

Performance Path Study

Summary of Edmonton Part 3 Performance
Path Building Permit Submissions

Edmonton, AB – Climate zone 7a

PREFACE – DATA CONTEXT

This report reviews Part 3 NECB performance-path energy modelling submissions associated with building permit applications in the City of Edmonton. The study aims to identify energy-performance trends reflected in submitted building permit energy models.

The analysis is based exclusively on information contained within submitted energy modelling reports and supporting documentation. No re-modelling, recalculation, or independent verification was undertaken. Results, therefore, reflect reported design-stage performance, as submitted for permitting and compliance purposes.

DATASET OVERVIEW

The analysis is based on a compiled set of Part 3 performance-path submissions extracted from processed permit-related documentation and associated energy modelling records for projects located within Edmonton.

Each submission was reviewed individually to confirm:

- Use of the NECB Part 3 performance pathway
- Availability of a clearly defined reference building
- Availability of reported proposed vs. reference performance outcomes
- Sufficient supporting information to characterize envelope and system strategies at a high level

Only submissions meeting these criteria were included in the aggregated analysis.

NECB COMPLIANCE SUMMARY

The Part 3 performance-path submissions reviewed in this study reference different editions of the National Energy Code for Buildings (NECB), consistent with the code edition in force at the time of application.

Based on the submitted energy modelling reports and supporting documentation:

- A portion of the reviewed projects explicitly references NECB 2017 as the compliance baseline
- A smaller subset explicitly references NECB 2020, reflecting more recent permit applications
- The remaining submissions rely on the applicable NECB edition in effect at the time of permitting.



Report Structure

This report is broken down into four parts. First, all the files were broken down into two groups: multi-unit residential buildings (MURBs) and Industrial, Commercial, and Industrial (ICI). These two groups have different typical forms; as such, they are hard to compare.

These two groups are further divided between those evaluated under NECB 2017 and NECB 2020. NECB 2020 introduced energy performance tiers. For the NECB 2020 files, the performance is evaluated against the energy performance tiers. For the projects using NECB 2017, the performance is NOT broken down by tiers.

Multi-unit residential buildings (MURBs)

Energy performance and breakdown of energy tier

Figure 1 below shows the overall energy performance of MURBs evaluated against NECB 2020. There are 8 files in this group.

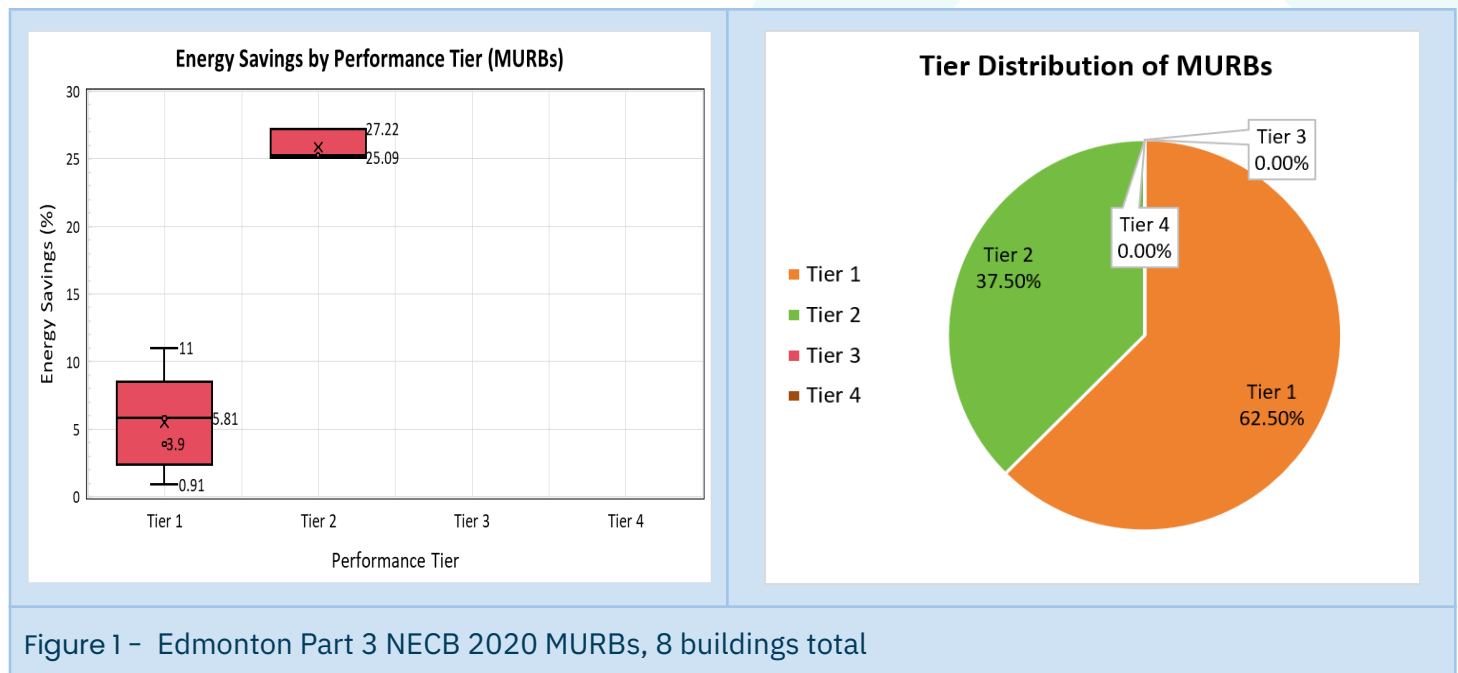


Figure 1 – Edmonton Part 3 NECB 2020 MURBs, 8 buildings total

Commentary on energy performance trends

This is a small sample size taken from 2024. Three buildings, or 38% of the plans, exceeded the minimum requirements of Tier 1. Two of the three buildings are being developed by the City of Edmonton.

Building envelope

Figure 2 below summarizes the major building envelope components.



