





AIR FILTRATION

**OPTIMIZING ENERGY EFFICIENCY
AND INDOOR AIR QUALITY**

by Robert F. Goodfellow



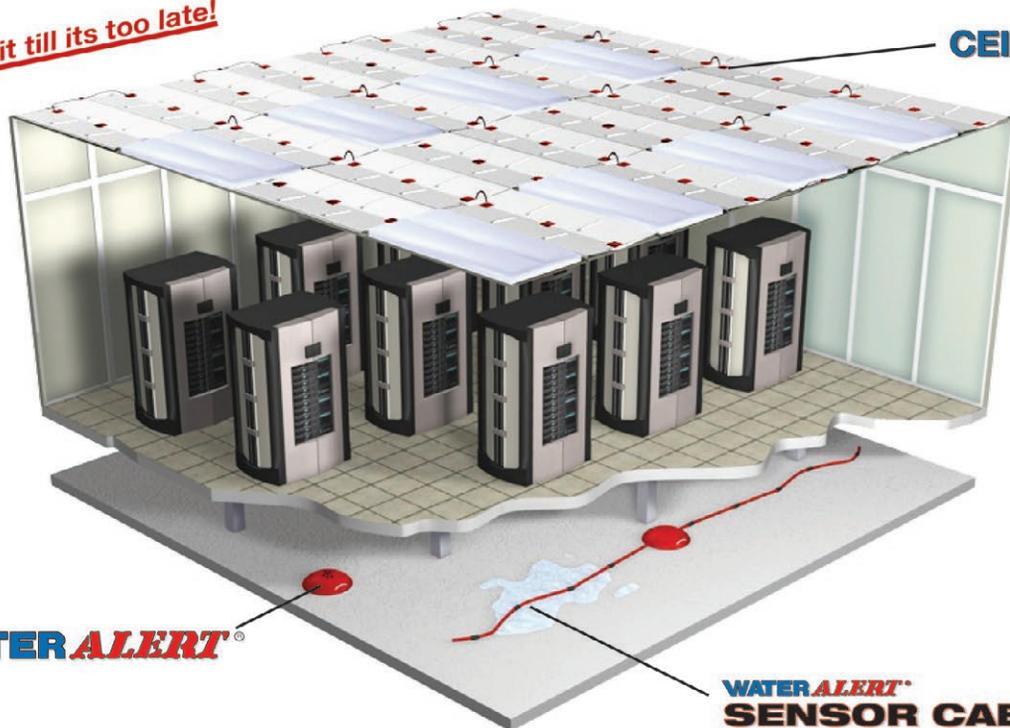
The current COVID-19 pandemic has highlighted the need for indoor air quality. With respect to HVAC systems, experts have stressed increasing outdoor ventilation air, using hospital-quality air filtration, and employing portable air cleaners and germicidal UVC lights. Maintaining Indoor Air Quality (IAQ) is a complex and long-standing challenge that can have roots in many other problems. The size, type, and age of the building, the climate, and the vast array of available mechanical systems are just part of the picture, and solving for good IAQ takes constant work; it's not a "one and done" situation.

As the pandemic stretches on, prudent planners will think about developing effective long term air quality strategies for their facilities. A sound IAQ strategy can not only help keep occupants safe, improve cognitive functions, and reduce absenteeism, but it can also provide a path toward sustainability, lower operating costs, and a more environmentally-friendly footprint. To make informed decisions about IAQ, planners must understand some of the basic tenants.

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Common Indoor Air Quality Problems

Airborne contaminants indoors either originate within the building or are drawn in from the outdoors. If pollutant sources are not controlled, indoor air problems can develop, even if the HVAC system is properly designed, operated, and maintained. Sources of indoor air contamination include underground sources (e.g., radon, pesticides), along with a variety of indoor sources (e.g., equipment, furnishings, and cleaning supplies). Concentration levels of air pollutants can vary greatly by time and location within a building and even a single room. Pollutants can be emitted from point sources, such as kitchen facilities, or from area sources, such as newly painted surfaces. Pollutants can also vary with time, such as only when floor stripping is done.

IAQ problems that generally get the most attention are those that involve lots of complaints. Issues can be exacerbated by

allergic reactions and health issues, which often involve outdoor contaminants that are being entrained into the building with outdoor ventilation air. One of the most common issues involves vehicle emissions. Vehicle exhaust can be problematic when buildings are located in urban areas or near heavily traveled roads.

