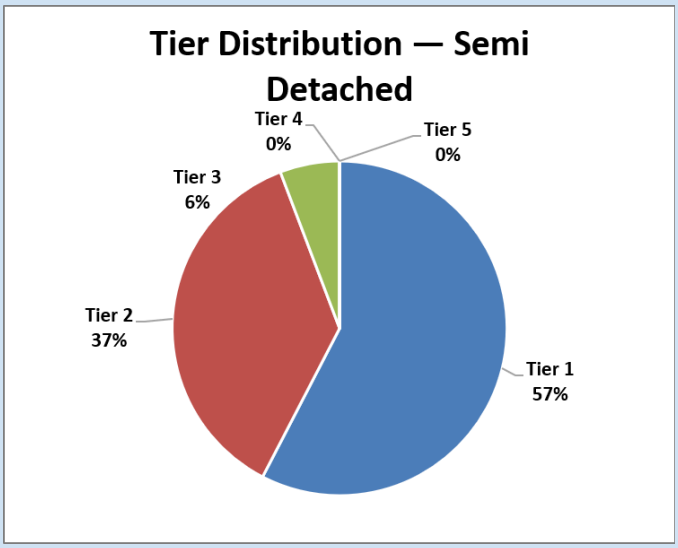


Figure 7 - Calgary Part 9, Semi-detached Houses, Energy Performance Tier summary

Commentary on Energy Performance Trends

- **The majority of semi-detached dwellings are at tier 1 (57%).** The remainder (43%) meet tier 2 and tier 3.
- **This is a meaningful portion of construction being produced above minimum code.**

Building envelope

Figure 8, below, is a summary of the significant building envelope characteristics:

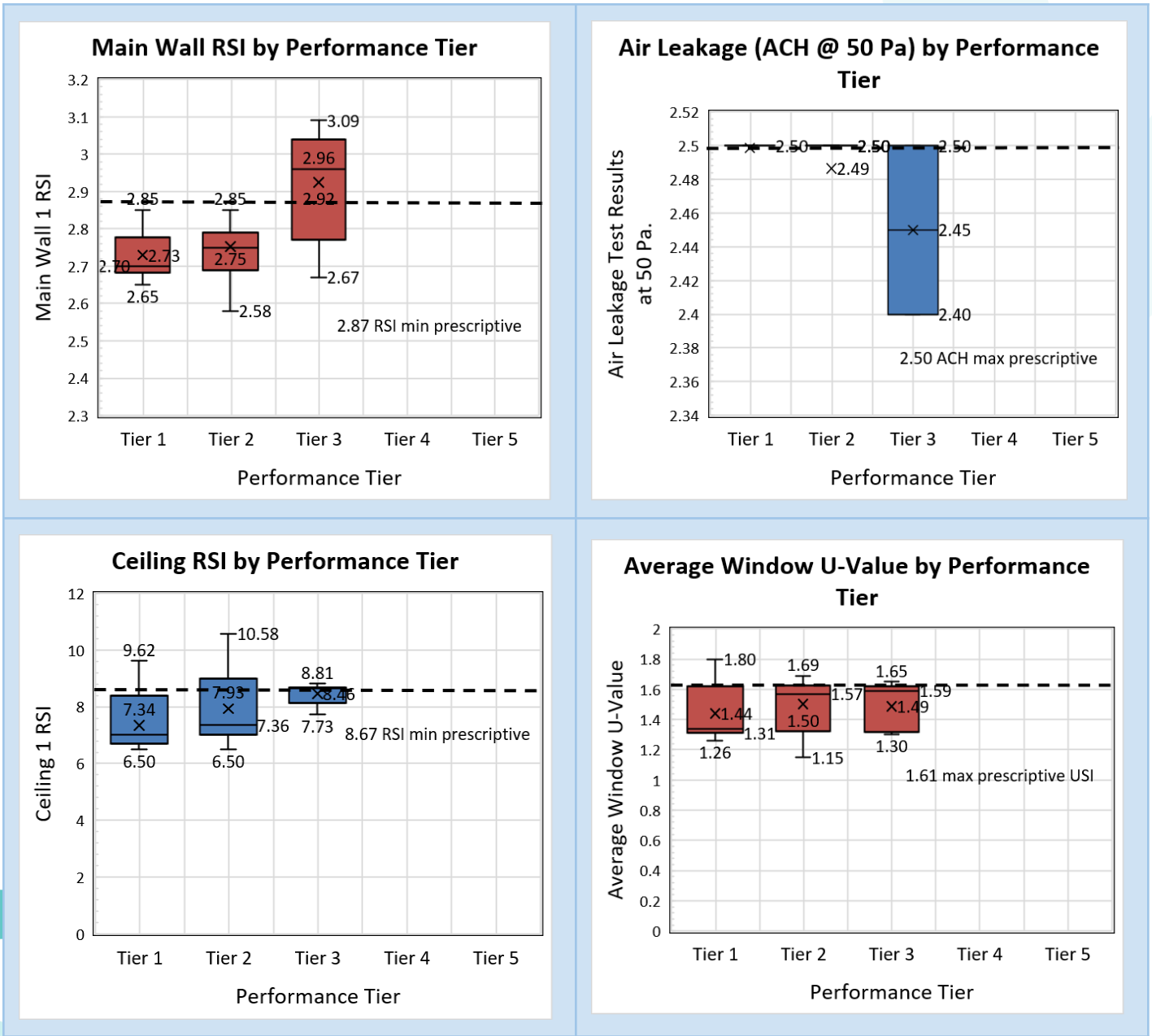


Figure 8 - Calgary Part 9, Semi-detached Houses, Building envelope major components by performance tier

