Welcome

CenterPoint® PCO Panels Webinar with Dan Briggs

July 22, 2020

GENESIS AIR

CREATING CLEAN AIR TO BREATHE

Dan Briggs, President
Genesis Air

Indoor Air Quality

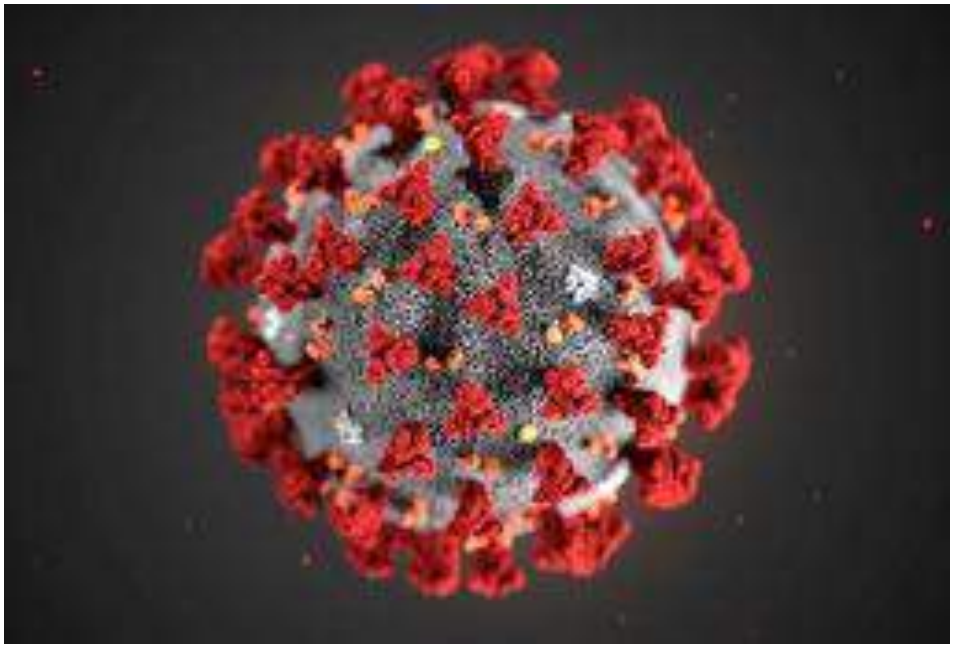
Just Breathe...

Hosted by: TRANE SAN FRANCISCO

Some Local Genesis Installations

GENESIS AIR
CREATING CLEAN AIR TO BREATHE

Project Name	Engineer	CFM
New Stanford Hospital	Mazzetti	1,360,000
John Muir Medical Center – Walnut Creek, Phase 1	Affiliated Engineers	12,800
John Muir Medical Center – Walnut Creek, Phase 2	Mazzetti	114,000
John Muir Medical Center – Concord	Mazzetti	42,600
Stanford BMT Cellular Therapy Lab	Gayner Engineers	12,000
Stanford Clinical Lab	Gayner Engineers	31,000
Stanford Research Animal Facility	Gayner Engineers	55,000
SFO Terminal 2	Cal Air	500,000
SFO Building 575	MHC Engineers	30,000
SFO Terminal 3 – Boarding Area E	Hensel Phelps	100,000
SFO Air Traffic Control Tower	URS	85,200
SFO Delta Lounge	Alfatech	12,600
SFO Terminal 3 East	WSP	100,000
OAK Air Traffic Control Tower	ACCO	10,000
SFO Consolidated Administration Campus	Integral Group	30,400
Hot Yoga Studio	Trane	10,000
Total:		**2,700,000**

