

# Evaluating Summertime Overheating in MURBs using Surveys and In-Suite Monitoring

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# OVERVIEW

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- 1** Study Buildings
- 2** Methodology
- 3** Survey and Monitoring Results
- 4** Key Implications for MURB Retrofits

## SEVEN STUDY BUILDINGS

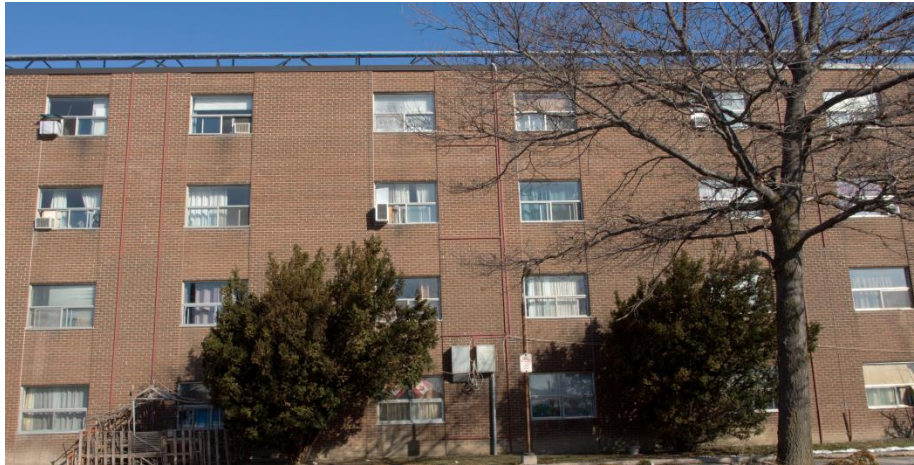
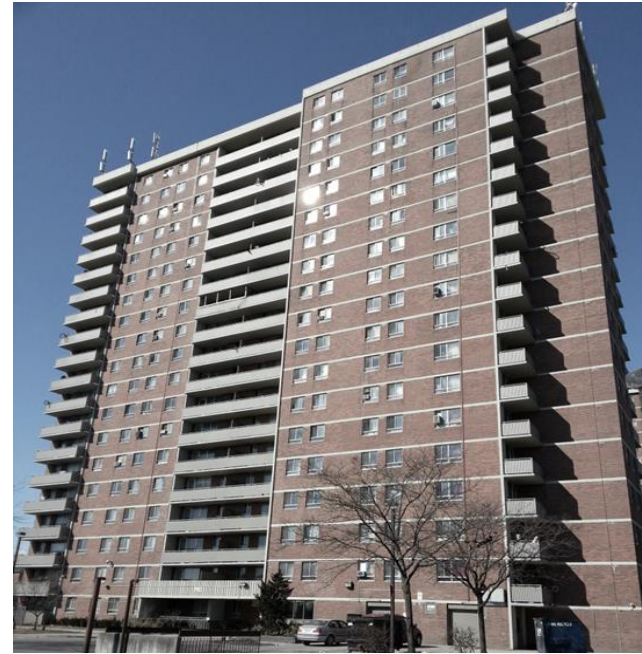
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4 -19 storeys

