Create safe and healthy indoor environments and come back with confidence

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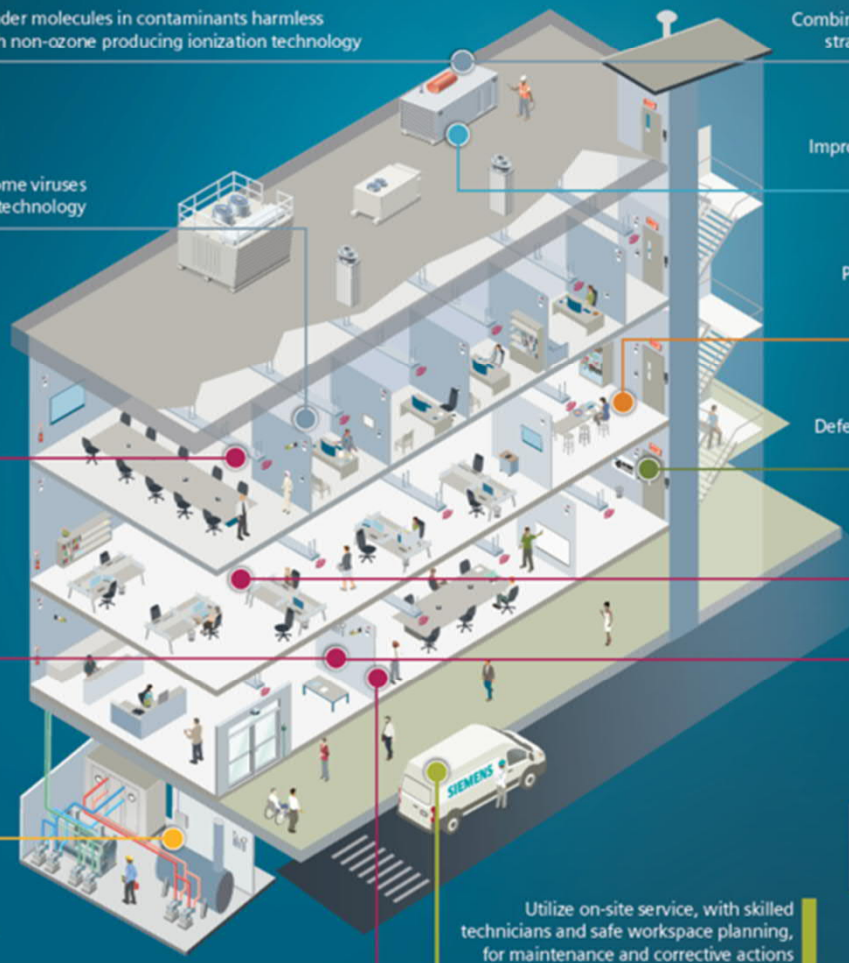

Render molecules in contaminants harmless with non-ozone producing ionization technology

Combine technology and HVAC maintenance strategies to reduce the spread of viruses

Improve air quality with new HVAC maintenance strategies and advanced filtration

Reduce bacteria, fungi and some viruses with fast and safe ultraviolet technology

Provide real-time updates on space utilization and emergency notification of critical events or COVID-19 updates

Create a targeted sanitation and surface disinfection strategy with equipment and IoT sensors

Defer capital budgets to operating budgets through financing options

Monitor office occupancy for density and safe distancing leveraging equipment and IoT sensors and analytics

Control occupancy in buildings by counting people coming in and out of a building leveraging video analytics or access control readers

Screen occupants for evidence of elevated skin temperature using thermal cameras

Manage energy performance by off-setting new HVAC guidelines with energy efficiency strategies and IoT technology

Utilize 24/7 monitoring, remote response and resolution, and maintenance to help onsite teams

Leverage advanced analytics and fault detection to identify issues early and service equipment based on need

Utilize on-site service, with skilled technicians and safe workspace planning, for maintenance and corrective actions

Contact tracing for individuals who tested positive

- Reduce the spread of airborne and surface contaminants
- Improve air quality
- Manage energy performance
- Enable social distancing
- Provide real-time updates
- Sustain healthy & safe environments
- Defer capital budgets