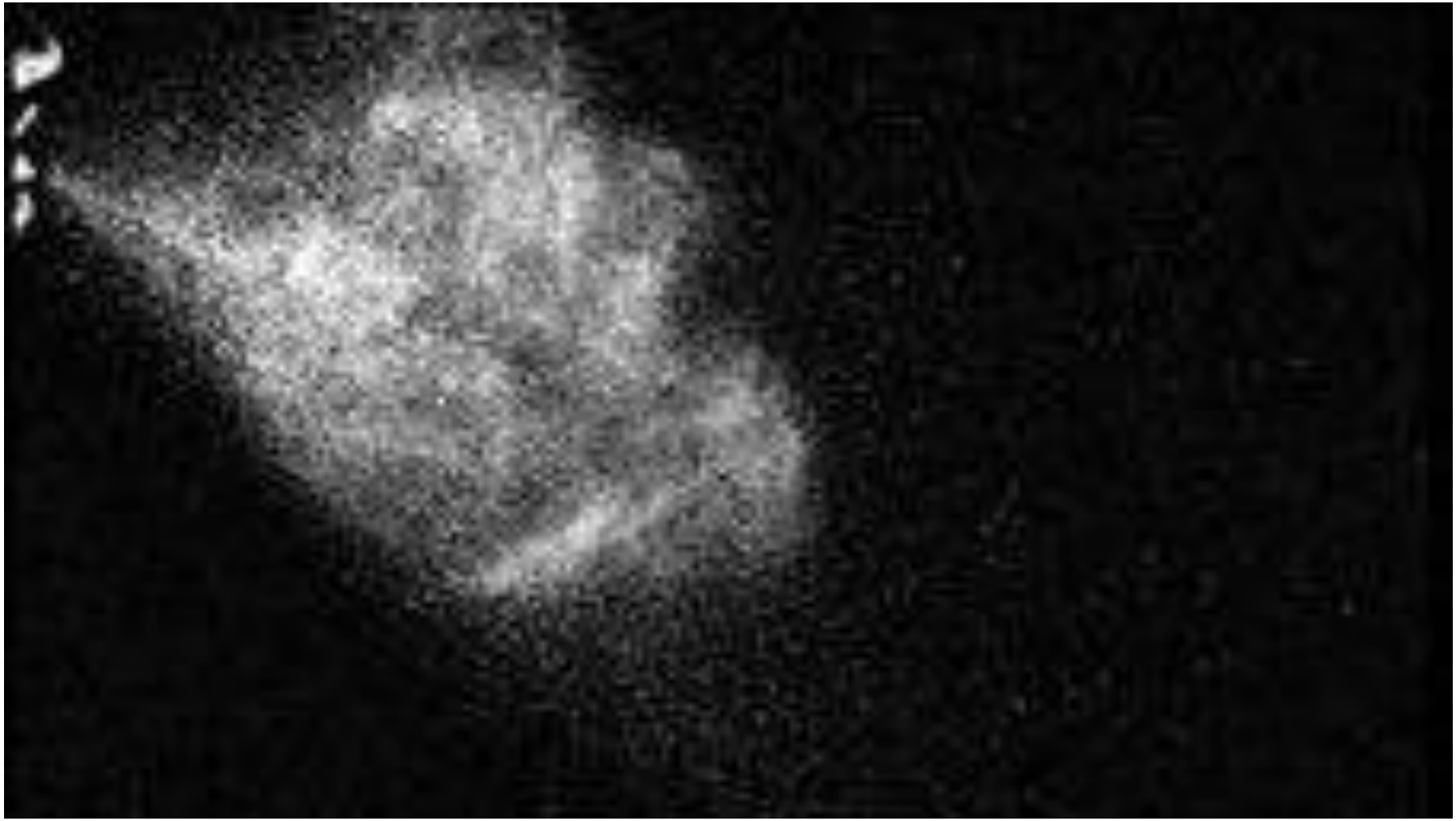


New Challenges for Enclosed Public Spaces

Medical, Schools, Offices, Retail, Homes and Government Facilities

Goals

Reviewing Limitation of Legacy Technologies



Addressing
Droplet Nuclei
Airborne particles <5µM

Most public health organizations, including the World Health Organization (WHO) [16], do not recognize airborne transmission except for aerosol-generating procedures performed in healthcare settings. Hand washing and social distancing are appropriate, but in our view, insufficient to provide protection from virus-carrying respiratory microdroplets released into the air by infected people. This problem is especially acute in indoor or enclosed environments, particularly those that are crowded and have inadequate ventilation

COVID-19

Size < .06 - .14 µM

99.97 HEPA too small

to capture completely

Half-Life - 2.7 hrs.

It is Time to Address Airborne Transmission of COVID-19, Lidia Morawska1,*, Donald K. Milton2
1 International Laboratory for Air Quality and Heath, WHO Collaborating Centre, Queensland University of Technology,
2 George Street, Brisbane, QLD 4001 Australia. Email: l.morawska@qut.edu.au2 Institute for Applied Environmental Health, University of Maryland School of Public Health, 255 Campus Dr, College Park, Maryland, USA. Email: dmilton@umd.edu
Clinical Infectious Diseases, ciaa939, https://doi.org/10.1093/cid/ciaa939
Published: 06 July 2020

Aerosol and Surface Stability of SARS-CoV-2 as Compared with SARS-CoV-1
https://www.nejm.org/doi/full/10.1056/NEJMc2004973

