1. Technical IAQP Explainer for Engineers

(ASHRAE 62.1 – Indoor Air Quality Procedure)

Purpose of IAQP

ASHRAE Standard 62.1 provides two compliant ventilation pathways:

1. **Ventilation Rate Procedure (VRP)** – prescriptive outside air volumes
2. **Indoor Air Quality Procedure (IAQP)** – performance-based contaminant control

The **IAQP** allows engineers to meet indoor air quality requirements by **limiting contaminant concentrations**, rather than by supplying fixed quantities of outdoor air.

This enables **safe reduction of outdoor air**, provided that:

- Contaminants of concern are identified
- Acceptable concentration limits are defined
- Control strategies are documented and verifiable

Why IAQP Matters in HVAC Design

In hot-climate regions, outdoor air dominates:

- Cooling load
- HVAC system sizing
- Energy consumption

IAQP enables engineers to **decouple IAQ performance from outside air volume**, unlocking opportunities to:

- Reduce ventilation rates
- Downsize HVAC equipment
- Lower peak and annual energy demand

IAQP Compliance Framework (Engineer View)

Under ASHRAE 62.1 IAQP, the design team must demonstrate that:

1. **Contaminants of Concern** are identified
   Typical examples:

- Particulates (PM2.5, PM10)
- VOCs
- Microbial contaminants (bacteria, viruses, mould)
- Odours

2. **Acceptable Concentration Limits** are defined
   Using:
   - ASHRAE guidance
   - WHO / EPA references
   - Owner Project Requirements (OPR)
3. **Control Measures** are implemented
   Including:
   - Filtration
   - Air cleaning / purification
   - Source control
   - Ventilation (reduced but sufficient)
4. **Performance is Achieved and Maintained**
   Through:
   - Independently tested technologies
   - Monitoring (optional but recommended)
   - Documented design intent

Role of Bipolar Ionization in IAQP

When **Direct Barrier Discharge (DBD) Bipolar Ionization** is integrated into the HVAC system:

- Pathogens, VOCs, and fine particulates are **neutralized in the air and on surfaces**
- Contaminant concentrations are **actively reduced**, not just diluted
- IAQ targets can be met with **significantly less outside air**

This allows engineers to justify **ventilation reductions often in the order of ~40–50%**, subject to project-specific modelling and approval.

HVAC Downsizing Opportunities Enabled by IAQP

Reducing outside air directly impacts system sizing:

System Element	Impact
FAHUs	Lower airflow rates
Cooling coils	Reduced sensible & latent loads
Chillers	Smaller capacity
Ductwork	Reduced cross-sectional area
Plant rooms	Smaller footprint
Electrical	Reduced fan & chiller power

The result is **lower HVAC CapEx** and **lower OpEx**, while remaining compliant with ASHRAE 62.1.

Energy & Sustainability Implications

Typical outcomes in IAQP + air purification designs:

- ~10–15% reduction in total building energy
- Reduced peak cooling demand
- Lower carbon emissions
- Improved LEED, WELL, and Fitwel alignment

Importantly, **IAQP is explicitly recognised** within these certification frameworks as a valid compliance pathway.

Key Engineering Considerations

- IAQP must be documented clearly in Basis of Design (BoD)
- Air cleaning technology must be **independently tested and ozone-free**
- Coordination with sustainability consultants is recommended
- Early-stage integration (concept / schematic) maximises savings

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Summary for Engineers

IAQP is not a workaround.
It is a **standards-compliant, performance-based design method** that:

- Improves IAQ
- Reduces HVAC size
- Cuts energy use
- Strengthens the business case for healthy buildings

When paired with proven air purification, IAQP becomes a **powerful engineering optimisation tool**.

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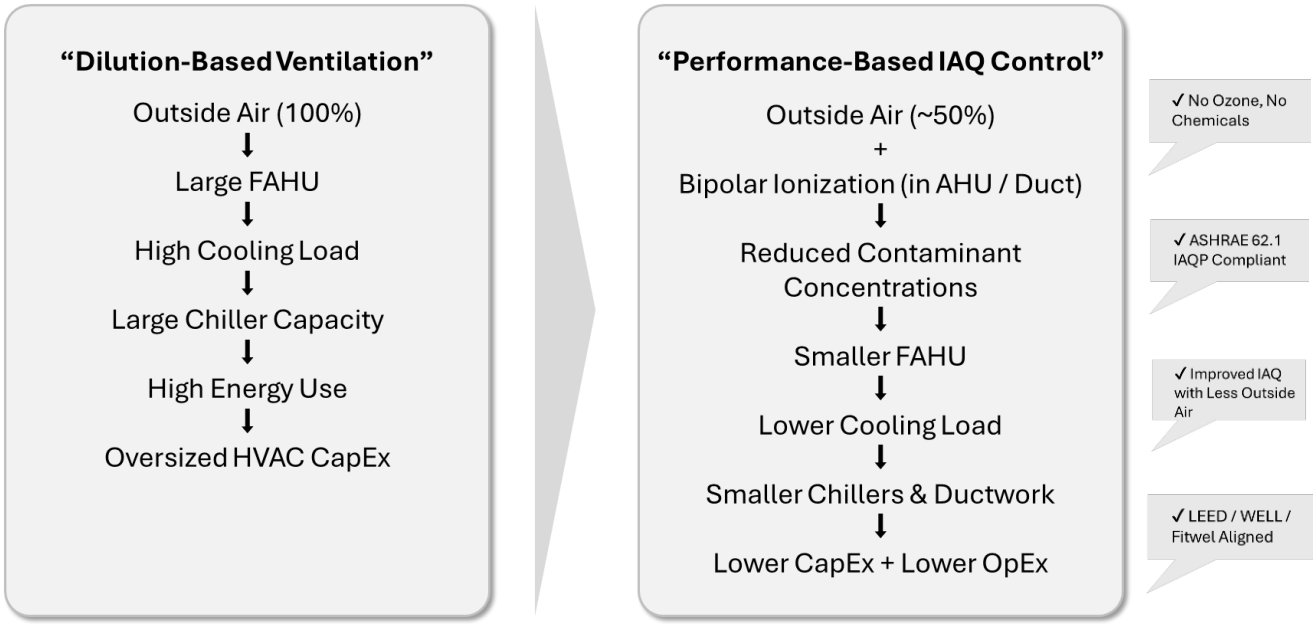
2. HVAC Downsizing via IAQP

HVAC Downsizing Using ASHRAE 62.1 IAQP



FOOTNOTE (Engineering Note)

Actual ventilation reductions and equipment downsizing are project-specific and must be validated through IAQP analysis and design documentation.