Figure 2 - Edmonton, part 3 NECB 2020, building envelope major components by performance tier

Commentary on building envelope

- **Wall assembly insulation values (RSI) are less** than the equivalent prescriptive code minimum
- **Roof insulation values are less** than the prescriptive code minimum.
- The thermal **performance of the windows (USI) is better** than prescriptive code.
- The **fenestration ratio (FDWR) is less** than the maximum allowed.

HVAC systems

Figure 3 below summarizes the heating, cooling, and ventilation systems.

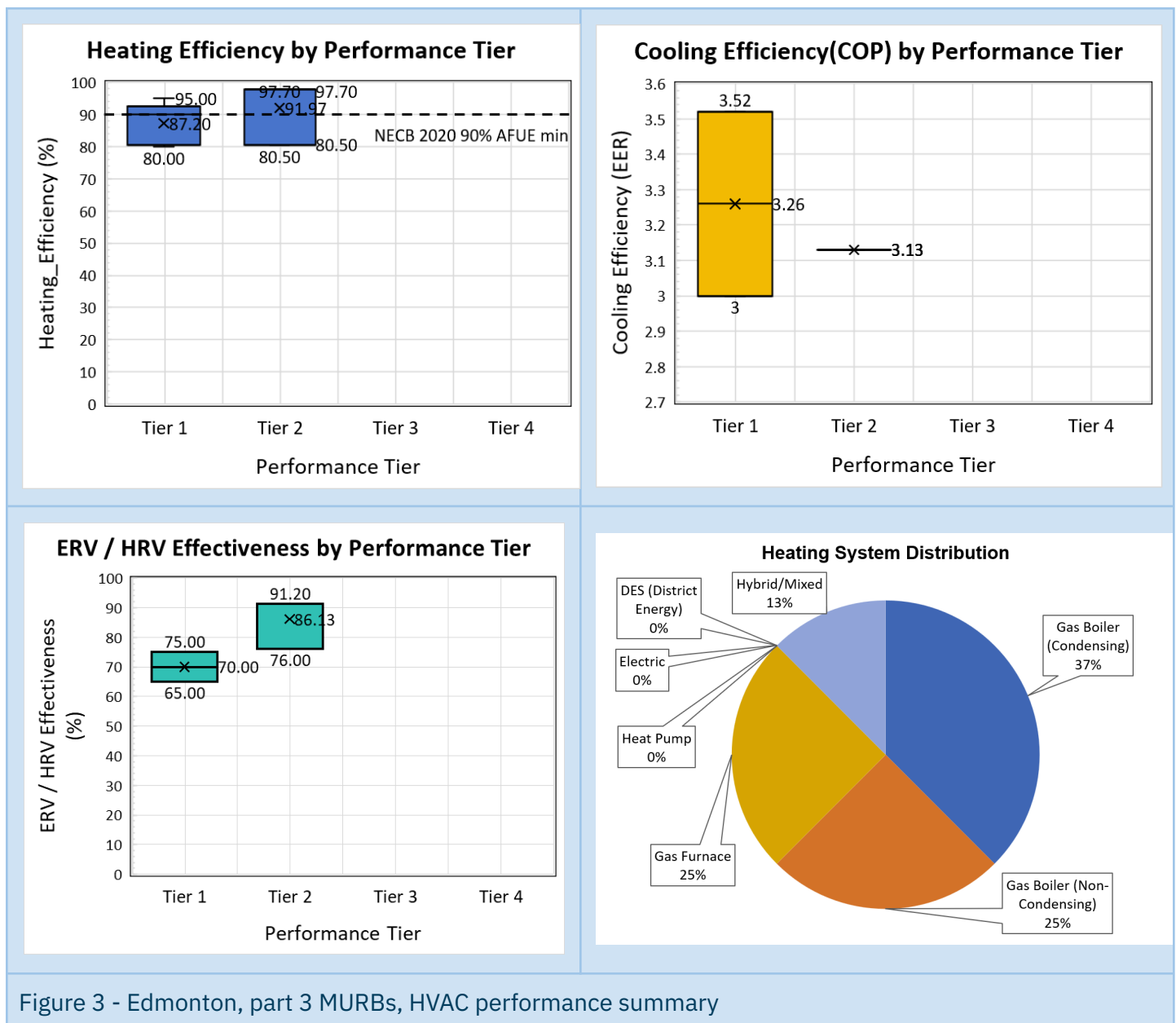


Figure 3 - Edmonton, part 3 MURBs, HVAC performance summary

Commentary on mechanical systems

- There is a diversity in the heating distribution system
- **Heating system efficiency for both Tier 1 and Tier 2 is similar to prescriptive minimums.** It is difficult to compare the heating system performance against the prescriptive code, as the reference building performance varies by system type.
- **Furnace/boiler efficiency improves with Tier 2**
- **Natural gas is the dominant fuel source.** There were NO fully electric buildings.
- HRV performance improves with Tier 2 performance.

MURB NECB 2017

The majority of the MURB permits in the Edmonton data set were designed to NECB 2017. We evaluated 66 permits.

While there are no energy performance tiers in 2017, the energy savings relative to the NECB 2017 reference building are calculated and shown below in Figure 4.