1,237 units

1965 - 1974 construction

Bachelor/Seniors/Family



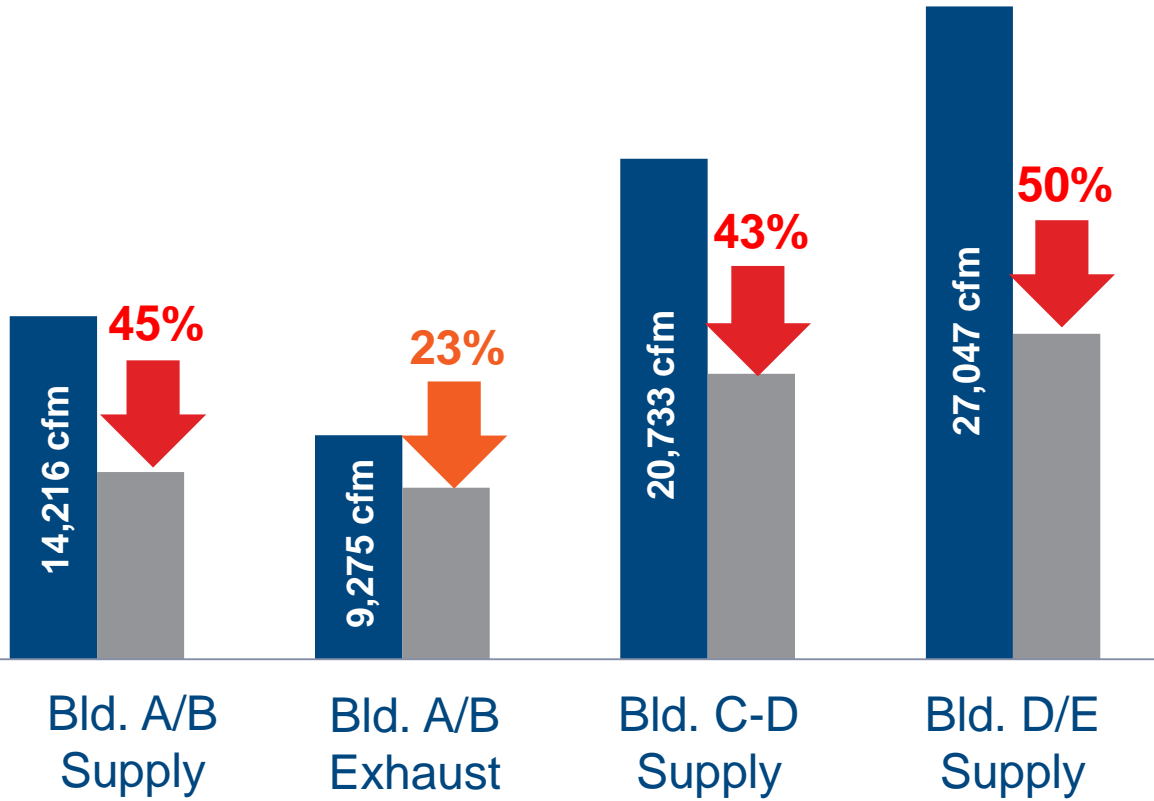








# VENTILATION CHALLENGES



# 2 Methodology



# IEQ FOCUS

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## OBJECTIVES

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1. Investigate extent and causes of overheating.
1. How well resident survey responses correlate to monitored data.
2. How to use data to prioritize thermal comfort issues that need to be addressed during building retrofits.

## SUMMERTIME FOCUS

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- 46 additional days where temperatures are  $>30^{\circ}\text{C}$  by 2049
- 62,000 households at risk of high heat exposure
- Managing summertime conditions is an increasing challenge



## MONITORING PROGRAM

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Resident Surveys

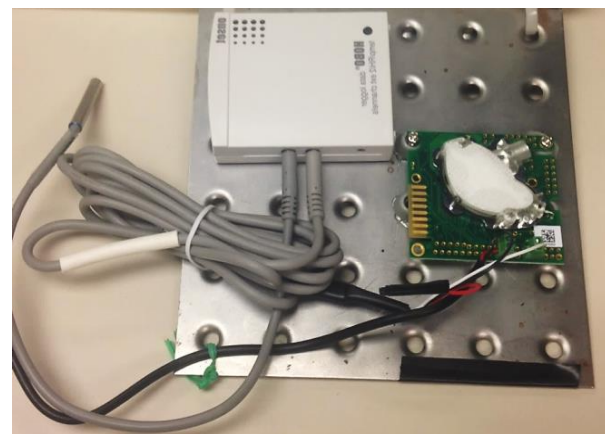
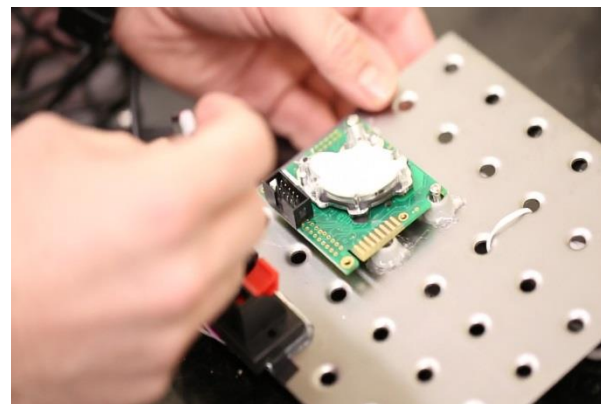
**15%**

