Weingart East LA YMCA

AirAware Air Quality Monitoring Quarterly Report

(10/2025 – 12/2025)

Photo of the Weingart East LA YMCA

Prepared by the AirAware Team

Weingart East Los Angeles YMCA

AirAware Air Quality Monitoring Quarterly Report - # 4

October 2025 - December 2025

Prepared by the AirAware team

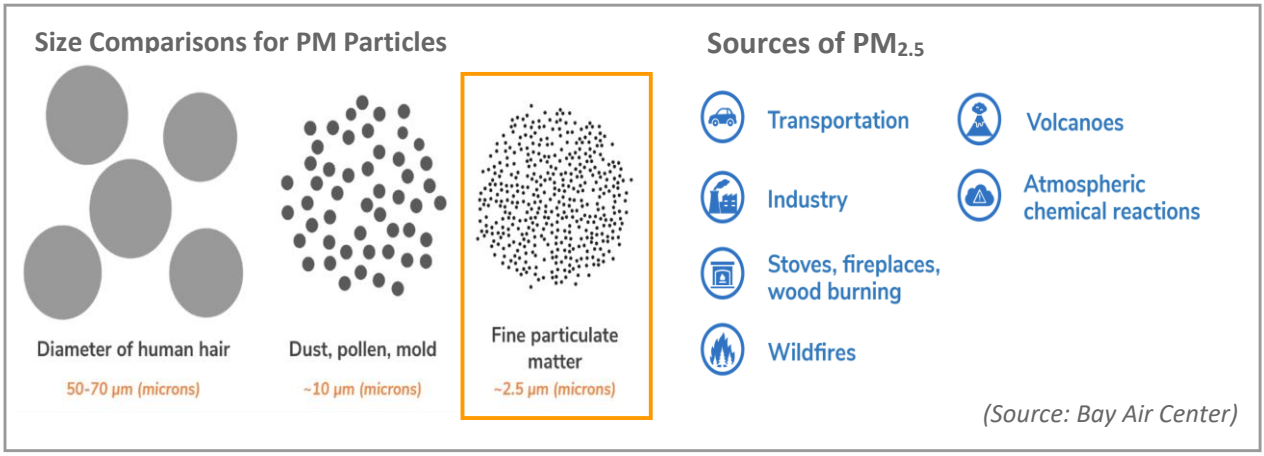
This report summarizes the recent air quality trends observed at the Weingart East Los Angeles YMCA, focusing on the differences between indoor and outdoor fine particulate matter ($PM_{2.5}$) and black carbon (BC) levels.

Key Takeaways

- $PM_{2.5}$ levels varied across time with the majority of indoor levels in the Good and Moderate AQI range, while outdoor levels rose into Unhealthy for Sensitive Groups and Unhealthy AQI levels.
- Indoor and outdoor pollution levels were exacerbated by the inversion layer, which is a meteorological phenomenon that occurs in the LA basin during winter months from wood-burning sources and stagnant air and increased smog conditions. Lower winter temperatures also tend to result in increased use of wood burning sources of heat, the PM from this burning gets trapped in the inversion layer causing higher pollution levels.
- The two multi-purpose rooms (MPR1 and MPR2) continue to have the highest indoor $PM_{2.5}$ during higher pollution days than other indoor spaces. During our May 2025 site visit, AirAware staff noted the air felt stagnant in MPR2 and had a strong chemical odor, suggesting the HVAC systems in these spaces may not be performing adequately. The Com-Room also shows this behavior during this period, when previously it was often the lowest in comparison to other indoor spaces. The Com-Room also has an external door that gets frequent use as well as a microwave, both of which could be the cause of the increased PM in this room. During past reporting periods AirAware staff noted an air purifier was in use in the Com-Room, if the purifier was removed, unplugged, or needs a new filter this could explain the higher PM levels during this period.
- BC levels often rose on weekday mornings, likely caused by early morning traffic in the area. Indoor BC levels were ~30% lower than outdoors, which is within the range of expected HVAC filtration efficiency (30%-80%) but lower than previous periods. An indoor air quality improvement intervention (e.g., improved HVAC filtration or air purifiers) would significantly improve indoor air quality conditions.