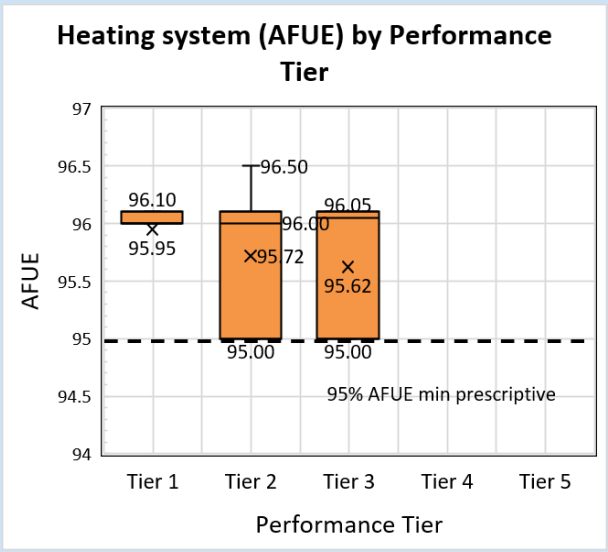
Commentary on Building Envelope

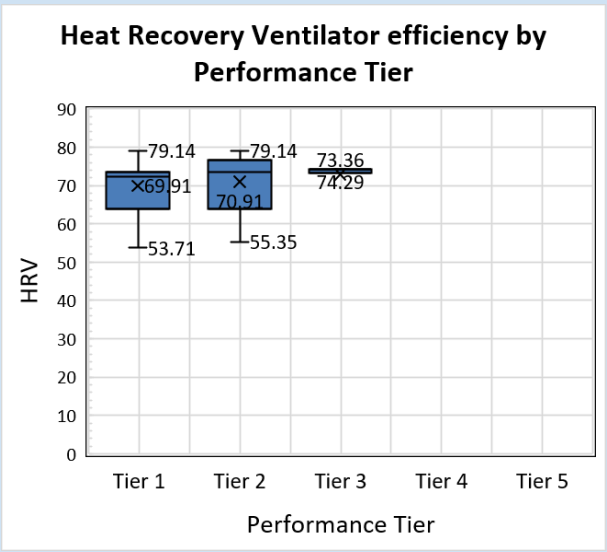
- **Exterior wall insulation is below prescriptive minimum** until tier 3.
- **Airtightness remains fixed** at the prescriptive code minimum.

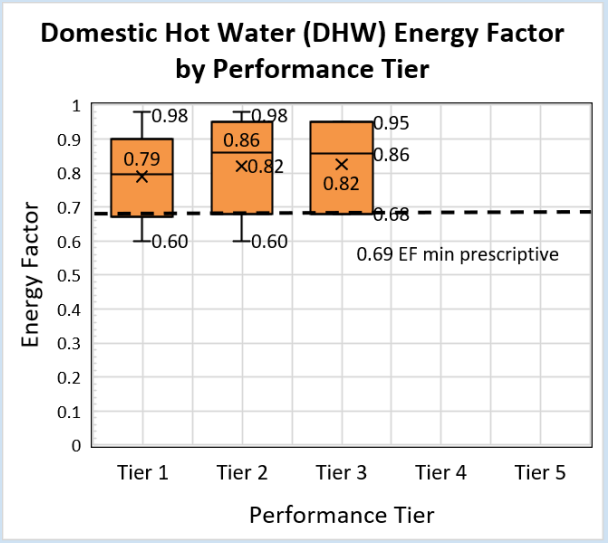
- **Ceiling insulation is below the prescriptive minimum** at all four energy performance tiers. There is a clear trend of increasing insulation values as energy performance tiers improve.
- **Window insulation is consistently better than the minimum requirement**. This is consistent with the other building types observed.

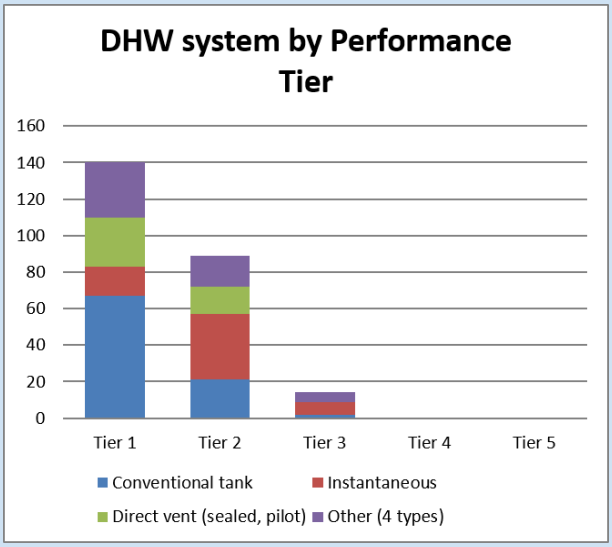
HVAC and DHW systems

Figure 9, below, is a summary of the significant building HVAC and DHW characteristics:









There were no heat pumps adopted in this category

Figure 9 - Calgary Part 9, Semi-detached Houses, HVAC and DHW summary

Mechanical Commentary

- **Heating system efficiency is better than minimum prescriptive requirements** but does not improve with increasing energy performance tiers. No heat pumps were observed in these categories.
- **Median HRV performance improves slightly** with increasing energy performance tier.
- **Domestic hot water systems consistently exceed minimum prescriptive requirements.** It does not improve significantly moving through the tiers. Equipment type varies significantly.