Safe and Healthy Buildings
Responding to Covid-19

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Minimize what comes in…

Technologies to enable social distancing

- FDA-cleared thermal cameras to detect people with EST
- Video Analytics + Access Control – people counting to control occupancy
- Enlighted + Where – enable contact tracing
- Enlighted + Space – identify high-traffic areas to adapt cleaning and sanitation, monitor occupancy, reconfigure spaces
- Comfy – configurable desk booking, building utilization tracking, occupancy, sanitation between meetings in common rooms

…and take out the rest

Technologies to accelerate virus deactivation

- Violet Defense – ultraviolet light technology eliminates viruses, etc.
- O2 Prime – ionization renders contaminants harmless
- Smart Building Commissioning – data-focused strategy to ensure system controls work properly
- Dynamic VAV Optimization – efficiently, automatically follow evolving ASHRAE guidelines for temp., humidity, ventilation

Occupant Environment

Virus Transmission Reduction

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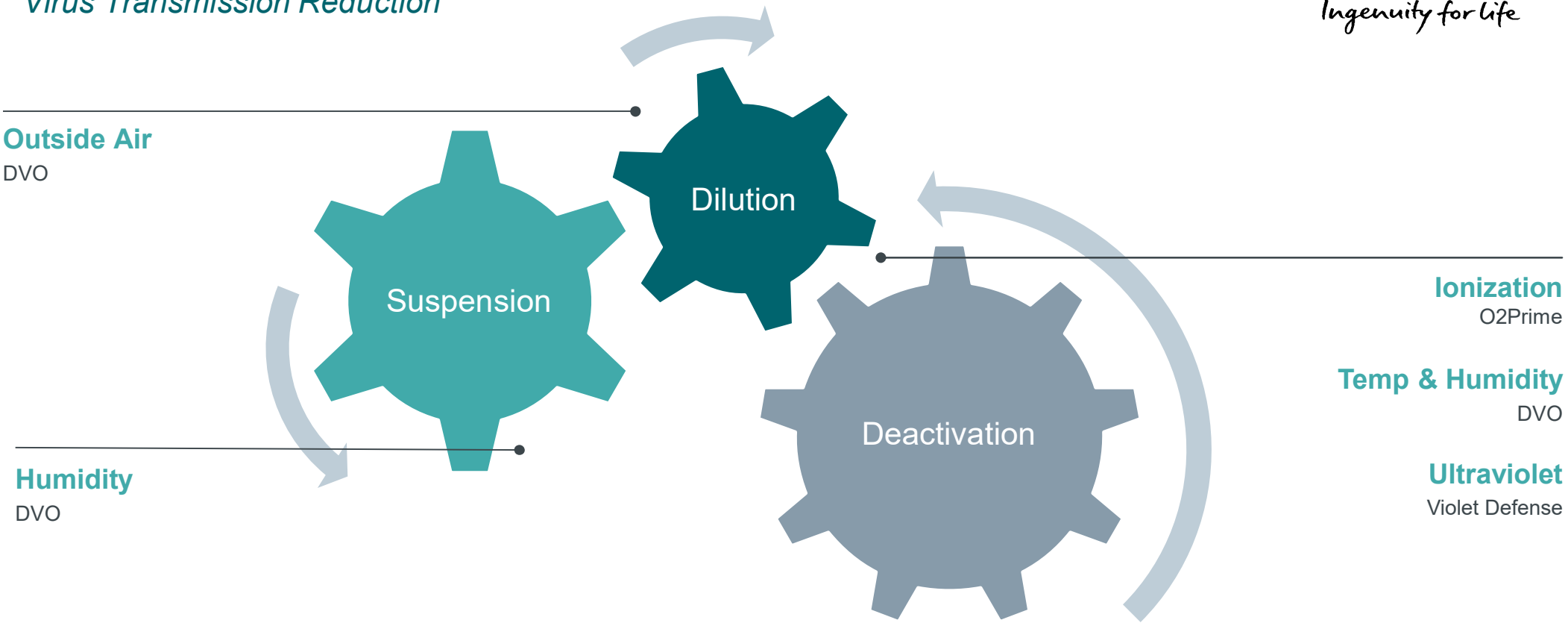