Background

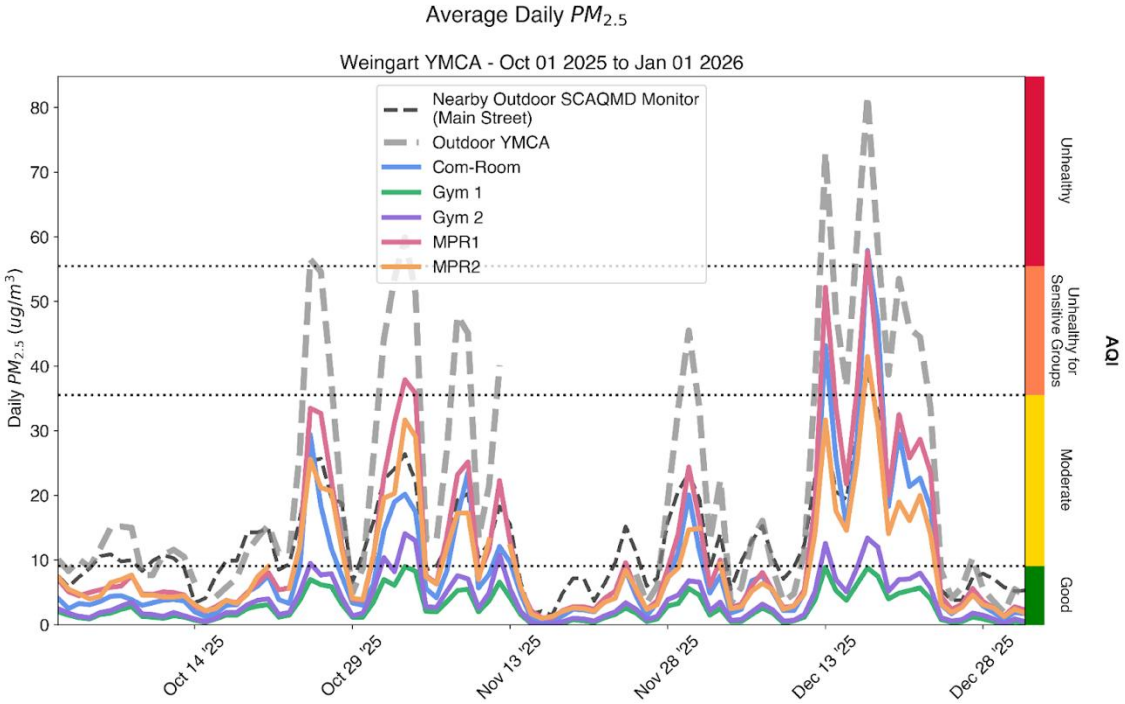
Particulate matter is an air pollutant made of tiny liquid and solid airborne particles that vary in size. Fine particulate matter ($PM_{2.5}$), measured at your YMCA, describes an important subset of particulate matter that is 2.5 microns and smaller in size (~30x smaller than the diameter of a human hair) and predominantly come from sources of combustion (burning of fuels), such as wildfires, residential wood burning, transportation, and industry.



Exposure to $PM_{2.5}$ has various detrimental health effects, such as aggravated asthma, decrease in lung function, increase in respiratory symptoms, and nonfatal heart attacks or premature deaths in people with heart and lung disease. It also impacts the environment through reduced visibility, damaged vegetation, and reduced soil nutrients, among many other impacts. Black carbon (BC), which is also measured at this YMCA, is a subset of $PM_{2.5}$ emitted from fossil fuel and biomass burning. A relevant urban source of BC is diesel exhaust. It has a wide range of negative respiratory, cardiovascular, and other health impacts, as well as detrimental climate effects.

Trends in Fine Particulate Matter ($PM_{2.5}$)

Indoor and outdoor air quality monitoring at the Weingart YMCA has been underway since late Fall 2024. This section explores the trends across time and space during fall and early winter of 2025 (October-December).



This plot shows average daily $PM_{2.5}$ levels across time for both the indoor (solid color lines) and outdoor (dashed grey line) AirAware monitors from the beginning of October 2025 to the end of December 2025. Data from the nearest regulatory monitor from the South Coast Air Quality Management District (SCAQMD) is also included (dashed black line). The Air Quality Index (AQI) categories coinciding with $PM_{2.5}$ concentrations are shown on the right with bounds shown across the plot in dashed black lines, helping to provide health context. The outdoor monitor also experienced a data gap in mid November due to power/solar battery charging issues caused by lack of sun during winter rains.