Range of  
orientations/height

Conducted Jan-Feb 2015

IEQ Monitoring

**4% - 7%**

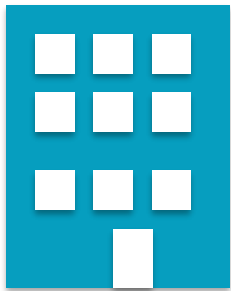


# 3 Survey and Monitoring Results

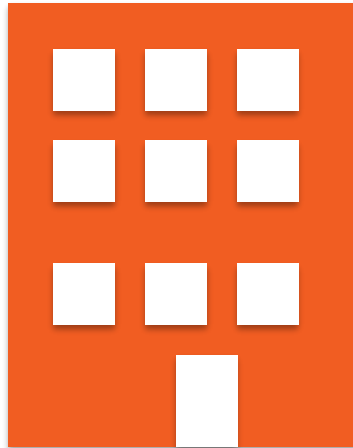


## SURVEY TRENDS – WARM TEMPERATURES

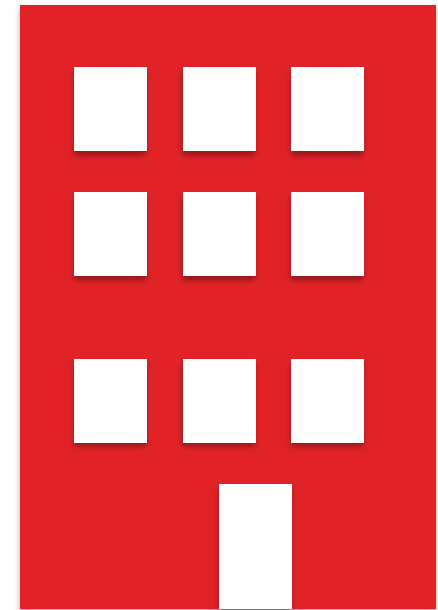
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Bldgs. A-B  
**32%** Too Warm

