

# Reducing Virus Transmission in Commercial Buildings: HVAC System Recommendations

**Natural gas systems supporting these recommendations**

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# Current Industry Recommendations to Address Virus Transmission in Commercial Applications

- We are witnessing a significant and historic shift in architectural / engineering building design and operations for commercial applications and certain residential applications. The current world-wide pandemic is moving the building design / construction industry to research and review ways to reduce virus transmission at indoor settings.
- There are several organizations offering recommendations to address virus transmission in commercial applications.
  - The American Society of Heating Refrigeration and Air-Conditioning Engineers (ASHRAE) represents the most influential organization in such recommendations for building mechanical systems.



# ASHRAE has approved the following statement regarding transmission of SARS-CoV-2 and the operation of HVAC systems during the COVID-19 pandemic:

- **Transmission of SARS-CoV-2 through the air is sufficiently likely that airborne exposure to the virus should be controlled.**
- Changes to building operations, including the operation of heating, ventilating, and air-conditioning systems, can reduce airborne exposures.
- Ventilation and filtration provided by heating, ventilating, and air-conditioning systems can reduce the airborne concentration of SARS-CoV-2 and thus the risk of transmission through the air.



## ASHRAE Recommendation

# 1. Increase Outside Air Ventilation

- Increase outdoor air ventilation within buildings:
  - Per code, the introduction of certain quantities of outside air per occupant within a publicly accessed building has historically been required (per ASHRAE Standard 62.1-Ventilation for Acceptable Indoor Air Quality).
  - New standards are currently under review to compliment the intended occupant loading within existing and new buildings. It is likely this work will result in a higher amount of outside air per occupant for new buildings and major renovations. Occupancy levels will also be reviewed and addressed.



