Reducing Outdoor Air and HVAC Costs in a Large Conference Hotel with IAQP Using smartIAQ®

A new large conference hotel faced significant mechanical challenges when ventilation rate requirements drove outdoor air above 43,000 CFM. Applying the Indoor Air Quality Procedure during design allowed the project team to reduce outdoor air by nearly half while preserving indoor air quality in ballrooms, meeting rooms, and public spaces. The result was a simplified system layout, smaller DOAS units, and an estimated $710,000 reduction in mechanical equipment costs.

The Case Study

A new construction large conference hotel in the Southeastern United States was in the early stages of mechanical design. The project included multiple floors of high-occupancy common areas, including grand and junior ballrooms, conference and meeting rooms, dining spaces, and expansive lobby areas. These spaces were designed to accommodate large and highly variable occupant loads, making ventilation a primary driver of system size and cost.

Under a conventional ventilation design using the **Ventilation Rate Procedure (VRP)**, preliminary calculations showed that the hotel's common areas alone would **require more than 43,000 CFM** of outdoor air. Meeting this requirement significantly increased mechanical system size and complexity and quickly became one of the dominant cost and coordination challenges in the project.

At this stage of design, it was clear that a traditional ventilation strategy would place substantial pressure on both the building layout and the construction budget.

Project Snapshot:

Building Type: Large conference hotel, Southeast U.S.

Design Challenge: Ventilation Rate Procedure required over 43,000 CFM of outdoor air for common areas, exceeding available roof and mechanical space.

IAQP Approach: Centralized smartIAQ systems applied to high-occupancy spaces to reduce outdoor air while maintaining indoor air quality.

Key Outcomes:

- Nearly 50% reduction in outdoor air
- DOAS units downsized to fit available roof space
- Majority of ERVs eliminated
- $710,000 estimated equipment savings
- $25,000 estimated annual energy savings

Design Constraints

As the design team evaluated how to accommodate the required outdoor air, several constraints emerged. Roof space was limited, restricting both the number and physical size of **dedicated outdoor air systems (DOAS)** that could be installed. The high outdoor air volumes required under the Ventilation Rate Procedure also triggered the need for **multiple energy recovery ventilators**, further increasing equipment count and coordination effort.

Mechanical room space within the building was similarly constrained. The air handling equipment required to serve the hotel already occupied much of the available space, leaving little flexibility to add ERVs or upsize air handlers. Even with aggressive coordination, the total DOAS capacity required under a VRP-based design exceeded what could realistically be installed on the roof or within the building.

Without an alternative approach, the project faced difficult tradeoffs between ventilation compliance, constructability, and overall project cost.

Indoor Air Quality Procedure

To resolve these challenges, the design team evaluated the Indoor Air Quality Procedure (IAQP) for the hotel's highest-occupancy spaces. Rather than relying solely on outdoor air dilution, the IAQP allowed the team to manage indoor contaminants through air cleaning while still maintaining indoor air quality.

The IAQP strategy was applied selectively to the spaces driving the largest ventilation loads, including ballrooms, conference and meeting rooms, dining areas, and lobby spaces. By targeting these areas, the design team was able to significantly reduce outdoor air requirements without changing the program or function of the spaces.

The final design incorporated **centralized smartIAQ systems** installed on the return air ductwork of **ten air handling units.** These systems provided in-space air cleaning to support the IAQP design, allowing outdoor air volumes to be reduced while maintaining a defensible and standards-aligned ventilation strategy.

As a result, the total outdoor air requirement for the common areas was reduced from over 43,000 CFM to approximately **19,000 CFM**, representing an almost **50% reduction** compared to the original Ventilation Rate Procedure design.

The Result

Applying the IAQP during the design phase fundamentally changed the trajectory of the project. The reduced outdoor air requirement allowed the DOAS units to be downsized to configurations that fit within the available roof space, resolving one of the project's most significant physical constraints. In addition, most of the energy recovery ventilators that were required under the VRP design could be eliminated, simplifying the mechanical layout and reducing coordination risk.

From a cost perspective, the IAQP-based approach delivered immediate value. The reduction in equipment size and quantity resulted in estimated mechanical **equipment savings of $710,000**, allowing the project to remain aligned with budget expectations. Lower outdoor air volumes also reduced the conditioning load on the system, producing **estimated annual energy savings of $25,000.**

By adopting the IAQP early in the design process, the project team was able to overcome space limitations, reduce system complexity, and improve overall project economics, while maintaining a clear and defensible approach to indoor air quality.