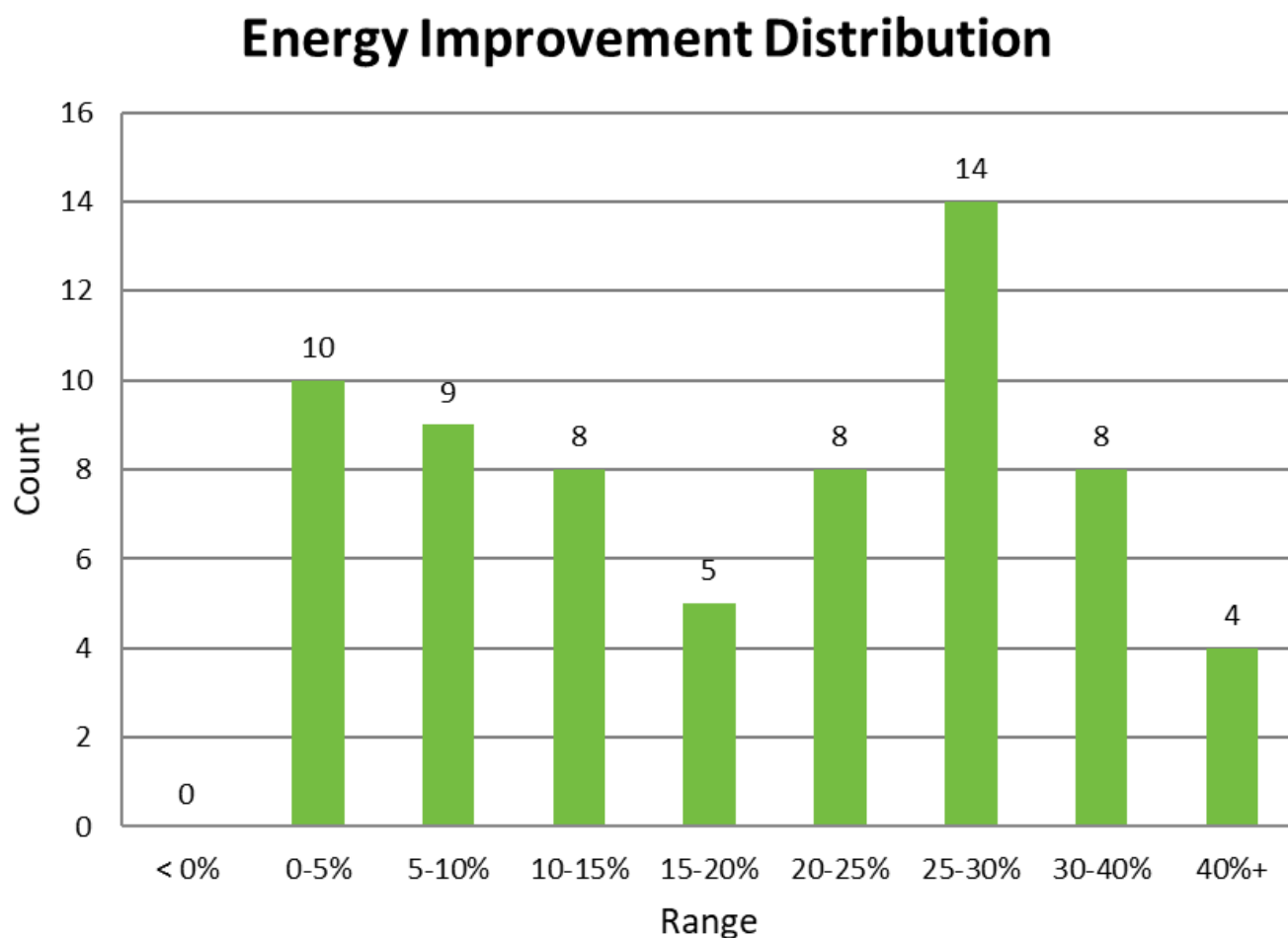


Figure 4 - Edmonton, part 3 MURBs, NECB 2017, summary of energy performance

Commentary on energy performance trends

- More than half of the building permits had greater than 20% reduction in energy consumption relative to the reference building.

Figure 5 shows building envelope performance. The average performance of the wall, window, and roof systems exceeded the minimum prescriptive requirements of NECB 2017. These values were subsequently adjusted in the 2020 code.