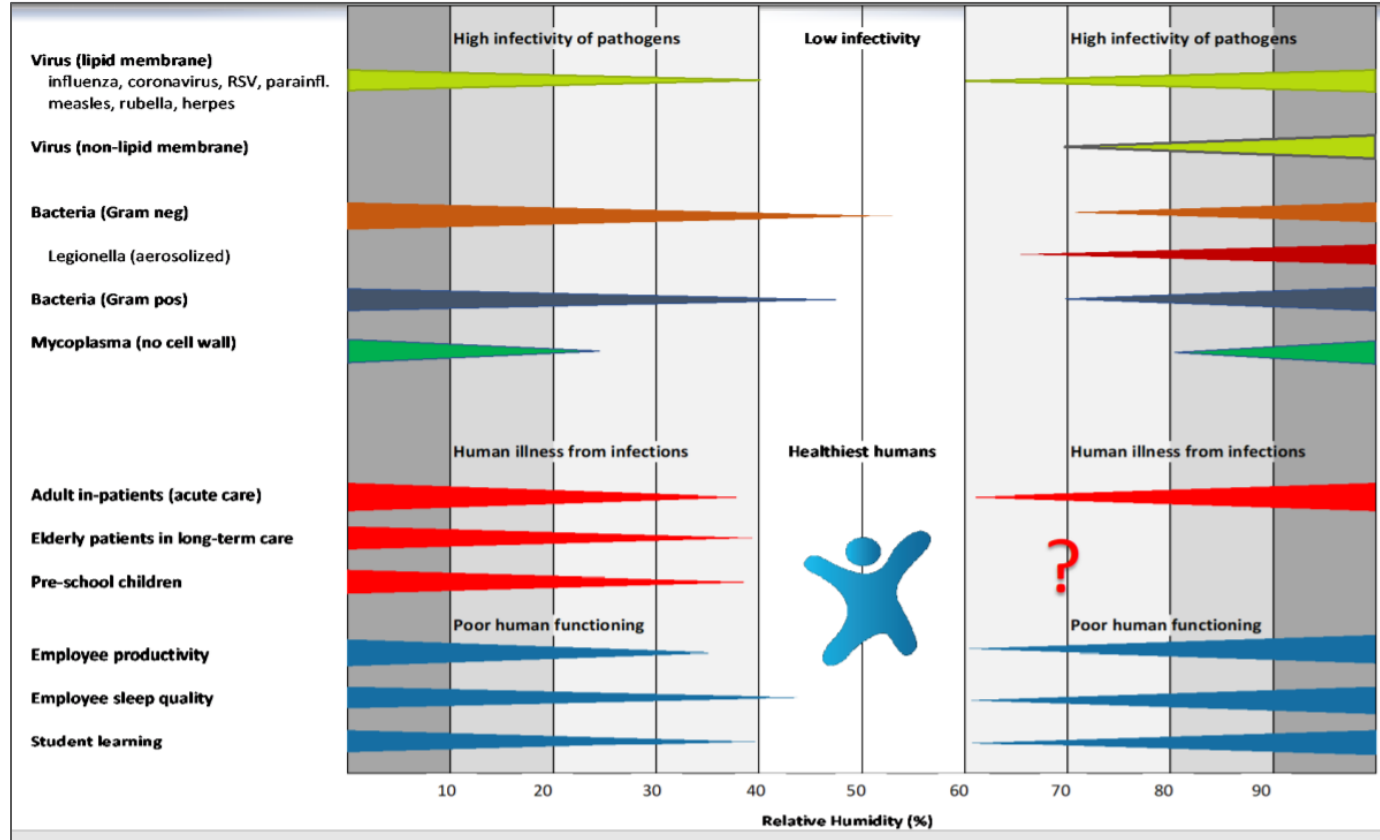
# 2. Improve Air Filtration

- Improve central air filtration to the MERV-13 or the highest compatible with the existing HVAC systems filter rack.
- According to the EPA, **Minimum Efficiency Reporting Values, or MERVs**, report a filter's ability to capture larger particles between 0.3 and 10 microns ( $\mu\text{m}$ ). The higher the MERV rating, typically ranging between 1 and 16, the better the filter is at trapping specific types of particles.



# ASHRAE Recommendation

## 3. Establish/ Maintain Indoor Relative Humidity (RH) at 40 - 60%



This recommendation provides the lowest risk of contamination from more common airborne health risks ...especially important in high-occupancy buildings like healthcare facilities and schools / universities.

**“Healthiest Humans”  
(Dr. Taylor):**



# The Benefits of Natural Gas Systems in Supporting these Guidelines to Reduce Virus Transmission:

- Natural gas commercial mechanical system solutions are easily integrated in the operations of the buildings for new construction or renovation.
- Natural gas commercial mechanical systems offer significant operational cost savings when evaluating solutions to address virus transmission in certain HVAC systems.



## 1. Natural Gas Systems Supporting Increased Outside Air Ventilation:

This additional outside air must be preheated and precooled to meet space conditions. Natural gas preheating options offer significant operation savings in energy when compared to preheating with electric equipment.

- **Natural Gas Dedicated Outside Air Units (DOAU)**

These units are specifically designed to increase the outside air / fresh air intake for commercial buildings. Natural gas is the primary energy source for most Dedicated Outside Air Units specified throughout the country.

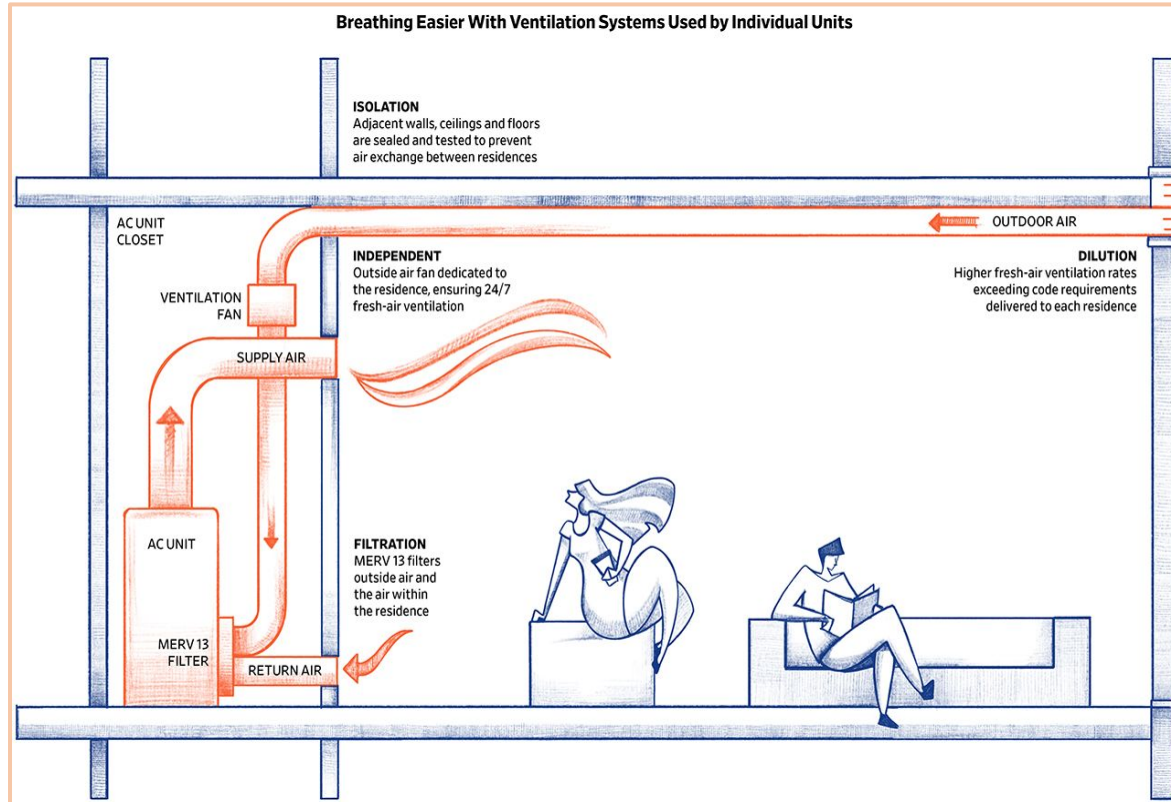
- **Natural Gas Packaged Rooftop Units:**