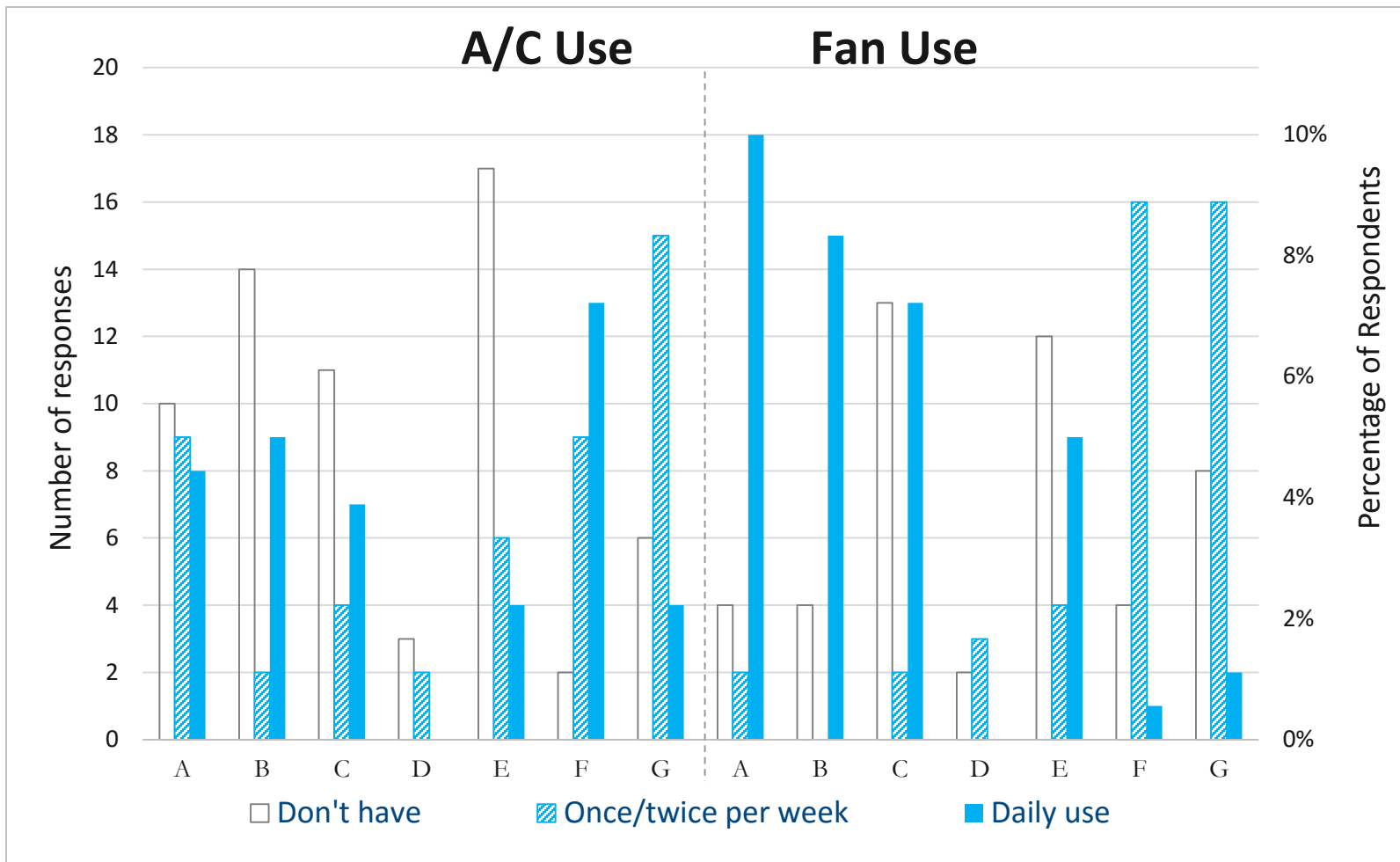


Bldgs. C-E  
48% - 52%  
Too Warm



Bldgs. F-G  
**77%** Too Warm

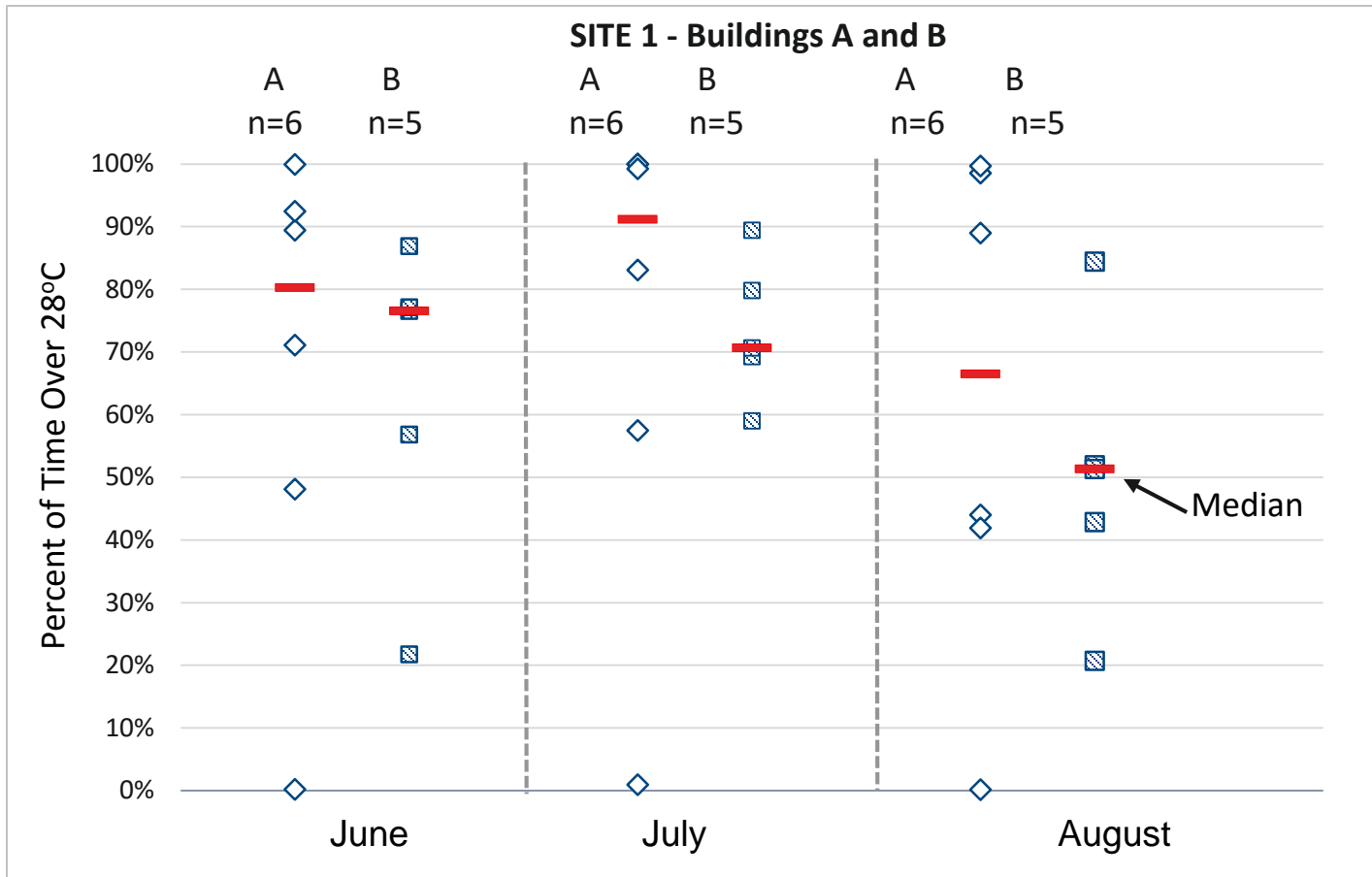
## SURVEY TRENDS – A/C AND FAN