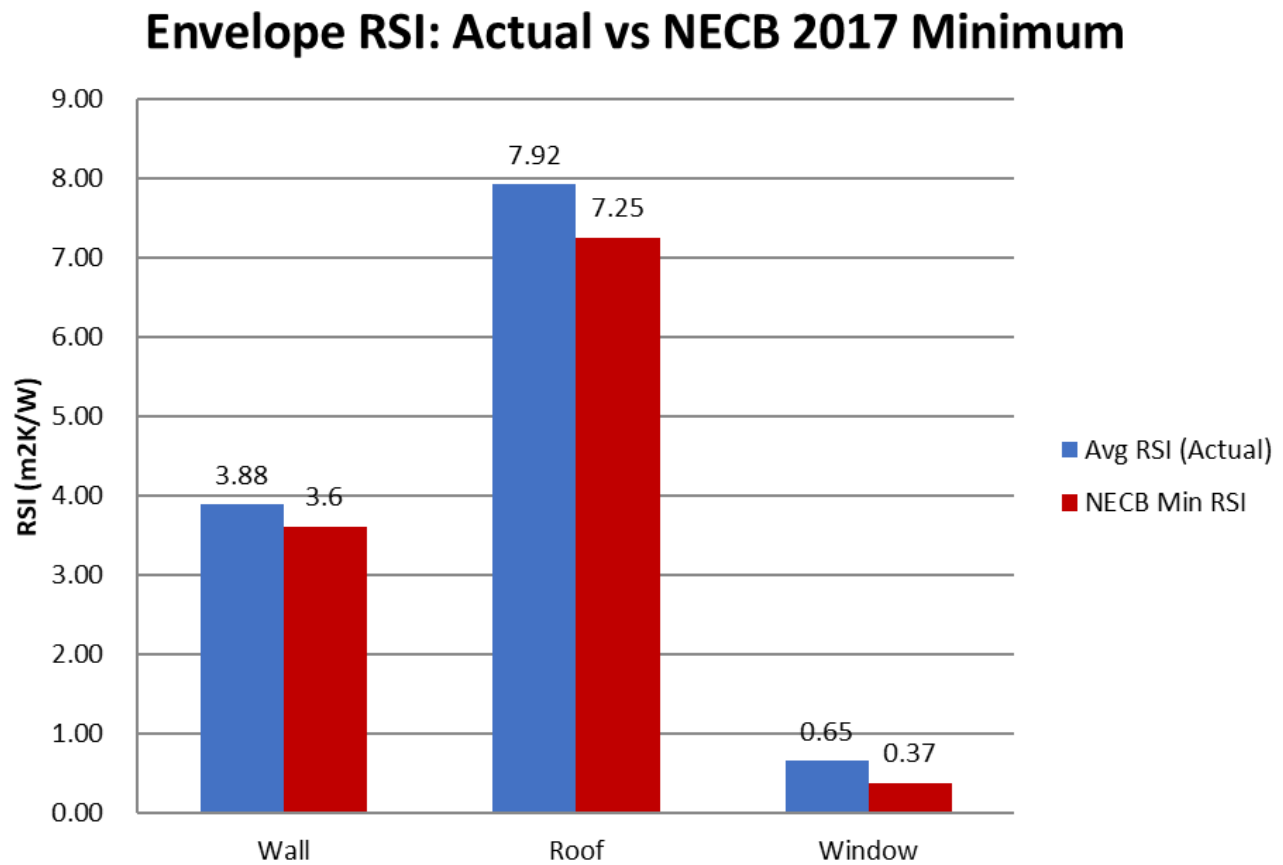


Figure 5 - Edmonton, part 3 MURBs, NECB 2017, summary of envelope performance

Commentary on building envelope

- **Wall and roof insulation performance exceeded the prescriptive minimum.** This was distinct from the buildings in the Calgary data set, where the average values for walls and roofs were consistently less than the prescriptive minimum.
- **Window performance was better than the prescriptive minimum.** This result is the same as all other data sets.

Figure 6 summarises the HVAC systems below. The most notable feature is the share of electric heating, including air-source heat pumps, in the larger data set.

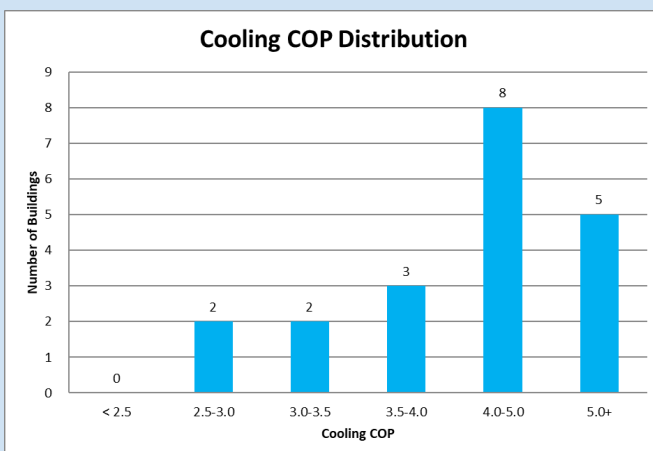
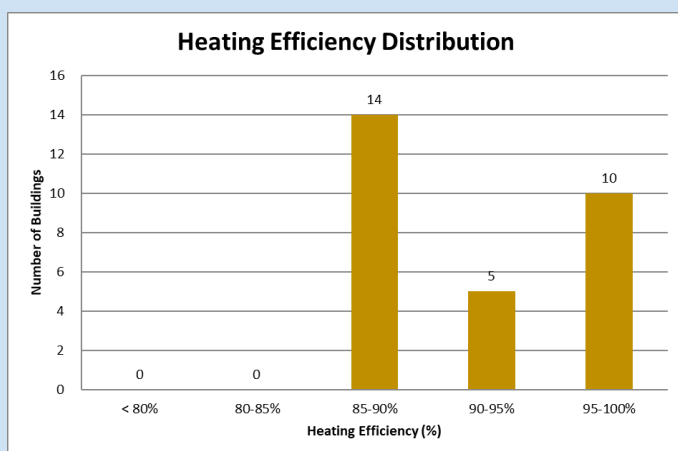
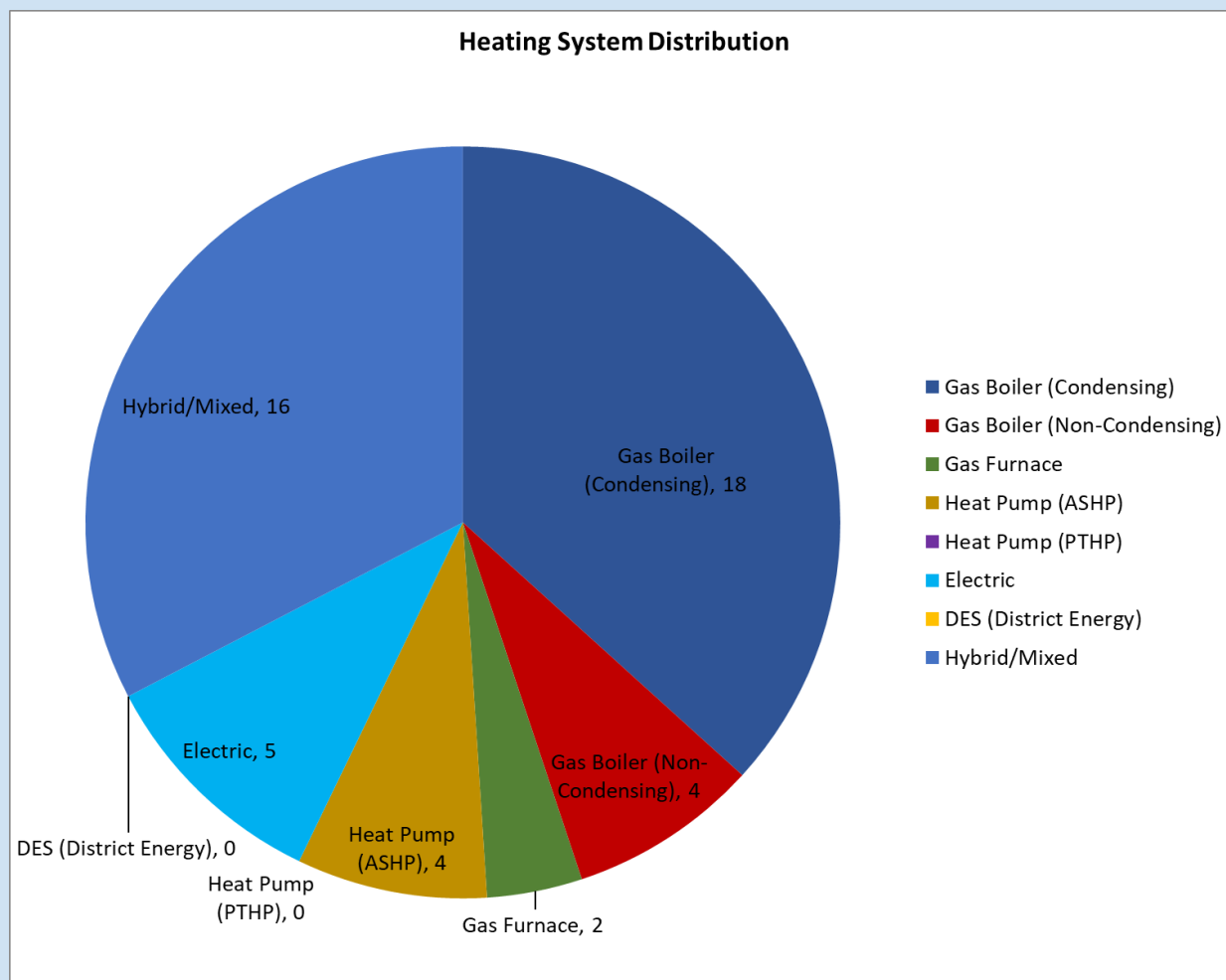