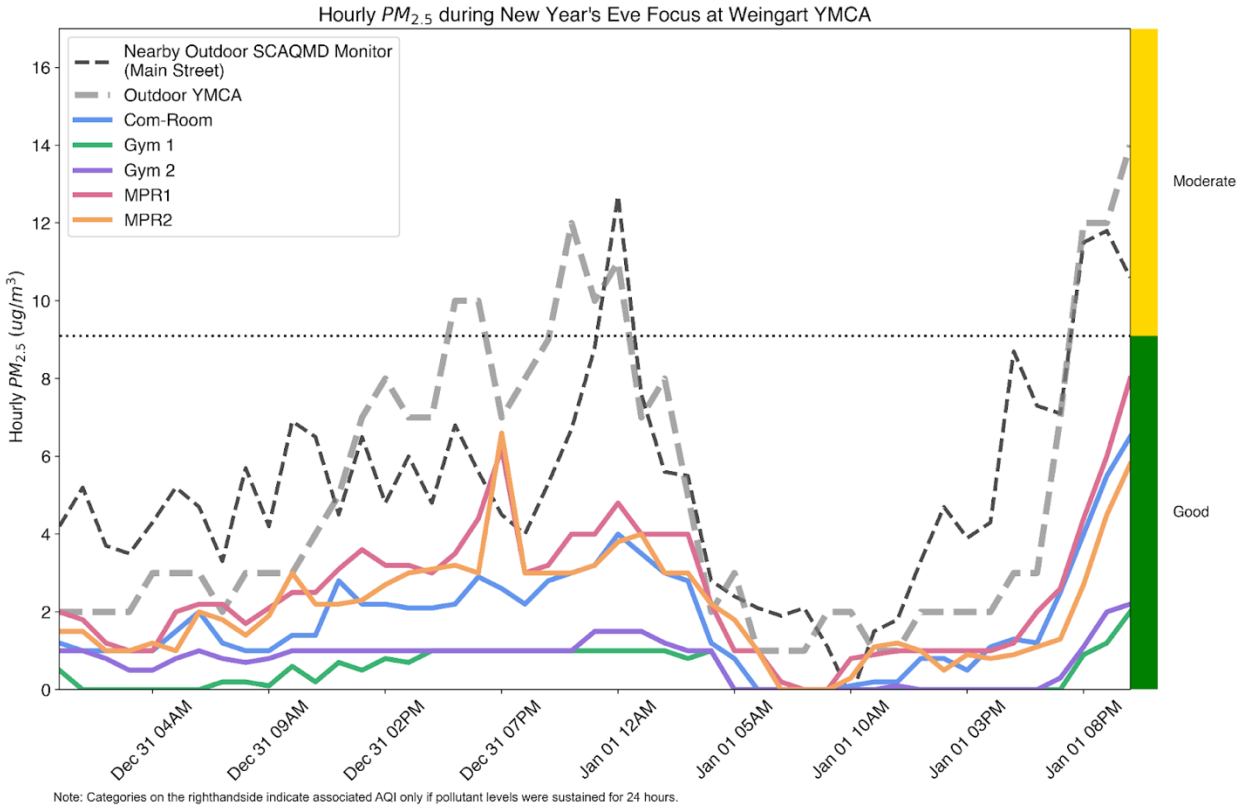
What does this plot tell us?

- From October 2025 to December 2025, outdoor $PM_{2.5}$ levels varied across time, and largely stayed within the Moderate AQI range. Indoor levels followed the rise and fall in outdoor air pollution, but at lower concentrations often an AQI level lower.
- Higher outdoor $PM_{2.5}$ concentrations in the Unhealthy AQI occurred briefly in mid December and in the Unhealthy for Sensitive Groups AQI in late October and November. These poor outdoor air quality days were likely due to pollution from stagnant winter weather, not wildfires, and highlight the importance of sustained and effective air filtration in maintaining healthy indoor air quality conditions year round. Some indoor spaces rose higher than others during these higher outdoor pollution periods; this is discussed in the next section.
- The outdoor YMCA monitor often showed a fairly similar pattern but with higher $PM_{2.5}$ levels than the nearest regulatory monitor from the South Coast Air Quality Management

District (SCAQMD) 2.5 miles northwest, suggesting the source of the PM is likely more local to this YMCA.[1]

Impacts of Fourth of July Fireworks

The plot below zooms in on the hourly data and further shows how fireworks impacted air quality both outdoors and indoors.