CENTERPOINT® PCO PANELS

GENESIS AIR

Creating and Maintaining Healthier Indoor Air Quality - Since 2003

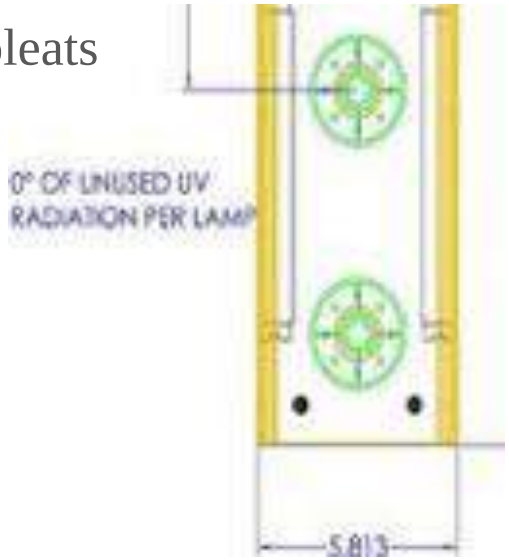
www.genesisair.com

UNIQUE CENTERPOINT® PCO DESIGN

NOT ALL PHOTO CATALYSTS PERFORM EQUALLY

- Genesis CenterPoint®
- 6” TiO2 coated
- Fiberglass pleated mesh
- UVGI lamp through center of pleats (center point)

Unique CenterPoint ® design for peak first pass performance

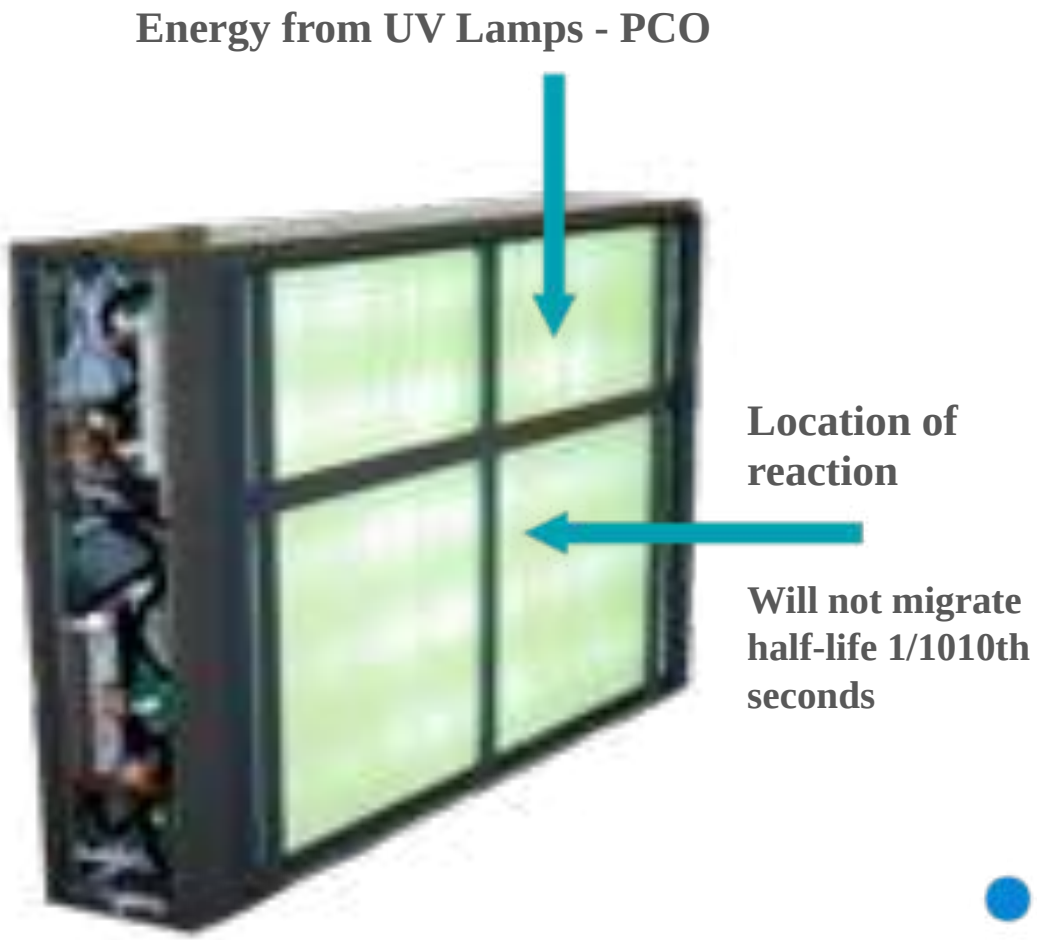


CENTERPOINT® PCO

Tested. Proven. It Works!