Figure 6 - Edmonton, part 3 MURBs, NECB 2017, summary of HVAC systems

Commentary on mechanical systems

- There is significant diversity in building heat delivery systems
- Both electric and hybrid fuel systems are present.

Industrial, commercial, and institutional (ICI)

Energy Performance / Breakdown of Energy Tier

Thirteen projects were in the ICI grouping and planned using NECB 2020. This category covers a wide range of buildings, including industrial sites, offices, fast food, and commercial spaces. Figure 7 below shows the reported distribution and energy savings.

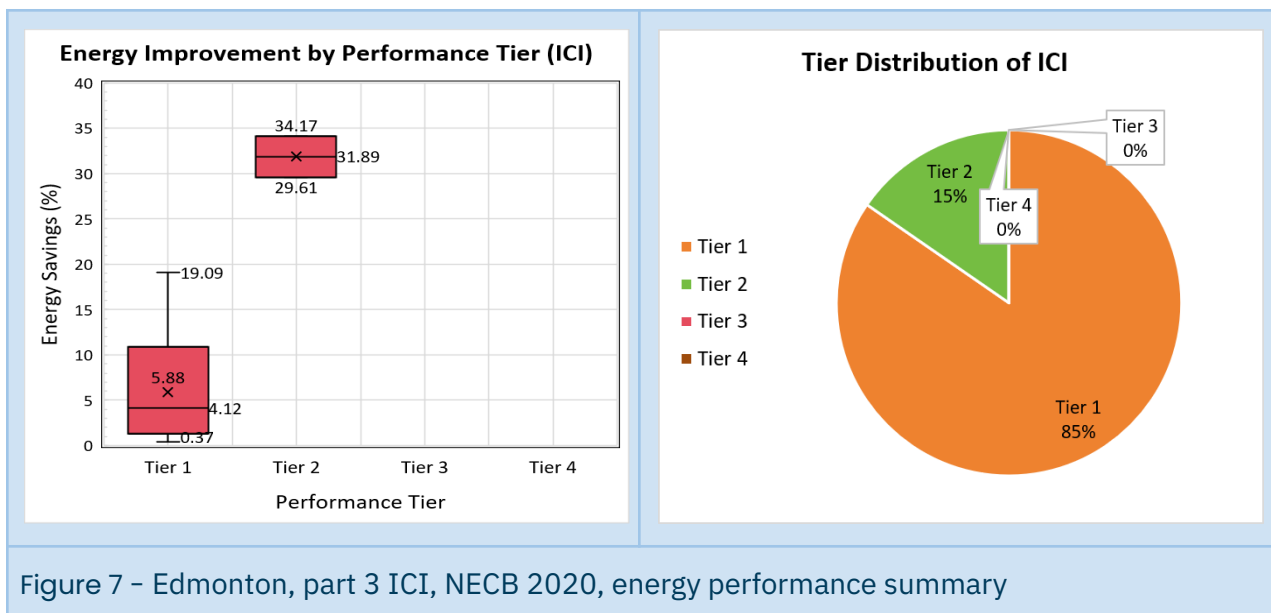


Figure 7 - Edmonton, part 3 ICI, NECB 2020, energy performance summary

Commentary on energy performance trends

Only 15%, or 2 buildings, of the ICI properties exceed the Tier 1 minimum. Neither was owned by the City. One location is an office, and the other is a community gathering space.

Building envelope

Figure 8 below shows a summary of the major building envelope components.