USE



**Window air conditioning is relatively ineffective.**



# MONITORING TRENDS – OVERHEATING

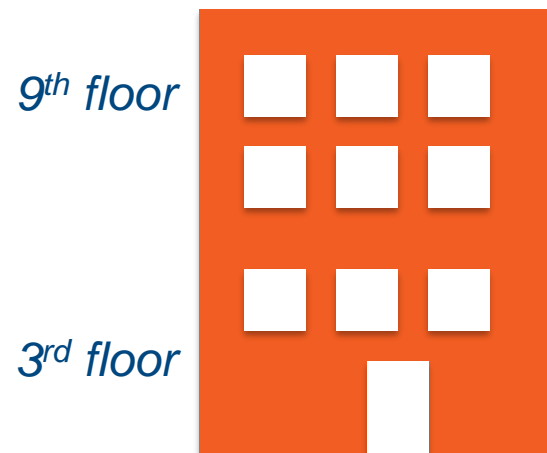
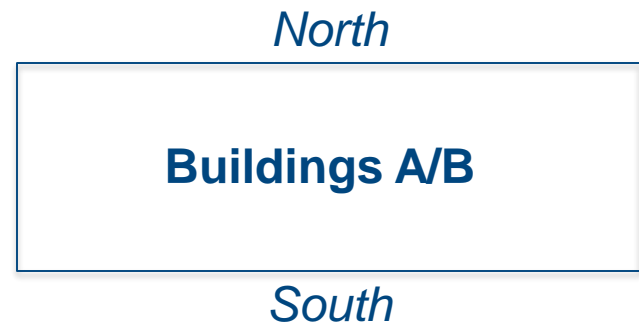


