

AmericanAirFilter® case study Commercial

Green Solutions for Building Exhaust Air

Introducing AAF's SAAFRecycle™

Distinguishing the true green strategies from the “green washing” that currently exists in the green building industry can be challenging. However, sometimes a concept comes along that intuitively makes sense. This is the case with Building Exhaust Air Recycling strategy — SAAFRecycle™, introduced by AAF® International. The SAAFRecycle strategy involves the recycling of building exhaust air by providing proven air cleaning technology for the removal of particulates and gaseous contaminants. Throwing away valuable conditioned air is not green or cost effective when it can be filtered and reused.

The SAAFRecycle strategy has been implemented in several building types including hotels, theaters, arenas, and office buildings. Buildings that require exhaust air due to odor issues, including restrooms and locker rooms, are good candidate buildings for the SAAFRecycle strategy.

Hotel Buildings

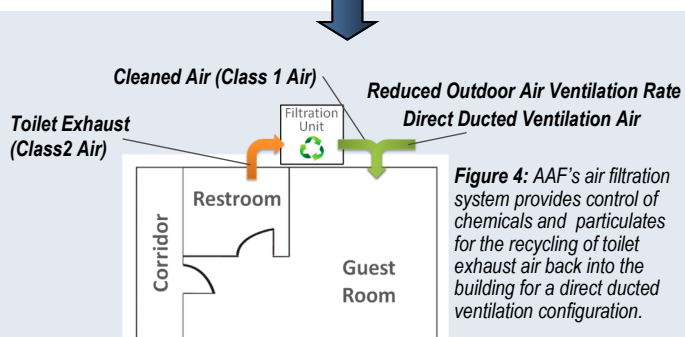
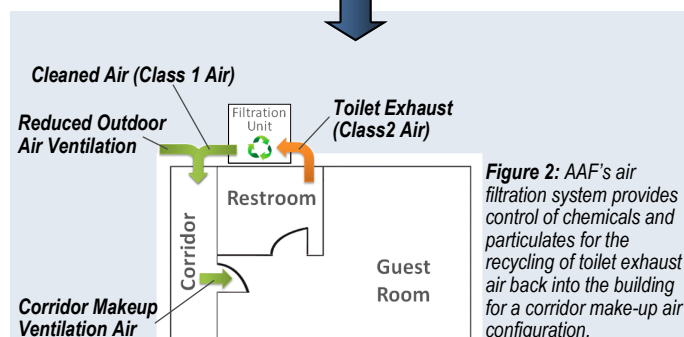
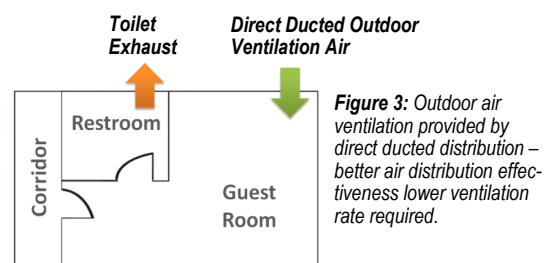
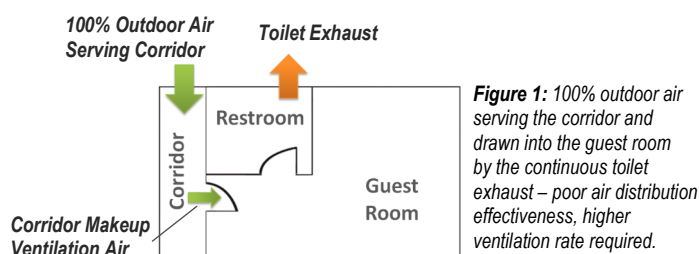
Hotels are unique buildings with a restroom in each guest room and a high density of people within the building. This uniqueness results in significant quantities of outdoor ventilation air and exhaust air requirements. Providing outdoor ventilation air to the guest rooms can be a challenge in order to ensure the required air distribution in the room is achieved.

Figures 1 and 3 illustrate two different ventilation configurations for a typical hotel guest room which require different outdoor ventilation rates according to widely accepted ventilation standards. Both of these configurations can benefit from the SAAFRecycle strategy by reducing the outdoor air ventilation rate to the guest rooms by recycling the exhaust air from the guest room toilet exhaust system.

How Can Exhaust Air be Recycled?

ASHRAE standard 62.1*, which has been widely accepted as code, classifies toilet exhaust air as Class 2 air, which is defined as “Air with moderate contaminant concentration, mild sensory-irritation intensity, or moderately offensive odors.” The standard has a provision which allows for the reclassification of Class 2 air to Class 1 air when air cleaning is provided. Class 1 air is defined as “Air with low contaminant concentration, low sensory-irritation intensity, and inoffensive odor.” Therefore, exhaust air from guest room toilets can be recycled provided the appropriate air cleaning filtration system is installed to control particulate and gaseous contaminants.