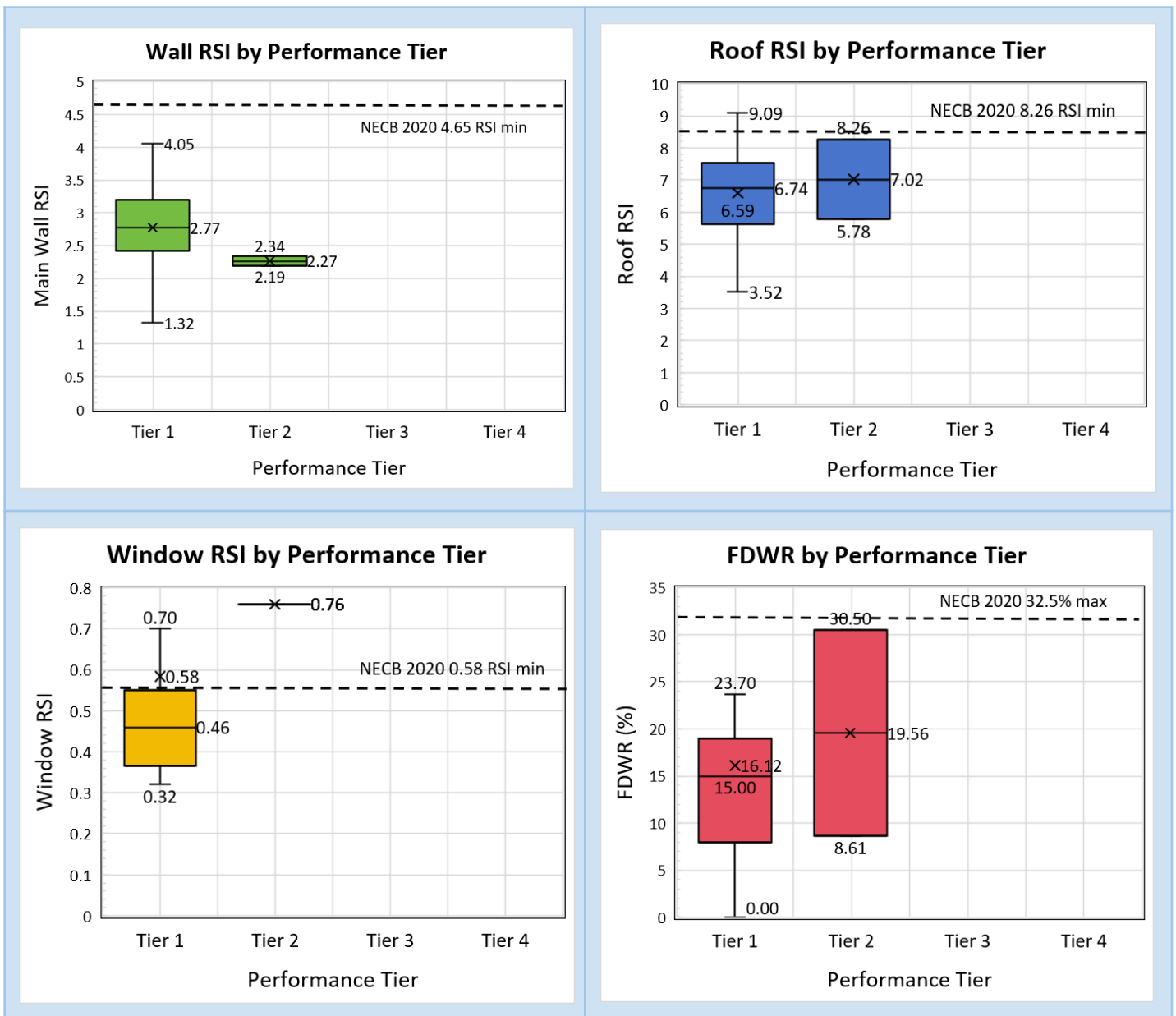


Figure 8 - City of Edmonton, part 3 ICI, NECB 2020, building envelope

Commentary on building envelope

- Similar to the observed MURBs, **both the walls and roof assemblies have insulation values below prescriptive** code minimums.
- Window insulation values are worse than the prescriptive minimum at Tier 1. This is an anomaly compared to other areas and building types.
- At Tier 2, the FDWR increases. There appears to be a corresponding increase in the window insulation value.

HVAC systems

Figure 9 below shows HVAC system performance.

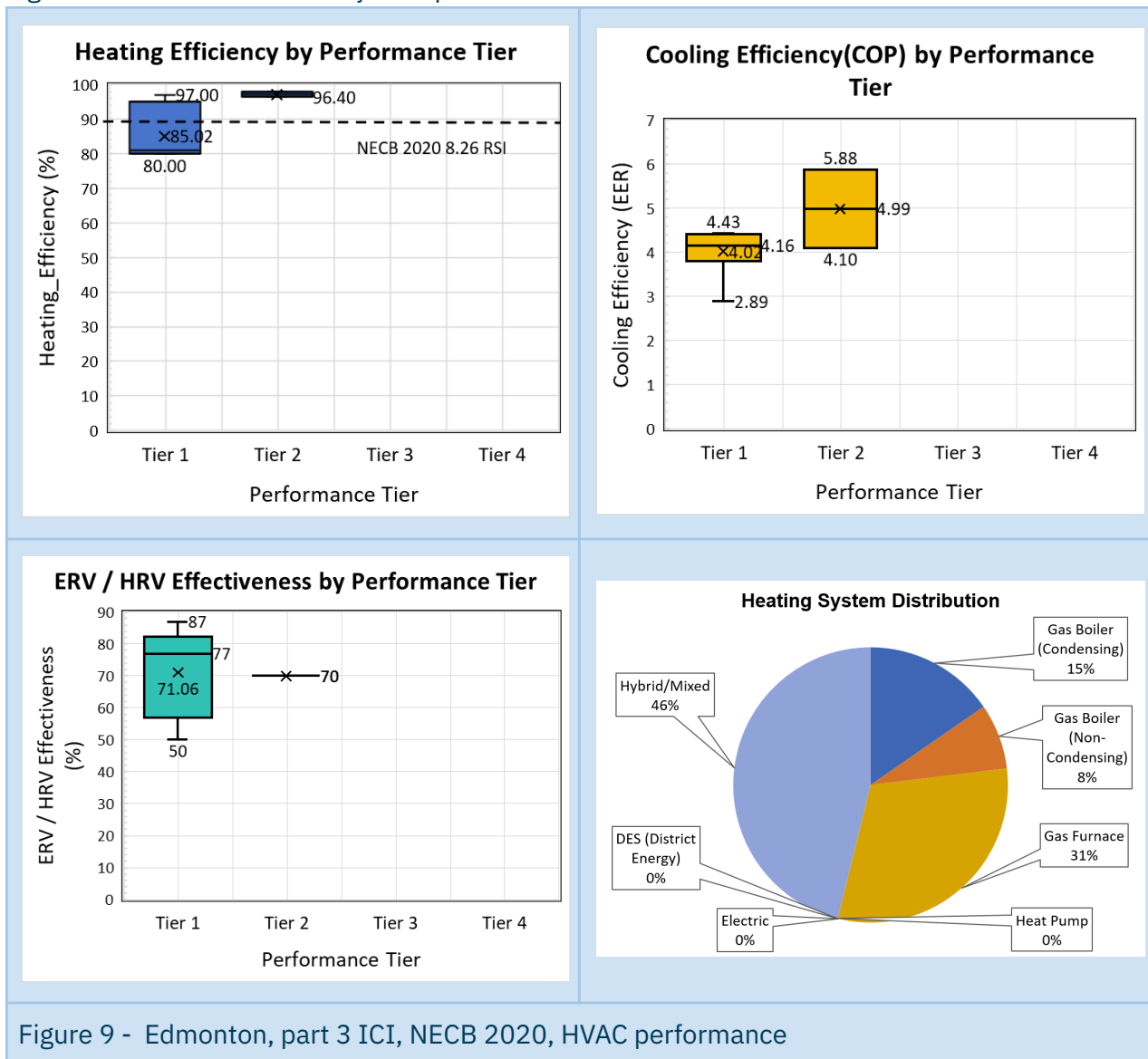


Figure 9 - Edmonton, part 3 ICI, NECB 2020, HVAC performance

Mechanical commentary

- Both the heating and cooling systems show clear efficiency improvements with increasing tier performance.
- Most systems still use natural gas as the primary heating fuel.
- A greater proportion of hybrid heating systems is used compared to MURBs.