Summary

Deactivation

Temperature and Humidity

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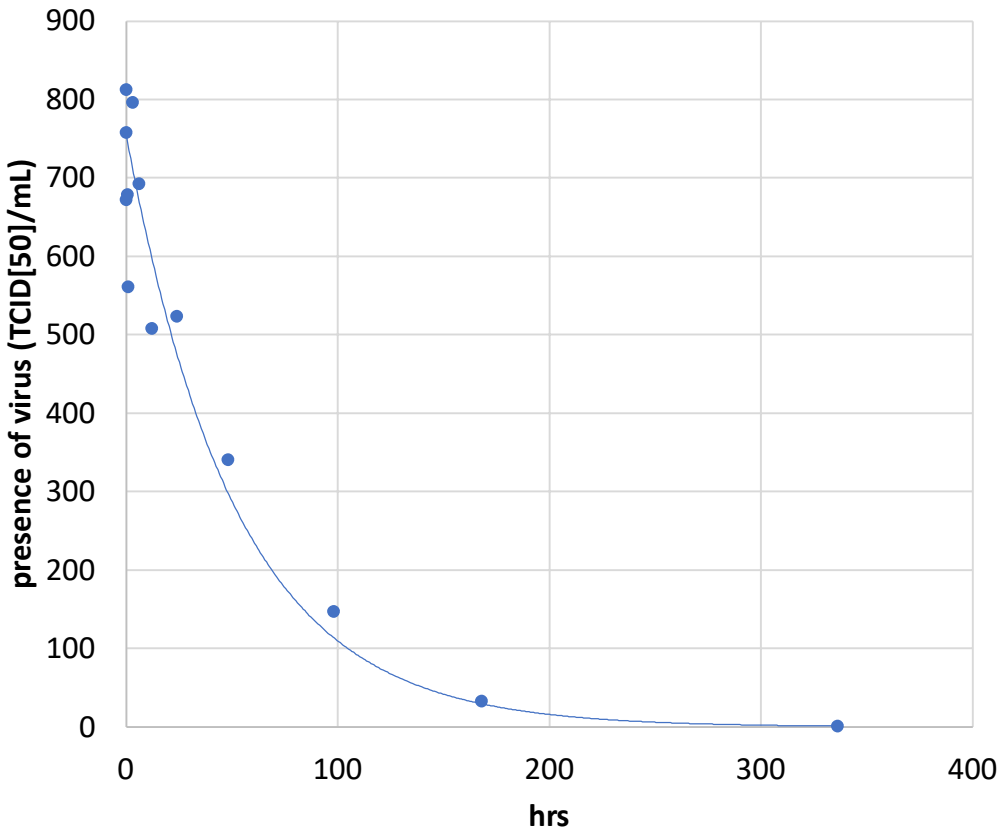
Viruses require specific conditions in order to replicate; in the absence of these conditions, virus becomes “deactivated”

There is not a “bright line” condition below which virus persists, and above which virus deactivates; rather, presence of virus decays at an exponential rate

The rate of this exponential decay is expressed as either “time constant” or “half life”

https://www.dhs.gov/science-and-technology/sars-calculator



Suspension

Humidity

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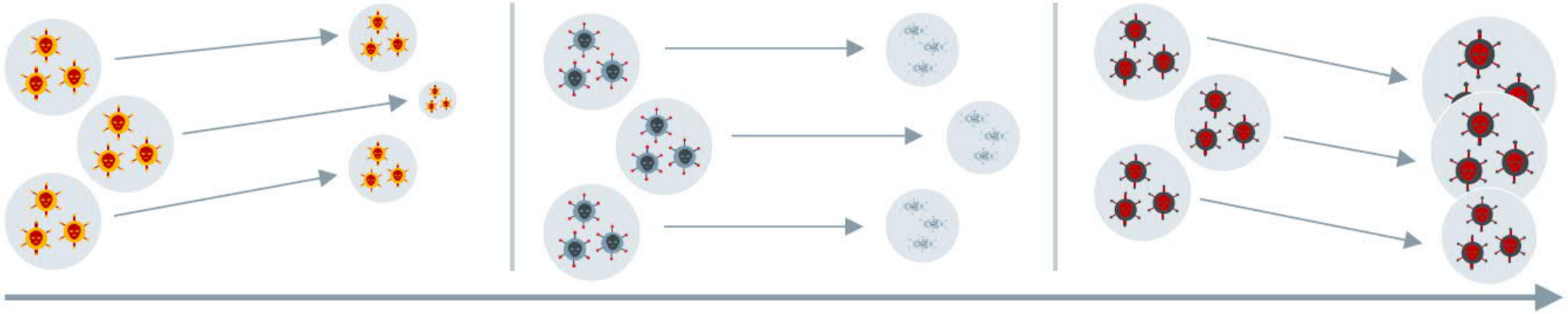

<40% r.h.

