

NYC Office Building: IAQ and Energy Reduction

Implementing Advanced Air Quality Solutions in a NYC Office Building

BACKGROUND

This is a decarbonization case study focusing on Indoor Air Quality (IAQ) and energy reduction that was conducted in a 34-floor office building located in NYC. The study examines whether HVAC energy consumption could be minimized through a series of operational and filtration efficiency modifications. This case study specifically examined two floors, the 14th and 15th, within the building.

OBJECTIVE & ACTIONS

To achieve the set objectives, a series of methodical actions were meticulously planned and executed. All floors of the building had AtmosAir bi-polar ionization installed into the supply air. The study delved into analyzing utility bills for the designated floors, in turn facilitating a thorough comparison between energy consumptions observed in August-September 2022 and the corresponding period in 2023. Simultaneously, IAQ data was diligently gathered and evaluated, contrasting the IAQ metrics recorded in June-July 2023 with those observed in August-September 2023. Various targeted changes were implemented during the testing phase - including a 50% reduction in outside air intake, adjustments to temperature setpoints during occupied and unoccupied hours, and the transition from MERV13 to MERV8 filters at air handlers servicing the two floors.



INDOOR AIR QUALITY RESULTS

An in-depth analysis of the IAQ data revealed crucial insights and outcomes following the implementation of the planned modifications. Notable findings included a noticeable reduction in particle levels within the return air with reduced ventilation and the utilization of MERV8 filters, as opposed to the baseline conditions with MERV13 filters. Furthermore, the effectiveness of MERV13 filters in mitigating particles in the supply air was confirmed through the study results. While MERV8 filters exhibited slightly less effectiveness in reducing particulate matter in incoming air compared to MERV13 filters, when combined with reduced ventilation, particle levels in the supply air were marginally lower with MERV8 filters.

- The results indicated that with reduced ventilation and MERV8 filters, particle levels in the return air were lower compared to baseline conditions with MERV13 filters.
- The MERV13 filters showcased efficiency in reducing particles in the supply air.
- Although MERV8 filters did not reduce particulate matter as effectively as MERV13 filters in incoming air, when combined with reduced ventilation, particle levels in the supply air were slightly lower with MERV8 filters.

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ENERGY ANALYSIS

The study's energy analysis provided crucial insights into the impacts of the implemented changes, particularly on the energy consumption dynamics of the 14th and 15th floors. By scrutinizing energy utilization patterns from August to September in both 2022 and 2023, the tangible outcomes of alterations such as reduced ventilation, thermostat adjustments, and the filter transition to MERV8 became evident. A substantial reduction of 35,780 kWh for the two floors over the two-month period reflected a promising 7.4% energy savings compared to baseline measurements, translating to significant cost efficiencies of \$6,619.87 during the test period for the two floors. Scaling this impact across the entire building alluded to substantial potential for monthly and annual energy cost savings.

Energy usage for the 14th and 15th floors was compared between Aug-Sep 2022 and Aug-Sep 2023:

- AtmosAir bi-polar ionization air purification showed a **reduction in PM 2.5 particles of 40%** compared to baseline conditions without AtmosAir.
- After implementing changes (reduced ventilation, altered thermostat settings, and lower filter efficiency), **energy consumption decreased by 35,780 kWh** for the two floors over the two-month period.
- This reduction translated to a **7.4% savings** compared to baseline measurements, totaling **\$6,619.87 saved** during the two months for the two floors.
- Extrapolating to the entire building, an estimated **monthly savings of \$56,261.50 and an annual savings of \$675,138** could be achieved.

CONCLUSION

The study findings underscored the efficacy of reducing outside air intake and optimizing filter efficiency in improving Indoor Air Quality (IAQ), culminating in expected IAQ enhancements while showcasing comparable IAQ levels achieved with MERV8 filters against MERV13 filters. Moreover, the orchestrated blend of reduced ventilation, operational tweaks, and the implementation of less restrictive filters not only yielded a notable reduction in energy consumption but also highlighted a significant 7.4% savings in energy usage. These modifications further contributed to a substantial decrease of 25.4 metric tons of CO2 equivalent, underscoring the pivotal role of AtmosAir systems, decreased ventilation rates, and less efficient filters in maintaining or even elevating IAQ standards beyond traditional methods. Ultimately, these strategic interventions are poised to make considerable strides in diminishing the building's carbon footprint and fostering the conservation of valuable energy resources.