This plot shows average hourly $PM_{2.5}$ levels across time for both the indoor (solid color lines) and outdoor (dashed grey line) AirAware monitors from December 31st 2025 to January 1st 2026. Data from a nearby regulatory monitor from the South Coast Air Quality Management District (SCAQMD) is also included (dashed black line). The Air Quality Index (AQI) categories coinciding with $PM_{2.5}$ concentrations are shown on the right with bounds shown across the plot in dashed black lines, to provide health context, with the caveat that levels would need to be sustained for 24 hours to translate to the shown AQI. Times are shown in Standard Time (i.e. one hour behind Daylight Savings Time).

- Outdoor and indoor $PM_{2.5}$ was minimally impacted by firework-related emissions during New Year's Eve celebrations, remaining in the Good AQI category for the majority of the December 31, 2025 evening to January 1, 2026 morning. Outdoor levels at the nearest regulatory monitor rose into the Moderate AQI at midnight on January 1, 2026, while outdoor and indoor levels at the YMCA stayed lower in the Good AQI.

[1] The outdoor YMCA monitor has not been directly evaluated against the SCAQMD monitor, so we cannot draw conclusions about differences between the two.

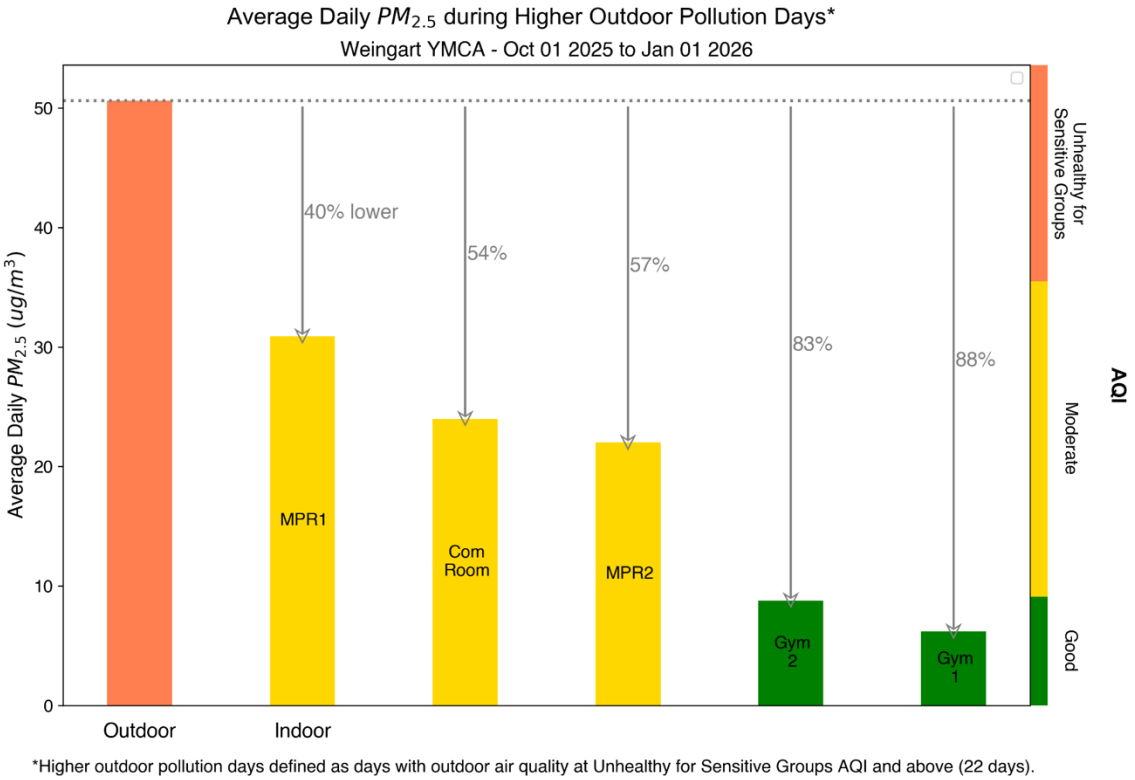
- These cleaner air quality conditions were likely caused by rainfall during New Years through both the particle removal from precipitation, as well as its impact on planned celebrations (e.g., reduced fireworks).[2] Many firework celebrations in the surrounding areas were also canceled this year as a response to the January 2025 Eaton and Palisades wildfires.
- These hourly levels were significantly lower compared to the previous year, where outdoor levels rose over 90 ug/m^3 with indoor levels ranging from 40-60 ug/m^3 were reported.[3] Other pollution conditions apart from New Year's Eve fireworks were occurring last year at the same time that likely impacted these levels as well (stagnant air, woodsmoke).