Low humidity

The water in the droplets evaporates; they get smaller and stay longer as an aerosol

40-60% r.h.

Medium humidity

Water droplets have less tendency to evaporate and viruses die quickly

>60% r.h.

High humidity

Continued benefits of medium humidity but higher risk of condensation and attendant issues

Dilution
OA and Temperature

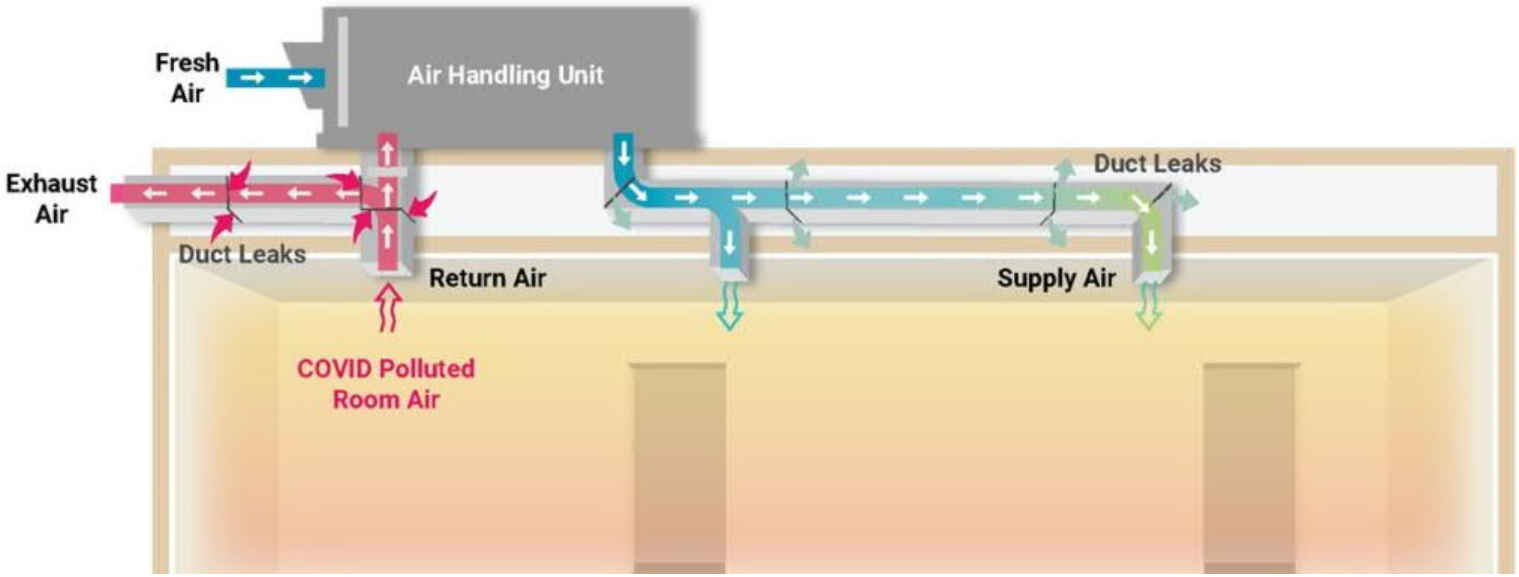

Image credit: I found it on the internet

Elevated discharge temperature increases air flow

- Higher ACH
- Increased introduction of fresh air
- Higher exposure to improved filtration