ICI NECB 2017

One hundred twenty-one permits were evaluated against NECB 2017. The majority of these spaces fell into the office, warehouse, or retail categories. Figure 10, below, shows the breakdown of projects relative to the reference buildings.

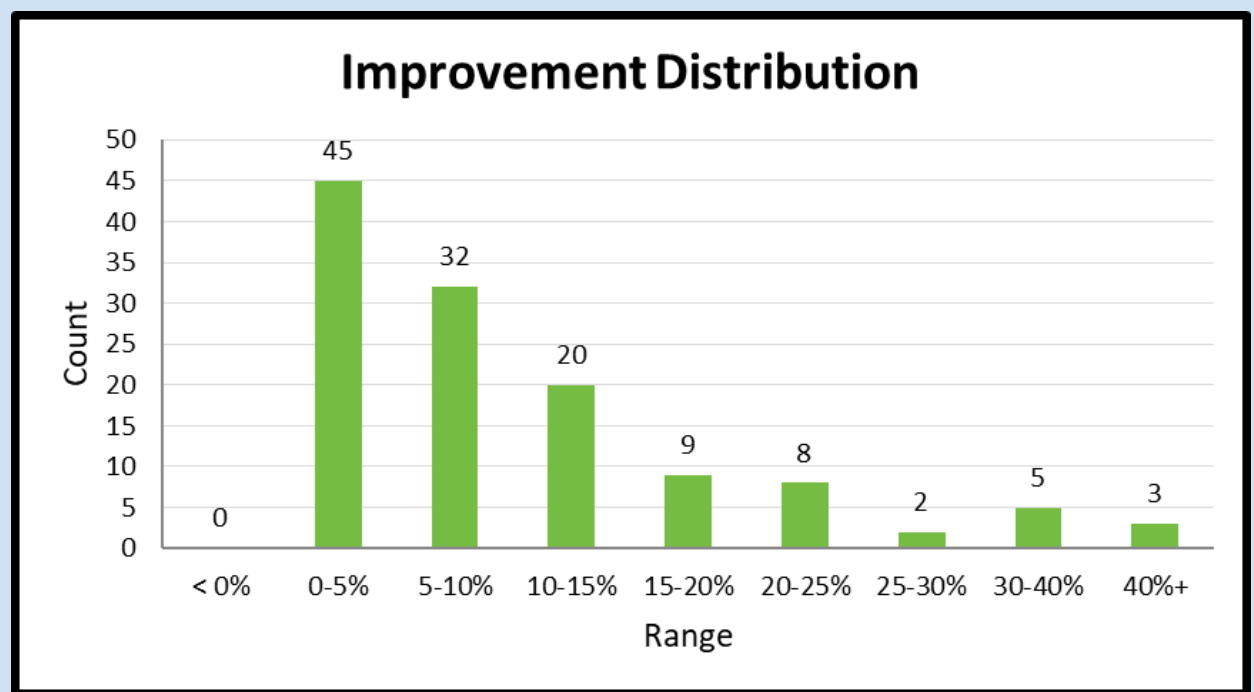


Figure 10 - Edmonton, part 3 ICI, NECB 2017 - energy savings

Commentary on energy performance trends

This is one of the larger data sets for part 3 buildings examined. The proportion of high-performing buildings (>20% improvement) is limited to only 15%.

Figure 11 below shows a similar trend to the MURBs, with walls, roofs, and windows all outperforming the reference buildings. The wall systems and the roof are noticeably better than the MURBs.