- Bioaerosols were destroyed in all 3rd party tests with CenterPoint® PCO panels
- New and retrofit
- Single pass efficacy
- Yes – varies by test agent

The Destruction of Viral Droplet Nuclei Confirmed



WHAT IS THE PRODUCT?

PANEL INSTALLED IN AN AIRSTREAM

- Destroys - does not capture
- Safe reaction occurs in the panel
- Creates powerful free radical
- Energized by UVGI lamps
- AHU, RTU, duct-mounted, standalone
- New systems – factory installed
- Other brands (OEM)
- Retrofit RTUs & DX Splits
- Existing AHUs - field installed

Retrofits

OEM: Factory Installed

Easy Installation

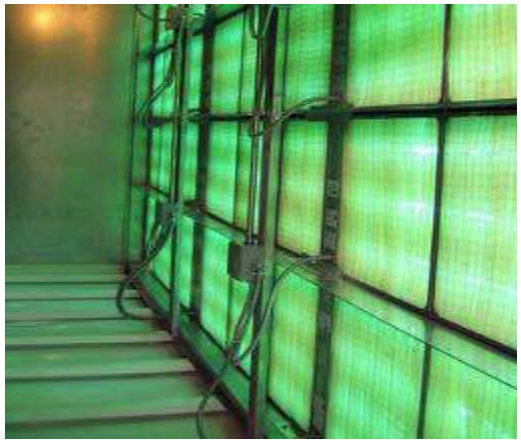
ADVANTAGES:

- Low pressure drop (.05@500fpm)
- Easy to service (12,000 hr. lamp)

- Requires little space (6”-13” panel)
- Low energy (lower ODA required)
- Sustainable (15-year panel life)
- Self-cleaning

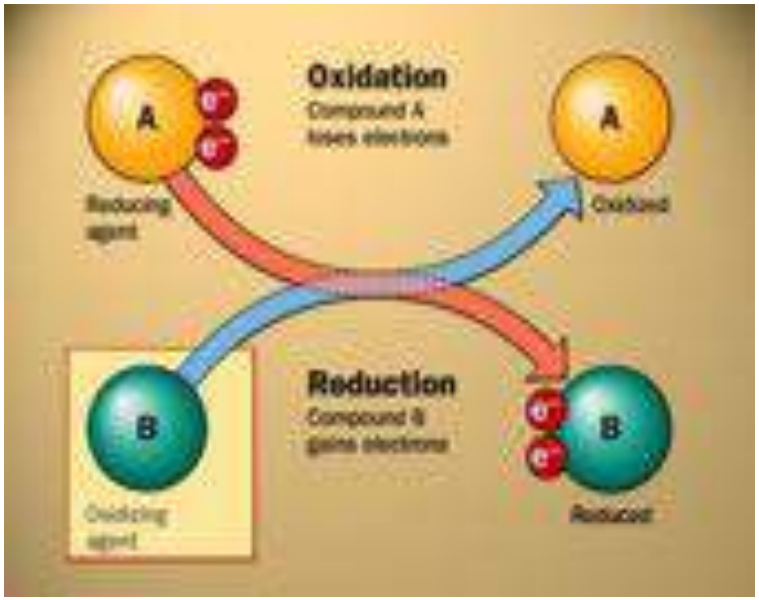
DESIGN CONSIDERATIONS:

- Preferred down stream of coil
- Must have upstream filtration
- Air speed 500fpm or lower
- Side load 6” Rack
- Front load 13” Rack with access
- Power 120V usage 0.05kw/ft2



HOW DOES THE PANEL WORK?

- Creates free radical OH*
- Destroys DNA/RNA infection causing virus, bacteria, and spores on the fly
- Breaks down hydrocarbon chains (odor control)
- Passive Oxidation/Reduction (safe for occupied spaces)
- Reaction occurs in the panel not in the occupied space



- **Introducing OH, the hydroxyl radical:** oxygen (O2) is not the main oxidant. Other molecules that are produced naturally in the atmosphere, including ozone (O3), the nitrate radical (NO3), and **the hydroxyl radical (OH),** are much more reactive. Radicals are highly reactive because they have unpaired electrons which tend to transfer to other molecules.
- **The OH radical is the most important oxidant** in the troposphere, OH is responsible for oxidizing carbon monoxide (CO) and other carbon-based molecules, such as methane (CH4)

Water & Atmosphere 16(1) 2008, http://www.niwa.co.nz/sites/default/files/import/attachments/detergent.pdf

PANEL BENEFITS

- Droplet nuclei breakdown
- Hydrocarbon chain breakdown
- Inside HVAC cleaning

Our challenge

Viral RNA associated with droplets smaller than 5 µm has been detected in air [14], and the virus has been shown to maintain infectivity in droplets of this size [9]. Other viruses have been shown to survive equally well, if not better, in aerosols compared to droplets on a surface [15].