**Average Temp – 27.7°C**  
**Maximum levels reached 34°C**

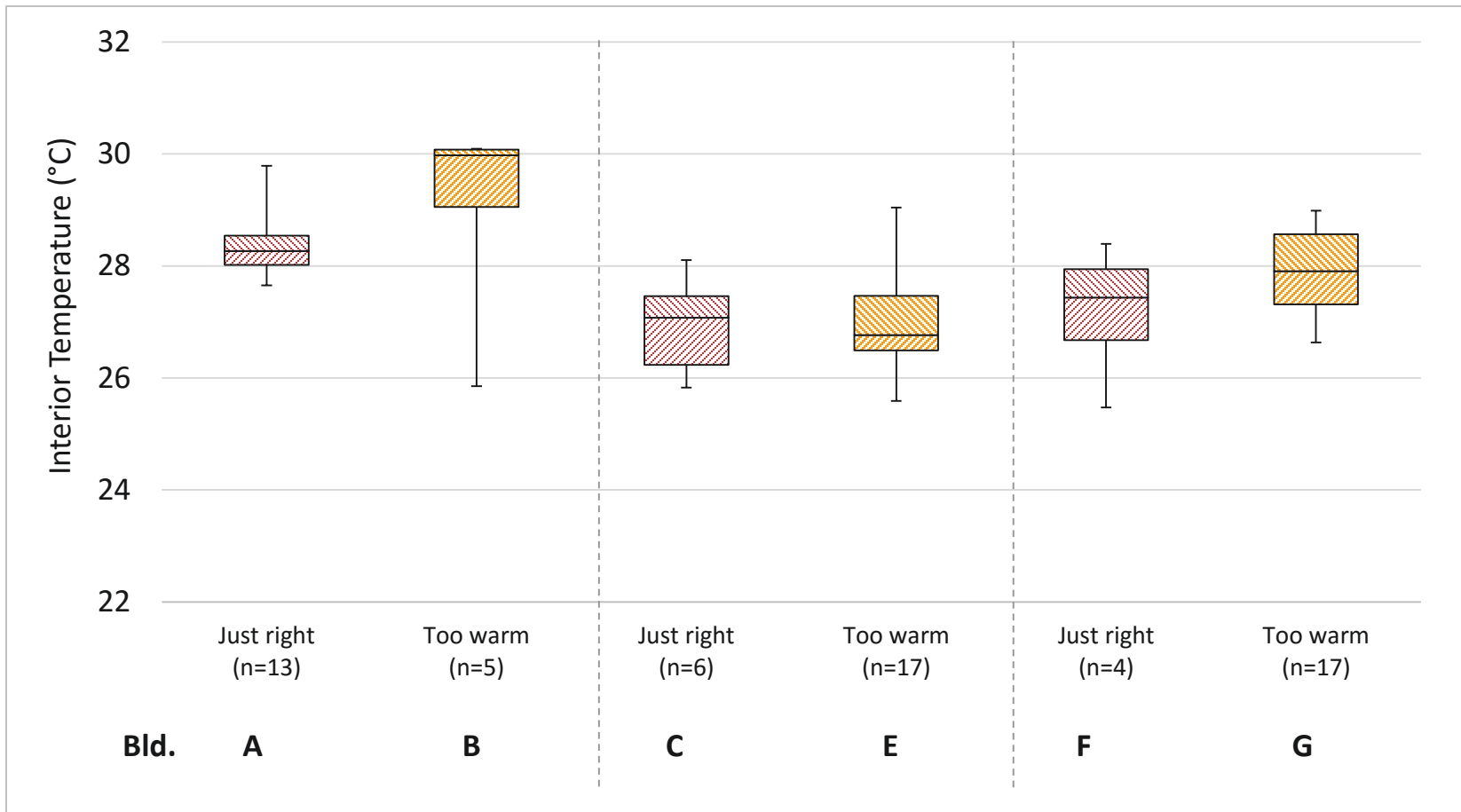
## MONITORING TRENDS – ORIENTATION AND HEIGHT

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- South up to **2°C warmer** on a hot day
- Smaller differences during typical day
- Top units up to **2.2°C warmer** on a hot day
- No significant differences during typical day