Increased OA means reduced recirculation air

O2Prime – Needlepoint Ionization Technology

How it Works

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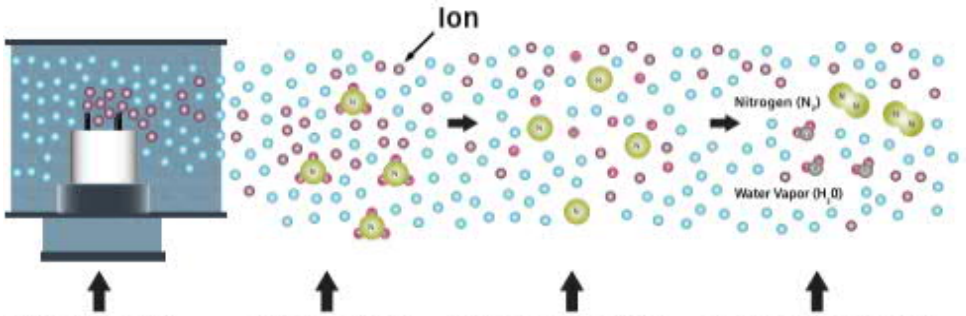
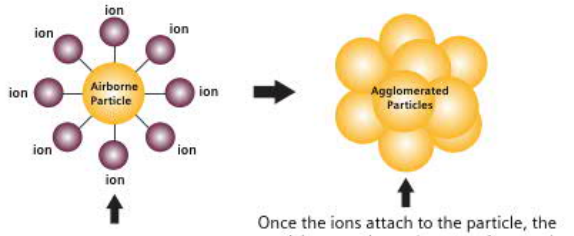
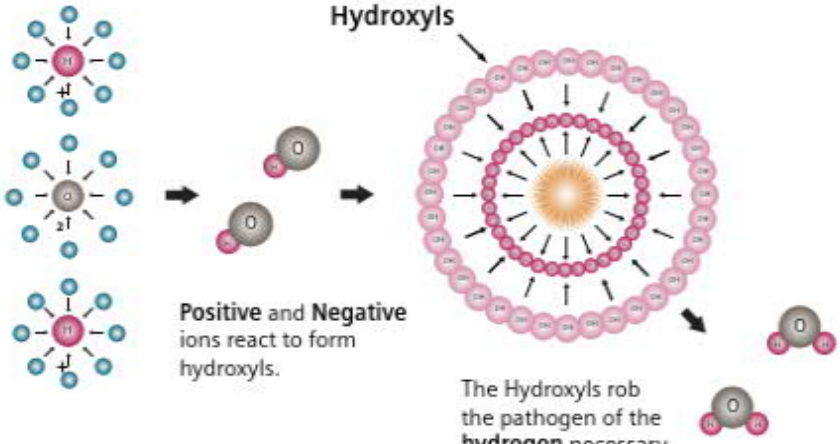
VOC Effects



Airborne Particle Effects



Bacteria and Pathogen Effects



Violet Defense – Full Spectrum Ultraviolet Light

How it Works

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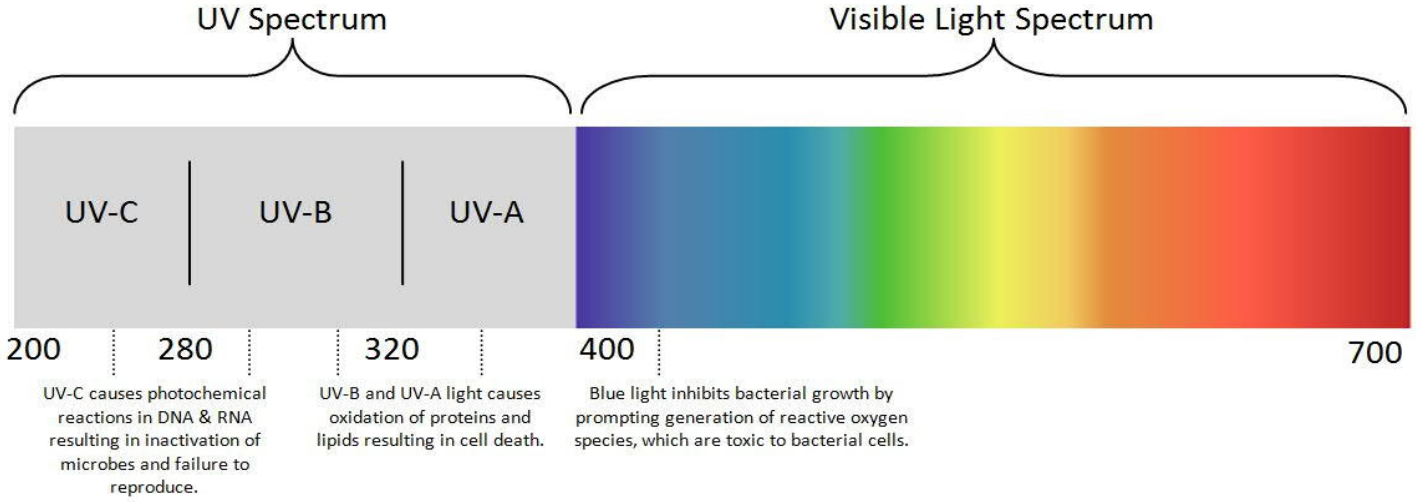
S.A.G.E. UV, the anti-microbial line of S.A.G.E., uses broad spectrum of light, including germicidal UV-C, UV-B, UV-A and violet blue light to effectively kill bacteria, mold, fungi, and even viruses on surfaces and in the air in a matter of minutes without the use of chemicals. Its patented technology miniaturizes the deployment of germ-killing light to integrate into almost any product or environment.