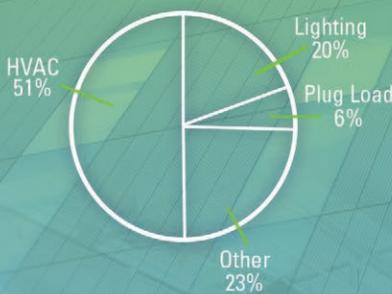
Outside ventilation air is used to dilute airborne contaminants, but outdoor air can sometimes be more problematic than indoor air. With today's low-VOC emitting building materials, furniture, and cleaning chemicals, and with the absence of indoor smoking, airborne particle and odor contaminants are much more apt to enter a building through the fresh air intakes. To cope with these issues, designers have found that air cleaning systems can be incorporated into the HVAC systems to not only clean the incoming fresh air, but also to keep indoor air at contaminant levels below outdoor levels.

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Addressing air filtration alone can reduce a building's total energy footprint by 5-10%. Historically, increasing filter efficiency has meant increasing energy and operating costs because it takes more fan horsepower to push air through denser, more efficient filter media.

Cost Savings

Even though good IAQ has real, tangible benefits, IAQ plans are still largely cost driven. So where are potential savings for facilities that implement these applications? Energy costs present the largest opportunity. HVAC accounts for about 40% of the energy used in U.S. commercial buildings, making HVAC fan energy a good target for cost reductions and savings on a facility's annual operating budget. In new buildings, according to the U.S. Department of Energy, adopting energy-efficient design and technologies—in HVAC and other areas—can cut energy costs by as much as 50%, and in existing buildings, renovations that replace older systems with more efficient technology can yield savings of up to 30%. With respect to only IAQ and the air filtration component of an HVAC system, significant operational savings can be found through:

- Reduced fan horsepower from lower static pressure
- Reduced ventilation air requirements
- Reduced maintenance and disposal costs from longer service intervals

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Polarized-media air cleaners offer relatively low resistance. In some cases, there can be mid-life pressure drop savings of up to one and half inches versus passive, mechanical filters. This difference allows fans to be designed and selected with lower horsepower requirements and potentially less operational energy consumption.

Maintenance costs present yet another area for savings and include labor, ordering, handling, storage, and filter disposal costs in addition to materials. High efficiency air cleaning systems such as the Dynamic V8 Air Cleaning System offer very high dust-holding capacities and can extend

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change-out intervals from every several months to every several years. Although cost controls may typically steer designers toward lower front-cost options, particularly in regards to air filtration, sustainability initiatives are highlighting a broader goal. Increasingly, sustainability initiatives have been trumping cost initiatives. In some cases, a high efficiency filtration system can pay for itself in fewer than two years, since fan horsepower and system static pressure greatly impact energy consumption; filter replacement costs and length of maintenance intervals influence ongoing operational costs, as well. These costs can be evaluated to determine the life cycle costs.

Good IAQ improves health, well-being, and performance. Planners should take this opportunity to develop an IAQ strategy that will enable them to improve campus IAQ while reducing energy consumption and lowering operating costs at the same time.



ABOUT THE AUTHOR: Robert F. Goodfellow, CAFS, is Vice President of Marketing with Dynamic Air Quality Solutions and an indoor air quality professional with over thirty years' experience in the HVACR industry. Dynamic Air Quality Solutions has been designing and manufacturing air cleaning systems for over 35 years and is known for high-efficiency particulate and gas phase air filtration with low pressure drop. Its products have been used in hundreds of high-impact applications. Contact him at rgoodfellow@DynamicAQS.com or visit www.DynamicAQS.com to learn more.

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Challenge:

Recovery tanks that collect all of the dirt, debris and possible contaminants are lying stagnant most likely, producing foul odour and possibly growing bacteria, viruses, mould and mildew. This is a risk to the health and safety of custodians, employees and visitors of any facility.

Cleaning equipment comes in contact with many surfaces throughout your facility, if it is cleaned after each shift, there is little worry, if it is not clean, there is a major possibility of cross contamination and health and safety issues due to spread of diseases and outbreaks.

Solution to Lower the Risk of Infection:

What is the cleaning and disinfecting protocol of equipment? Now is the time to introduce the proper protocol.

Types of equipment to include are auto scrubbers, walk behinds and ride on's, wet vacuums, sweepers, carpet extractors and even pressure washers.

The focus should be the recovery or collection tanks, anywhere the dirty water and solutions are collected. The bins of sweepers, the wheels of vacuums, extractors and pressure washers, even wet mop buckets. As a side note, vacuum filter bags should be changed more frequently or even switched out to HEPA filtration which will reduce the amount of airborne particulates spread in the air.



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