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Clinical Infectious Diseases, ciaa939, https://doi.org/10.1093/cid/ciaa939
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COMPREHENSIVE INFECTION CONTROL PLAN

Fillin

Retrofits

OEM Factory Installed

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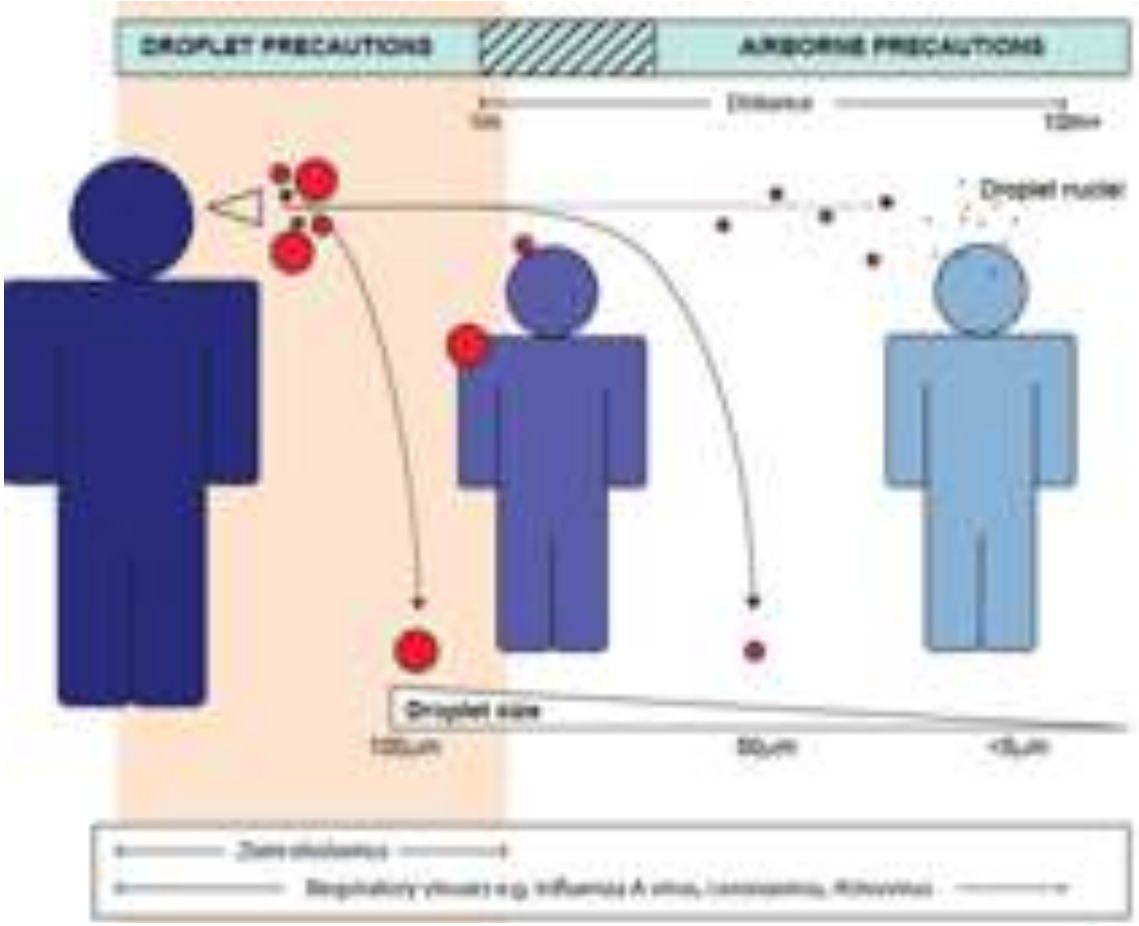
It is Time to Address Airborne Transmission of COVID-19, Lidia Morawska1,*, Donald K. Milton2

DEFINING THE CHALLENGE

- How to address droplet nuclei
- Size < .06 - .14 µM
- 99.97 HEPA
- Most penetrating size - .3 µM
- Too small to capture completely
- Half-life COVID-19, 2.7 hours