S.A.G.E = Surface & Air Germ Elimination



Summary of ASHRAE HVAC recommendations

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Step 1
Enable Remote Access

- Provide remote access for both building operators and service providers
- Follow cybersecurity best practices

Step 2
Assess System Capabilities

- Is system functioning correctly?
- Is system capable of implementing new strategies?

Step 3
Implement New Strategies

At all times:

- Control indoor humidity between 40%-60%
- Maintain indoor air temperatures in compliance with ASHRAE-55 comfort standards

Occupied

- Raise OA as much as possible without violating these limitations
- Raise discharge air setpoints

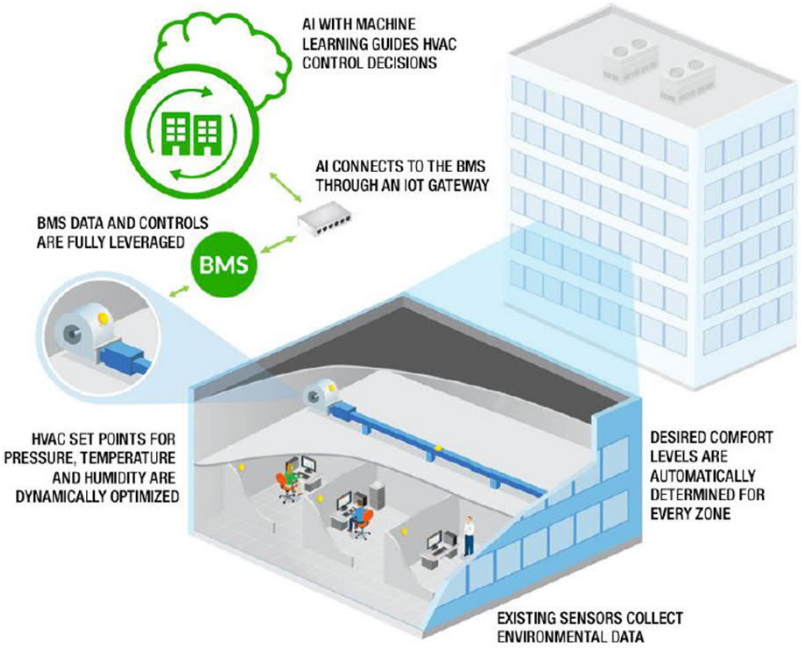
Unoccupied

- Consider running systems 24/7; if not, run a system flush for 2 hours before and after occupancy
- Keep OA at minimum

During the pandemic, treat your **comfort cooling** systems like a **critical, life-safety** system

Implement these strategies as a new **Epidemic Mode** of operation that can be enabled and disabled by operators

Dynamic VAV Optimization (DVO)



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3 Modes of Operation:

- **Green Mode:** optimizes temperature, pressure and humidity setpoints to maintain occupant comfort & minimize energy consumption
- **Defense Mode:** optimizes a model-based indoor air quality metric that includes the effects of pathogen inactivation while ensuring compliance with the thermal comfort and ventilation requirements of occupants
- **Decontamination Mode:** uses heat to rapidly inactivate airborne pathogens and those that are deposited on surfaces. Model-based optimization is used to either achieve a target level of disinfection as fast as possible and with the least energy possible, or to achieve the highest level of disinfection in a defined time window.