The SAAFRecycle strategy involves installing particulate and gas-phase filtration to clean the air for the reclassification of Class 2 air to Class 1 air. AAF's filtration systems remove particulate and gaseous contaminants including airborne chemicals that may be an irritant or have offensive odors. Figures 2 and 4 show how using the SAAFRecycle strategy can reduce the outdoor air ventilation air required to the guest room.



*ASHRAE (American Society of Heating, Refrigerating, and Air Conditioning Engineers) specifies outdoor air ventilation and exhaust requirements for hotel guest rooms and guest room toilets in standard 62.1-2010 entitled *Ventilation for Acceptable Indoor Air Quality*. Standard 62.1-2010.

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SAAFRecycle™ Reduces Carbon Footprint

To illustrate the success of the SAAFRecycle strategy in a hotel application, AAF gas-phase and particulate filtration products were installed and an extensive environmental characterization was performed for a large hotel. The hotel has been recycling approximately 80,000 cubic feet per minute (cfm) of guest room toilet exhaust for many years that would otherwise been conditioned for temperature and moisture removal.

The energy cost savings associated with the SAAFRecycle strategy has been estimated to be \$121,000 annually¹. This equates to an annual energy savings of approximately 1.3 million kWh annually². In addition, there was a corresponding carbon footprint reduction of approximately 934 metric tons of CO₂.

The SAAFRecycle™ Solution

Figure 5 shows the configuration of the SAAFRecycle strategy at this hotel where guest room toilet exhaust air is being recycled back into the building where ventilation is provided via an atrium make-up air configuration (similar to Figure 3).

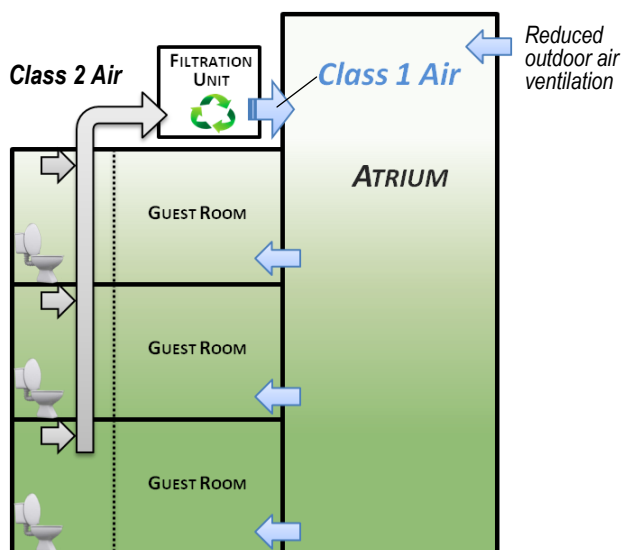


Figure 5: AAF SAAFRecycle™ strategy at work saving energy at a hotel in the southeast U.S.

Gas-Phase Filtration Reduces Chemical Concentrations by 40%

AAF performed an environmental characterization involving monitoring and sampling for indoor air contaminants within the exhaust air from the guest room bathrooms (before filtration), in the air being recycled back into the hotel building (after filtration), and in the outdoor air. The environmental parameters measured included the following:

- ◆ Airborne Chemicals
 - VOCs (EPA method TO-15)
 - Aldehydes (EPA method TO-11A)
 - Ammonia and Hydrogen Sulfide
- ◆ Bioaerosols
 - Fungi (non-viable and viable)
 - Bacteria (Coliforms with isolation of E.coli sp.)

Results of the sampling and monitoring were compared to industry guidelines including ASHRAE Standard 62.1-2010 (Table B-3 "Concentrations of Interest for Selected Volatile Organic Compounds"), and the U.S. Environmental Protection Agency's (EPA) Building Assessment and Survey Evaluation (BASE) study. Chemical and biological findings were generally found to be less than the levels recommended by cognizant authorities including EPA, California Office of Environmental Health Hazard Assessment (OEHHA), and Agency for Toxic Substances and Disease Registry (ATSDR) and/or lower than what has been found in non-problem office buildings (using findings from BASE).

The AAF gas-phase filtration system reduced the chemical concentrations by approximately 40% ensuring a safe, odor free reintroduction of exhaust air back into the hotel building as Class 1 air.

Let AAF help you recycle building exhaust air for energy savings and reduced greenhouse gases with the SAAFRecycle strategy - **Now That's GREEN!**

¹ - Estimate presented at ASHARE Winter Conference 2009, Seminar 58 (Intermediate). *Achieving Sustainability and Energy Reduction through the IAQ Procedure: Case Studies of Success*; H.E. Barney Burroughs "Attaining Sustainability Using IAQP: Documentation of Successful Building Performance in 15 IAQP Sites in Atlanta".

² - Based on electricity rate of \$0.08/kW·h.



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