[2] National Weather Service Climatological Data for Los Angeles Downtown Area, CA - December 2025 showed 0.43 inches of rain.

[3] Unfortunately, only two indoor spaces (MPR1 and MPR2) were collecting data at this time last year as the other indoor air quality monitors were experiencing data communication and power issues.

Comparison of Indoor and Outdoor $PM_{2.5}$

The relationship between indoor and outdoor $PM_{2.5}$ is important to explore as it can tell us how effective your YMCA's HVAC system is currently at filtering out particulate matter from outdoor sources and can help highlight indoor air quality concerns and any needs for HVAC improvement.



This bar chart compares average daily outdoor (left) and indoor (right) $PM_{2.5}$ levels during higher outdoor pollution days. The color of each bar chart coincides with an AQI category, and the arrows from the grey dashed line and coinciding percentages indicate how much lower average indoor levels are per room compared to outdoor. The indoor spaces are ordered from most to least similar to outdoor levels.

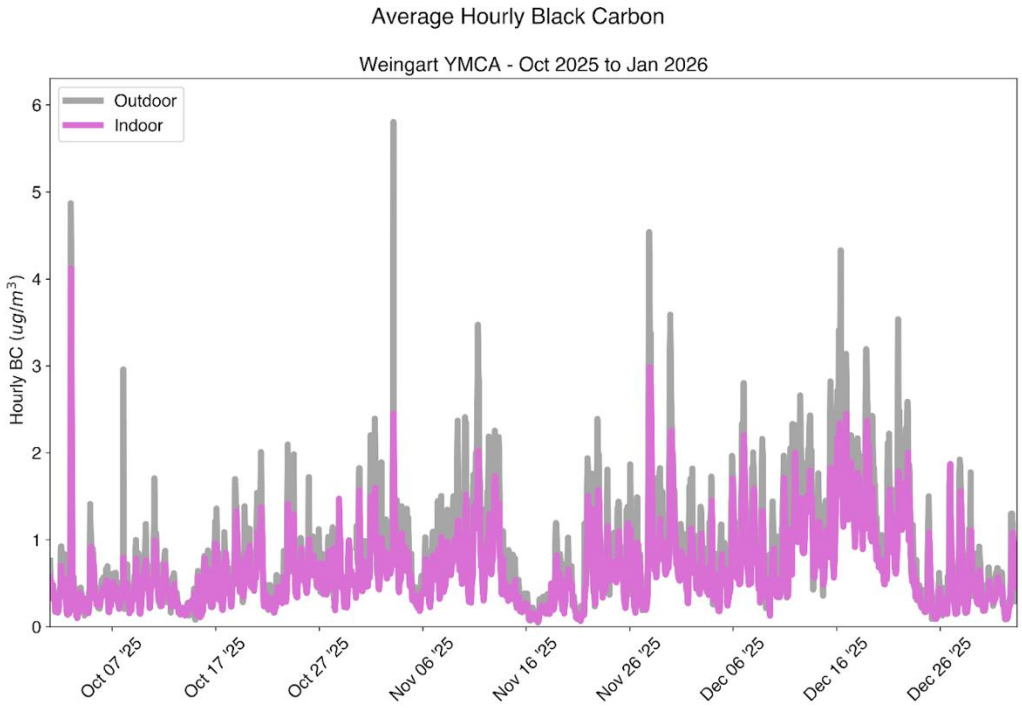
What does this chart tell us?

- On average, we would expect indoor levels to be between 30% and 80% lower than outdoor levels, depending on currently installed HVAC filtration and operation. During this period, all average indoor levels during higher pollution days were within this expected range. In general, this means the HVAC filtration system is working as expected for most spaces. Levels would be expected to reduce to at least 80% if an indoor air quality improvement intervention was introduced (e.g., enhanced HVAC filters or indoor air purifiers). However, it should be noted that while the overall indoor levels remained in the Good to Moderate range, there were several days during this reporting period in which indoor $PM_{2.5}$ levels reached Unhealthy for Sensitive Groups levels, and one day in which MPR1 and the Com-Room reached overall Unhealthy levels (see chart on page 4).

