

Why Use an Indoor Air Biofilter?



A White
Paper by
Dr. Alan
Darlington



Issue: Indoor Air Biofilter and Indoor Air Quality

Since 90% of an average North American's day is spent indoors, the impact of Indoor Air Quality (IAQ) is very high.

Importance of Indoor Air Quality

Most of us live where the outdoor environment is harsh, cold in the winter, hot in the summer. To protect ourselves from these extremes, we create synthetic environments within our buildings.

The buildings are frequently designed to be 'air tight'. To keep the tempered air within the building, we have windows that do not open and effectively seal the building air-tight. This reduces the cost of heating/cooling the space. But sealing the building also traps all the pollutants that arise in the spaces.

These pollutants can accumulate to the point of reducing the well being of the building's occupants. Since 90% of an average North American's day is spent indoors, the impact of Indoor Air Quality (IAQ) is very high.

Traditional Systems to Deal with Indoor Air Quality:

Most buildings rely on ventilation to remove the gaseous pollutants from the indoor space. Ventilation brings new ('clean') outside air into the structure and through the process of dilution pushes the contaminants outdoors.

This approach can work very well. Exceptions would be when the outside air is of poor quality such as in highly industrialized areas or areas with vehicular traffic, which is why they call it 'outside air' rather than 'fresh air'.

Ventilation air frequently must be conditioned in terms of its temperature prior to dissemination into the occupied space. Occupants have a fairly narrow range of acceptable temperatures. In the winter months, air entering the building is frequently colder than -20°C but has to be heated prior to releasing indoors.



In the summer months, the same air can have temperatures higher than 30°C and therefore has to be cooled. The heating and cooling the additional air flow represents a can represent 20 to 30% of the energy demand of the building.

Building designers and operators are therefore faced with the dilemma of trying to provide an adequate indoor environment for the occupants while trying to minimize the energy footprint (consumption) of the building.

The biofilter can operate two ways. The virtual outside air from the biofilter can be used to replace (*supplement*) or *augment* outside air.

Indoor air Biofilter and IAQ

Indoor biofilters offer the opportunity to re-generate virtual outside air from the air that has already has been conditioned within the structure. The process removes the gaseous chemical pollutants in the building.

The biofilter can operate two ways. The virtual outside air from the biofilter can be used to replace (*supplement*) outside air that otherwise would have been brought into the space to control air quality. This means the total energy consumption of the building would be reduced without affecting IAQ.

There is also an opportunity to reduce the size of the required HVAC system and associated capital expense. This approach requires the signing off of the mechanical consultants.

Another approach is to use the virtual outside air from the biofilter to *augment* the outside air delivered by the HVAC system so that the occupants experience a substantially higher air quality with only a minor energy consumption of the building as a whole.

The operation of the two biofilter approaches need not be exclusive. The building operator/design can easily fluctuate between the two approaches depending on current conditions.