Rooftop units are utilized extensively in commercial buildings. Such systems can be easily designed with additional natural gas heating capacity to allow for additional outside air requirements. Natural gas rooftop units will offer significant operation savings in energy when compared to electric-heating rooftop equipment.





# 1. Natural Gas Systems Supporting Increased Outside Air Ventilation:



This is the sketch of a proposed mechanical system for individual apartment residences (Reference: Wall Street Journal “What Buildings Will Look Like After the Covid Crisis”). Note the recommendation for bringing the outside air directly into the space. This arrangement shown can be more easily accomplished with individual air handlers hosting hot water heating coils served by centralized natural gas high-efficiency boilers. Additional natural gas system options include water-source heat pump systems with air handling units in each residential space.



## 2. Natural Gas Systems Supporting Improved Filtration Systems:

This is becoming the primary recommendation to prevent virus transmission. Interestingly, this requirement for improved filtration may now direct the type of HVAC system selected, moving to systems that can host better filtration methods. This shift can benefit the traditional natural gas building mechanical systems as they can more easily incorporate sophisticated air filtration systems.

- **Natural Gas Heating Systems in Traditional HVAC Systems:**

Traditional commercial Variable Air Volume (VAV) or Constant Volume (CV) systems can incorporate natural gas boiler / hot water terminal heating and offer significant advantages over all-electric systems such as Variable Refrigerant Flow (VRF) systems. These traditional commercial systems have gained renewed interest because they can host and support sophisticated air filtration systems to prevent virus transmission. (The popularity of the all-electric VRF systems in the commercial / institutional sector may fade due to their incredibly poor filtration components.)



### 3. Natural Gas Systems Supporting Indoor Relative Humidity at 40 -60%

Maintaining a specific indoor Relative Humidity of 40-60% is a renewed recommendation, especially for medical buildings, schools and universities.

- **Natural Gas Hot Water or Steam Boilers (High-efficiency):**

Natural gas hot water or steam boilers serve as the preferable choice to provide humidification solutions in most commercial applications. Schools / Universities will see a renewed focus on humidification /dehumidification and will certainly benefit economically with natural gas boiler solutions.

- **Natural Gas Desiccant Systems:**

We anticipate a renewed interest in natural gas desiccant dehumidification systems to support this requirement to maintain a specific (40-60%) indoor relative humidity. These natural gas desiccant systems will reduce operating / energy costs when compared to electric refrigeration dehumidification systems.



## Closing Notes:

- There is a growing concern in the architect / engineer design community that the implementation of these recommendations must be balanced with current energy efficiency goals.

We have seen several articles recently, such as this article below, outlining this concern:

Wall Street Journal (July 21, 2020) by Konrad Putzier:

### **Why Covid-19 Makes It Harder for Cities to Fight Climate Change:**

“Energy bills and carbon emissions rise as office buildings pull in more outside air to keep workers safe. Cities are trying to reduce carbon emissions at office buildings. That goal is now colliding with efforts to fight the coronavirus pandemic.”

- And, we have seen several companies and organizations prioritize the implementation of the air filtration options that **incorporate electric energy** over the other primary ASHRAE recommendations. These organizations are advocating a disproportionate emphasis on electric filtration options to support a policy-driven electrification agenda.