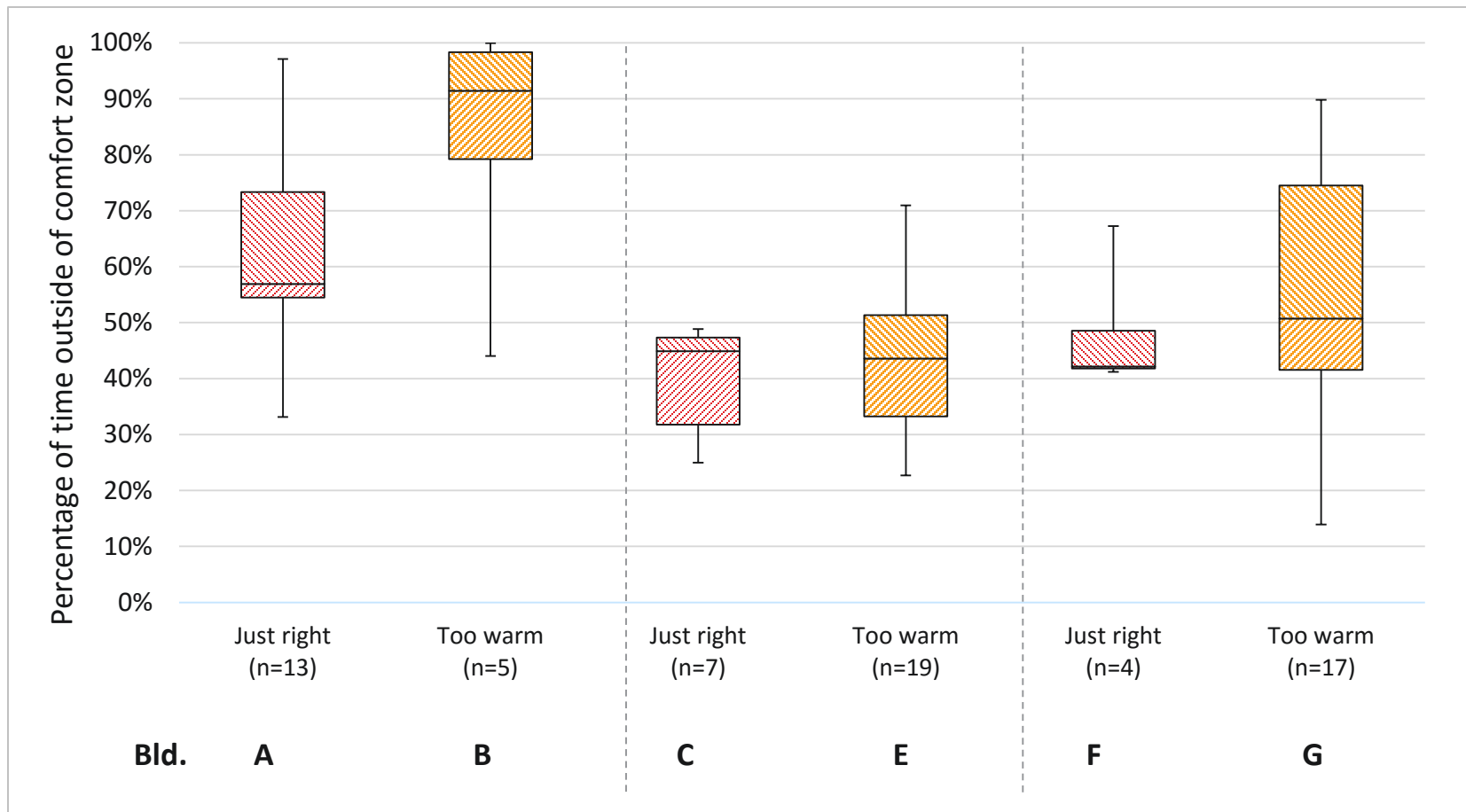
## COMPARISON – TEMPERATURE VS. PERCEIVED COMFORT



**Small correlation between operative temperature and perceived comfort.**



# COMPARISON – CALCULATED COMFORT VS. PERCEIVED COMFORT



**Greater variation in the range of percentages that corresponded to a particular survey response**

# **4** Key Implications for MURB Retrofits

## KEY TAKEAWAYS

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- 1 Significant overheating** occurs during summer months. Thermal dissatisfaction increases with building height.
- 2** It is not appropriate to use surveys in lieu of in-suite monitoring to reliably identify magnitude and extent of overheating.
- 3** Frequent use of fans and resident-installed A/C is not the most effective way to combating overheating