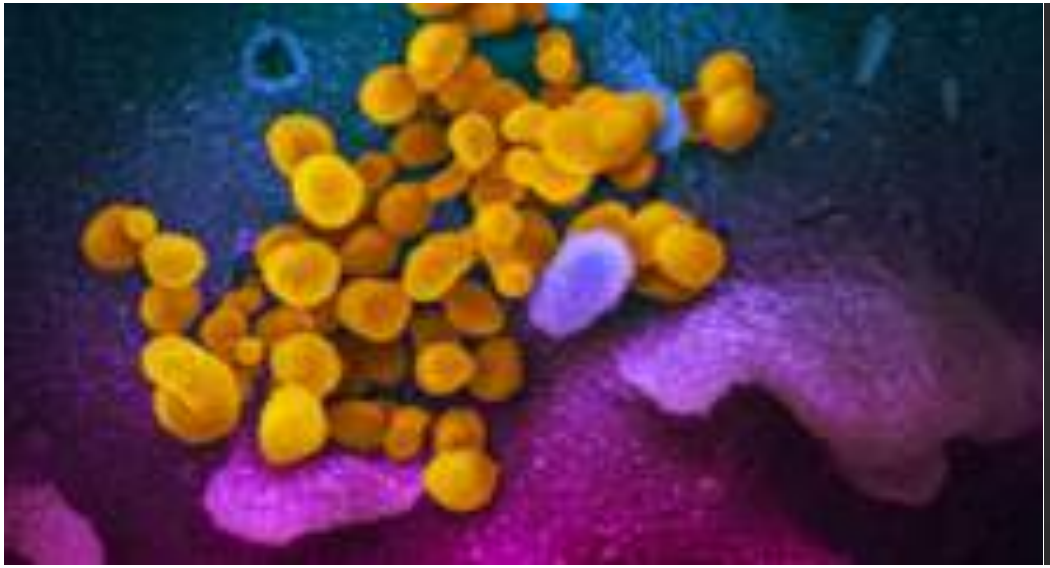
ASHRAE POSITION PAPER

- AHUs move pathogens
- Capture is not assured
- How do you render COVID-19 non-viable?

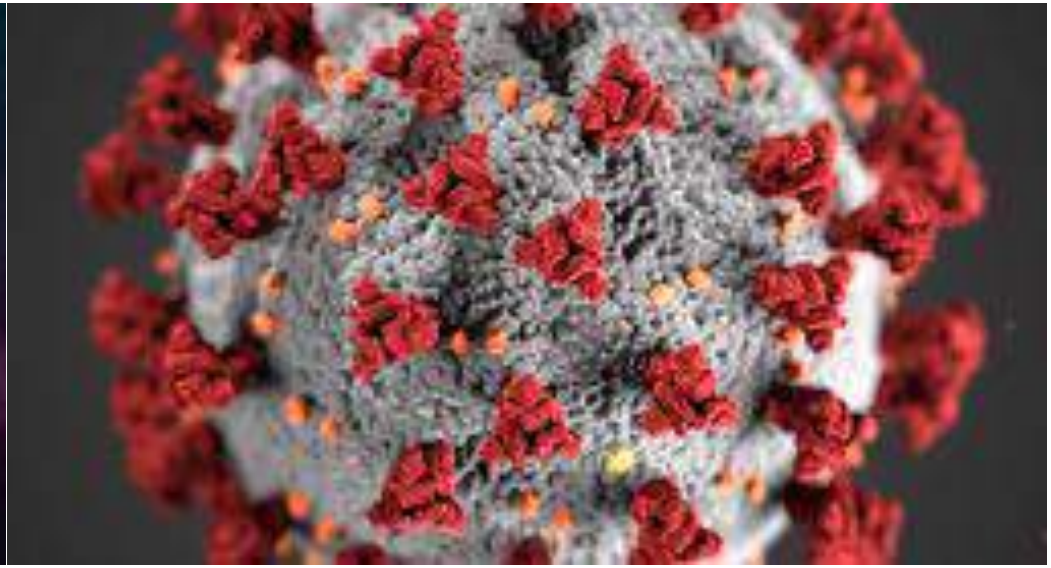


Simple sketch of droplet and airborne virus and bacterial transmission by Ian MacKay, Phd