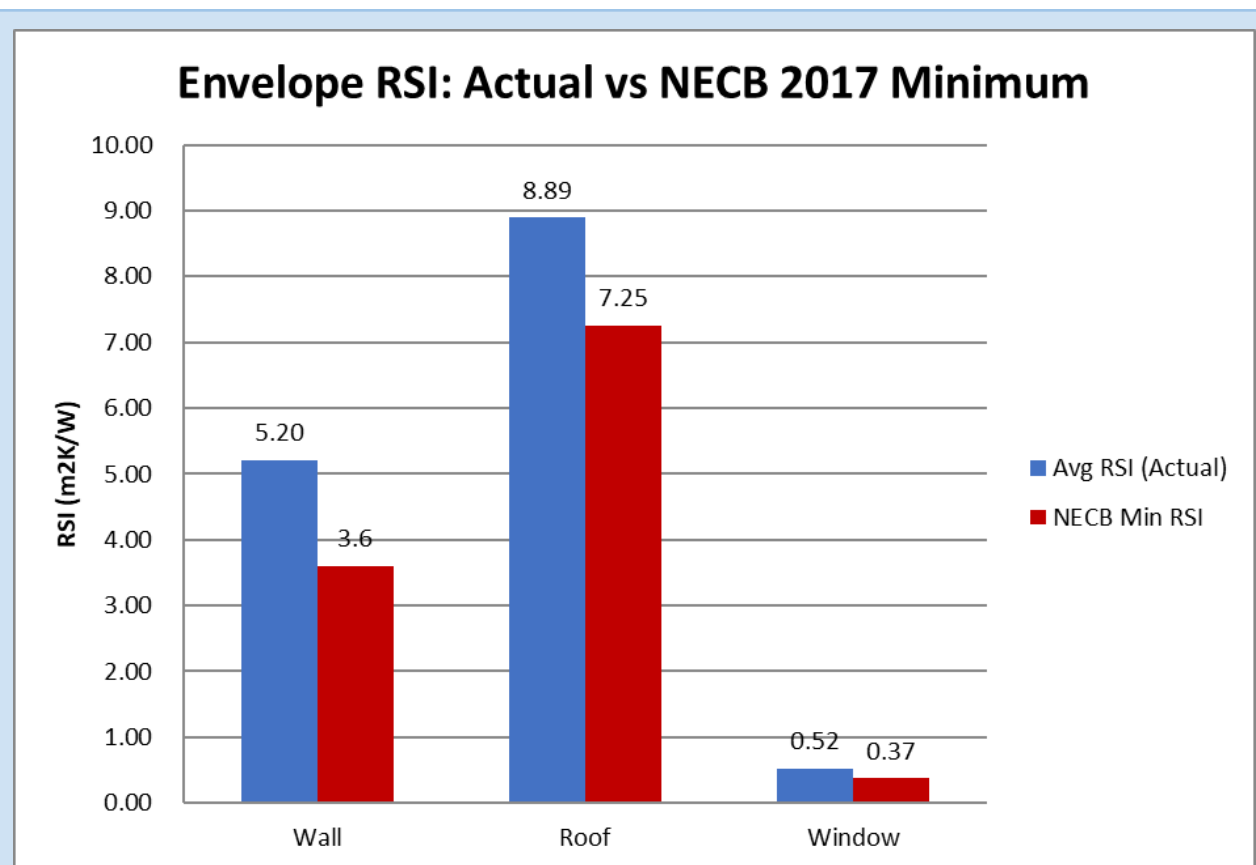
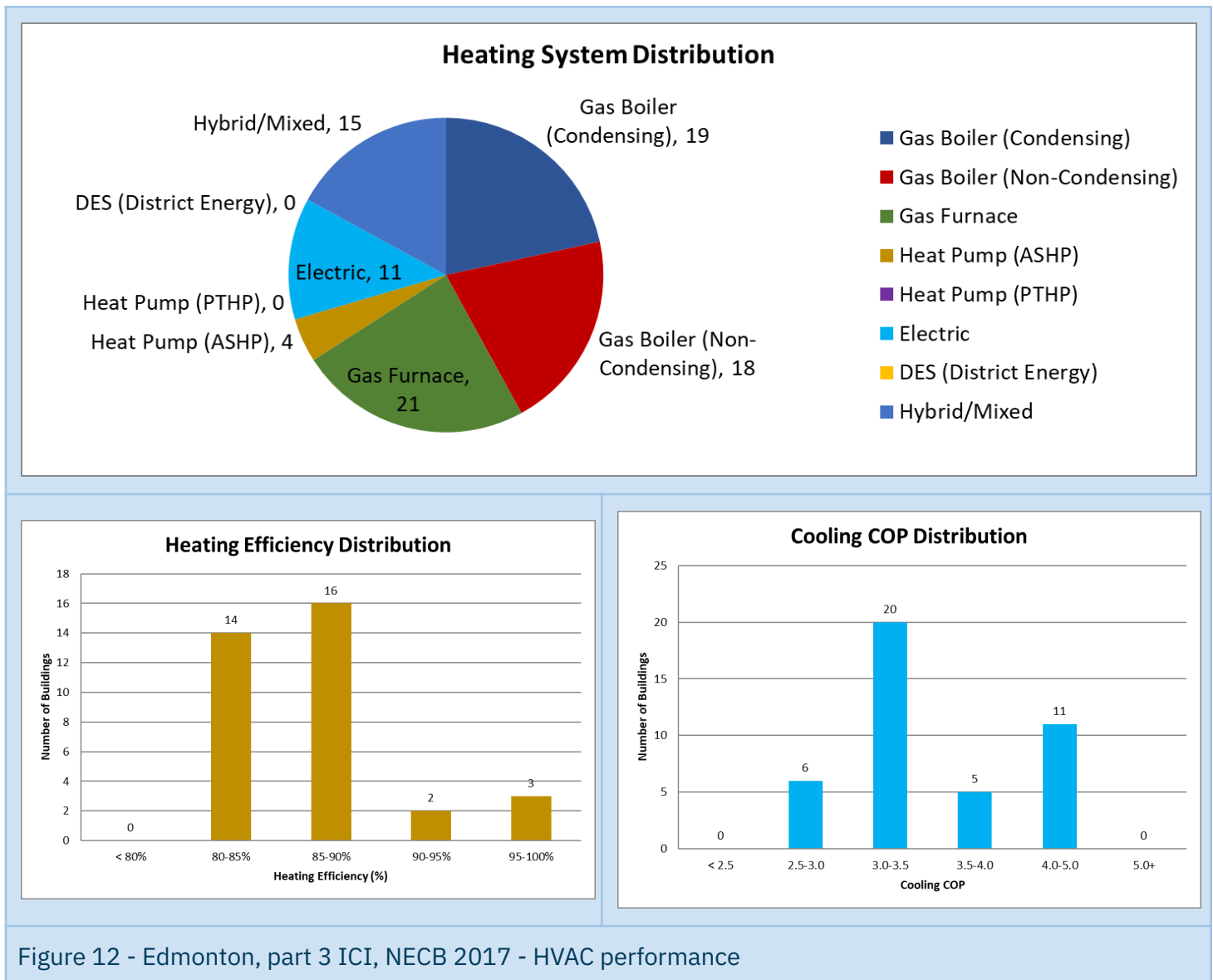


Figure 11 - Edmonton, part 3 ICI, NECB 2017 - building envelope

Commentary on building envelope

- Wall, roof, and window insulation values all outperformed the prescriptive minimum values.

Figure 12 below shows heating and cooling system performance. Natural gas is the dominant heat fuel, but a small number of resistive electric heating systems and an even smaller number of ASHPs are present.



Commentary on mechanical systems

- More diversity of heating systems is present
- Electric heating, both resistive and ASHP, makes up a significant portion of buildings.