- Indoor air quality in MPR1 and MPR2 continue to be the most impacted by outdoor air pollution than other indoor spaces; AirAware staff noted the air felt stagnant in MPR2 during the last site visit in May 2025 and had a strong chemical odor, suggesting the HVAC systems in these spaces may not be performing adequately. However, many other factors may be causing these differences, such as building and HVAC design.
- In previous reports, Com Room $PM_{2.5}$ was often highlighted as showing low levels compared to outdoor levels, but this behavior was not observed for this period. What changed? Was the air purifier that was previously located in the Com-Room removed, turned off, or perhaps its filter needs to be changed? **Are there any other activities or changes that could be causing the higher levels in the Com Room during this period?** Gym 1 and Gym 2 continue to experience the lowest $PM_{2.5}$ levels.

Trends in Black Carbon

Indoor and outdoor BC monitoring at the Weingart East Los Angeles YMCA has been underway since early November 2024. This section explores the trends across time and space across late spring and early summer of 2025. **Note:** $PM_{2.5}$ concentrations can be compared to the AQI, but BC does not have official health standards for comparison yet, which limits our review to concentrations only. While BC may appear lower in comparison than $PM_{2.5}$, health studies have shown that continued exposure at these lower levels can have detrimental health impacts.

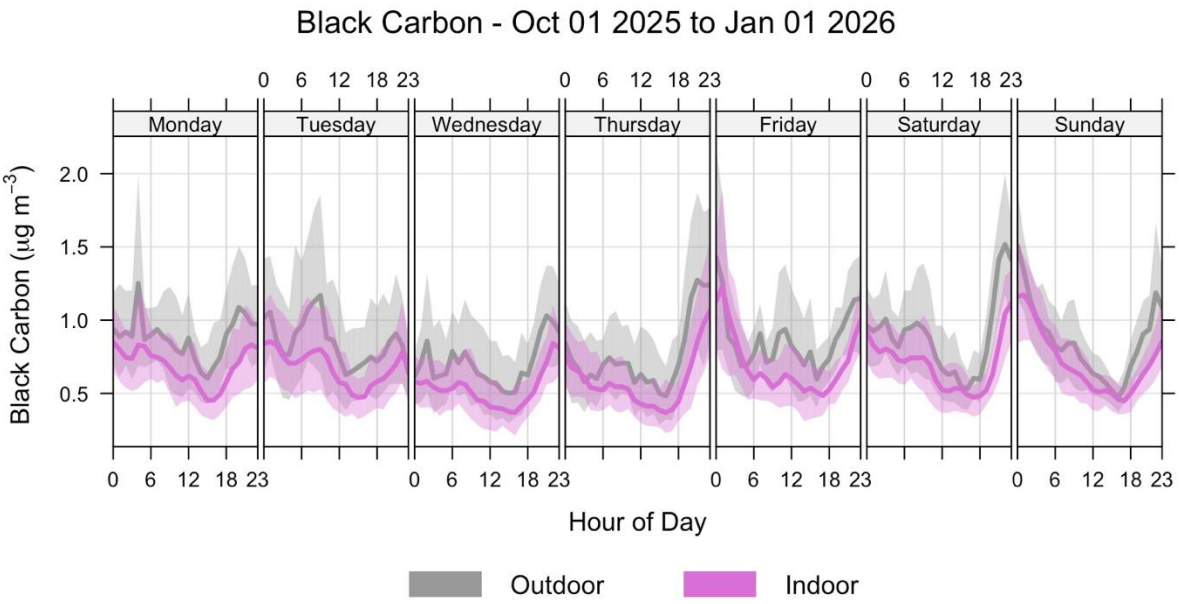


This plot shows average hourly BC levels across time for both the indoor (pink) and outdoor (grey) monitors from the beginning of October 2025 to the end of December 2025. Any gaps in the data are due to routine monitor maintenance or brief operational issues.

What does this chart tell us?

- Hourly BC levels varied across time, fluctuating across the day. Indoor levels followed the rise and fall of the outdoors but were lower in concentration to varying extents. This relationship is explored more on page 11.