FREE RADICAL CREATING TECHNOLGIES IN THE MARKET



Cluster of COVID-19 in Lung Tissue

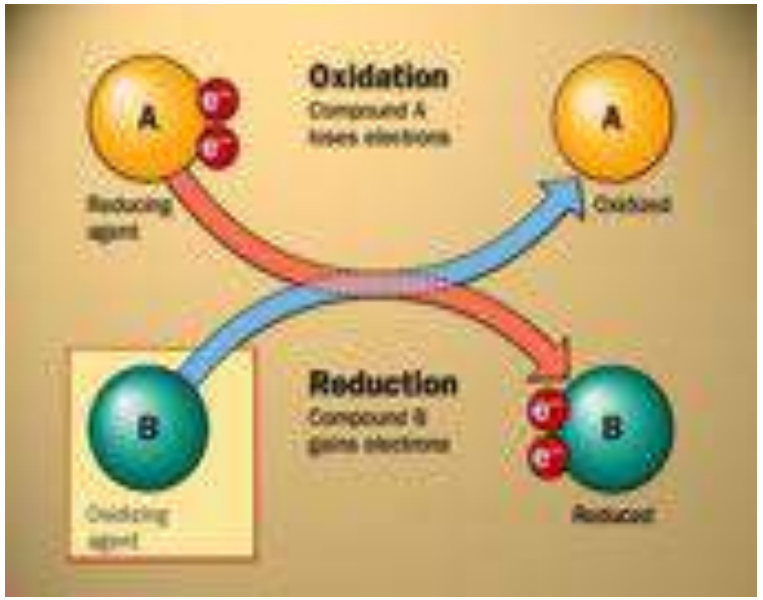


COVID-19 Virus

WHAT DO THESE PRODUCTS HAVE IN COMMON?

- **CATALYTIC CONVERTERS**
- **ION CREATING TECHNOLOGIES**
- **CENTERPOINT PCO**

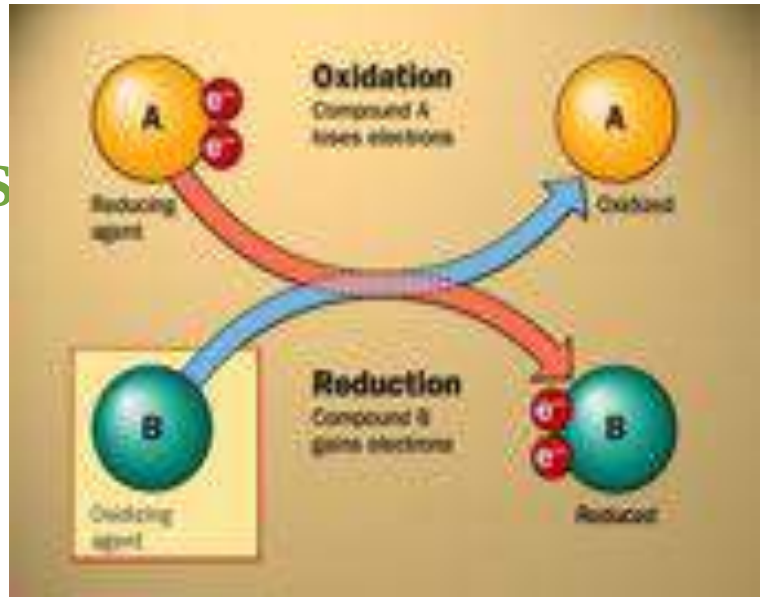
- Generation of Free Radicals
- Redox Reaction Occurs



HOW ARE THESE PRODUCTS DIFFERENT?

- **CATALYTIC CONVERTERS**
- **ION CREATING TECHNOLOGIES**
- **CENTERPOINT PCO**

- Energy Source
- Location of the Reaction
- Type of Free Radical Created



FOOD FOR THOUGHT…

If I don't like bug bites, when I let my kids play in the backyard, do I use a Bug Zapper or continuously run a fogger in the backyard?

THE NEED FOR CARE WITH FREE RADICALS

Oxidative stress describes a state of physiological stress in the body that arises from exposure to high levels of reactive oxygen species (ROS) relative to the level of neutralizing antioxidants. Free radicals can interact with molecules in the body and damage various cell components such as DNA, protein and lipids, giving rise to various disease states.

Oxidative Stress Effects, Dr. Ananya Mandal, MD
https://www.news-medical.net/health/Oxidative-Stress-Effects.aspx

Key concern: Destruction occurs on surface using Free Radicals in occupied space; are lungs effected?

