

View keeps residents comfortable during the hottest summer days

Overview

Bower is an elevated apartment building located in the Fenway neighborhood that was built on the idea that biophilic design is key to creating a comfortable, sustainable space. The building is enclosed with View Smart Windows, which use artificial intelligence to automatically adjust in response to outdoor conditions, maximizing access to natural light and views while controlling heat and glare. The windows also reduce HVAC operational energy consumption.



Study Objective

A measurement study was conducted to track indoor temperatures and quantify the thermal resilience benefit of View Smart Windows, in the event of a loss of air conditioning. Thermal resilience is the ability of a building to maintain habitable and safe indoor conditions under various forms of thermal stress, such as a hot summer day without air conditioning due to power failure or equipment malfunction. Extreme heat stress over an extended period can have serious health consequences. Therefore, thermal resilience is a critical parameter for occupancy.

Thermal Comfort Assessment

Studies have found that thermal comfort in a space significantly influences occupants' overall satisfaction with the indoor environmental quality, influencing their health, wellbeing, and productivity. Thermal comfort is driven by the combined effect of the following six factors:



Humidity



Clothing
Insulation



Air
Temperature



Air
Speed



Radiant
Temperature



Metabolic
Rate

Study Setup

The measurement study was conducted at two identical southwest corner apartment units at Bower over five days in July 2021. Two days had peak daytime temperatures of 95°F and high solar gain on the windows. Both apartment units have View Smart Windows installed. In one unit, all windows were kept in a fixed tint state to represent a typical non-dynamic window, while the other unit had View Smart Windows automatically transiting through tint states as programmed. In both units, the HVAC was turned off for the duration of the study to simulate a loss of mechanical cooling due to equipment failure. The operable windows were kept closed on the hottest days as outdoor air temperatures were above 85°F and would not provide any cooling benefit.

Each unit had sensors in three rooms to measure the following metrics at 5-minute intervals:

- Air temperature
- Relative humidity

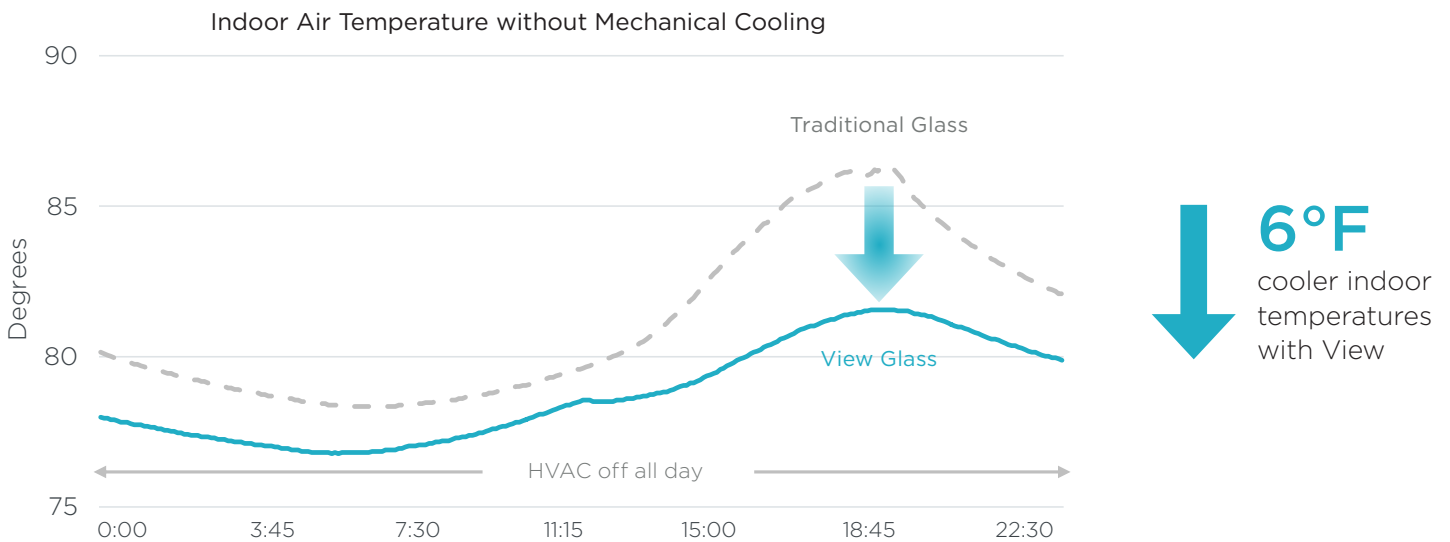
Baseline Unit
Traditional windows with fixed tint

View Unit
View Glass with four tint states



Study Findings

The study found that the air temperatures in the apartment unit with traditional windows were consistently above 80°F throughout the afternoon and well into the night. On the other hand, the unit with the View Smart Windows was up to 6°F cooler without AC even when the outdoor temperature was at the peak of 95°F and there was direct sun on the windows. Based on the temperature delta with View, it was estimated that the AC would consume up-to 37% less power to maintain indoor comfort on peak summer days.



Conclusion

View Smart Windows improve thermal resilience on hot summer days by eliminating 90% of window solar heat gain. Residents at Bower enjoy a connection with nature with maximum natural light and outdoor views while staying cool and comfortable with View.