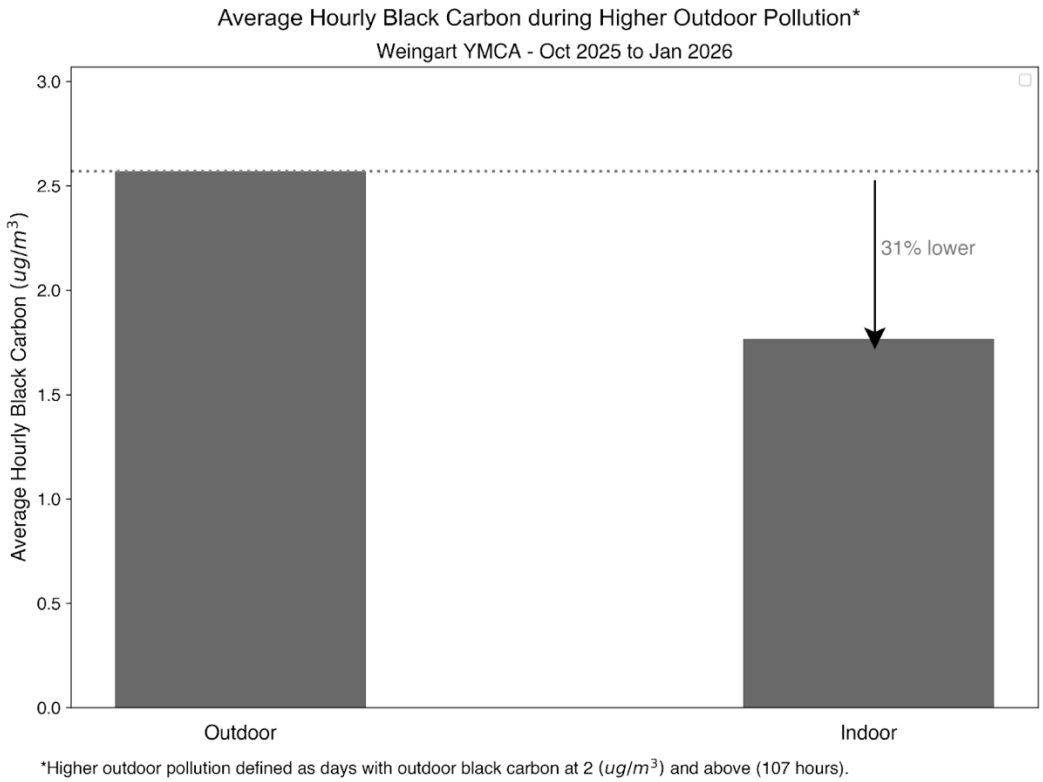
- Higher peaks all predominantly occurred overnight, ranging from 11PM - 4AM (in Local Standard Time), mostly occurred across weekdays, and occurred less frequently in October. This pattern is explored more in the next plot.



This plot shows the "average week of BC" for the quarter for both outdoor (grey) and indoor (pink) monitors. Levels are shown across different hours of the day and days of the week. The horizontal (x) axis uses 0-23hr notation, where 0=12AM, 18 = 6PM, and 23 = 11PM. All hours are shown in Standard Time (i.e., not Daylight Savings Time).

What does this chart tell us?

- BC levels followed similar trends across the week as seen previously with levels rising gradually in the evening across nighttime and lowering in the afternoon. This is due to the natural changes in the atmosphere across the day (there is more 'room' for pollutants to mix during the daytime when temperatures rise and this phenomenon means concentrations are often lower - the opposite is true during the nighttime).
- On top of this general trend, there are also frequent morning spikes, seen predominantly on Monday and Tuesday during this period. Afternoon peaks also occurred on Thursdays and Fridays of this period. Indoor and outdoor BC levels were most similar on Sundays.



This bar chart compares average daily outdoor (grey) and indoor (pink) BC levels during periods of higher outdoor pollution. The arrow from the grey dashed line and coinciding percentage indicates how much lower the average indoor level is compared to outdoor BC.

What does this chart tell us?

- In general, we would expect indoor levels to be between 30% and 80% lower than outdoor levels on average, depending on currently installed HVAC filtration. For this period, the average level of indoor BC during higher outdoor pollution was within this expected range, but on the lower end (31%), showing less filtration than previous periods, and further indication that this YMCA's HVAC system may not be performing optimally. More BC data was available for this comparison than in previous reports (due to higher on average levels), providing further confidence in these results. Indoor BC levels are expected to substantially improve (lower) after an indoor air quality improvement intervention (e.g., improved HVAC filtration or air purifiers).