## DESIGNING FOR SUMMERTIME OVERHEATING

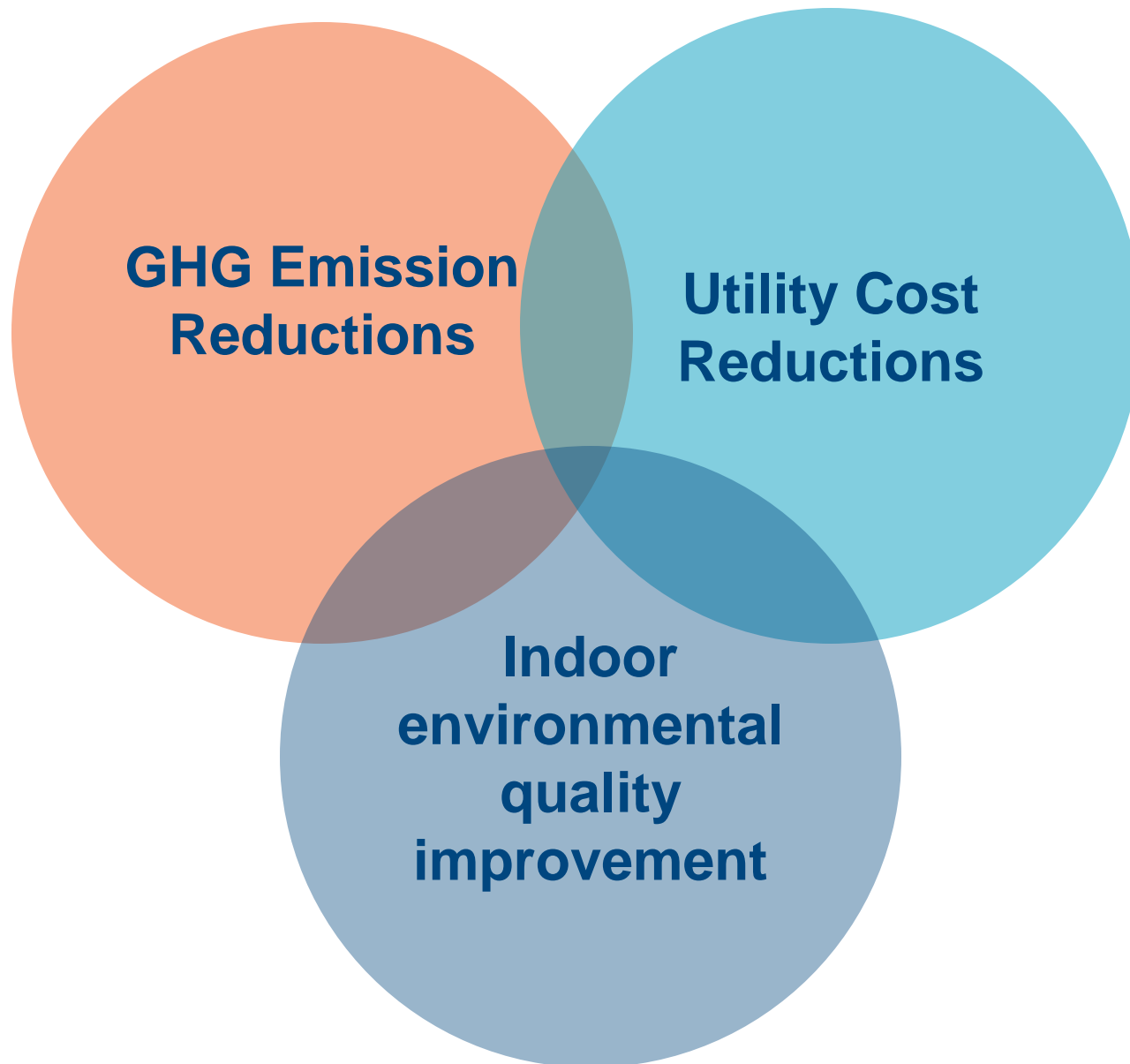
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- Window replacement (↓ solar heat gain)
- Envelope upgrades
- Exterior/interior blinds
- Resident education
- Suite level retrofits



## TARGETING MULTIPLE OBJECTIVES

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## STAY CONNECTED!

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