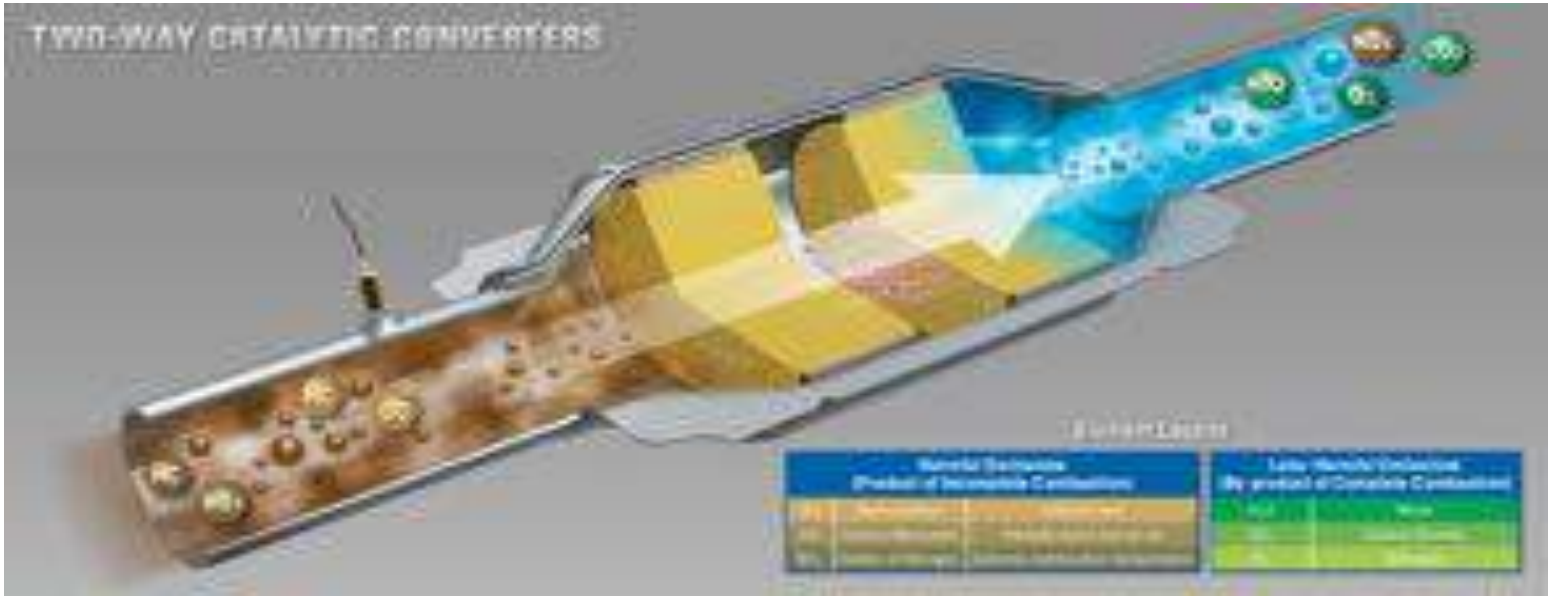
Table 1 List of ROS and RNS produced during metabolism [16, 17, 19]

Free radical	Symbol	Half-life
Reactive oxygen species-ROS		
Radicals		
Superoxide	$O_2^{\bullet-}$	10^{-6} s
Hydroxyl	$OH^{\bullet}$	10^{-10} s
Alkoxyl radical	$RO^{\bullet}$	10^{-6}
Peroxyl Radical	$ROO^{\bullet}$	17 s
Non radicals		
Hydrogen peroxide	H_2O_2	Stable
Singlet oxygen	$^1O_2$	10^{-6} s
Ozone	O_3	s
Organic peroxide	ROOH	Stable
Hypochlorous acid	HOCl	Stable (toxic)
Hypobromous acid	HOBr	Stable (toxic)
Reactive nitrogen species-RNS		
Radicals		
Nitric oxide	$NO^{\bullet}$	s
Nitrogen dioxide	$NO_2^{\bullet}$	s

SAME CHEMISTRY DIFFERENT METHOD OF ENERGY ACTIVATION

Energy source heat from engine

Location of reaction in converter chamber



Single pass efficacy?
Yes, varies by fuel

IONIZATION, PHOTOHYDROIONIZATION OXIDATION

MECHANISM OF BI-POLAR IONIZATION FOR INACTIVATING HARMFUL SUBSTANCES

Mechanism for Inactivating Airborne Fungi

The positive and negative ions cluster together on the surface of airborne fungi, causing a chemical reaction that results in the creation of highly reactive OH groups called hydroxyl radicals. The hydroxyl radical will take a hydrogen molecule from the cell wall of an airborne fungi particle. (Image from Bio Climatic)

9.4

Ultraviolet Light, Ionization and Chemicals. ASHRAE guidance on the use of ultraviolet energy as an adjunct infection control measure may be found in Chapter 60 of the 2015 *ASHRAE Handbook—HVAC Applications* and Chapter 17 of the 2016 *ASHRAE Handbook—HVAC Systems and Equipment*. Current guidance from the U.S. Centers for Disease Control and Prevention can be found in CDC (2005) and NIOSH (2009). Ionization devices and/or chemical fogging/mists are not recommended in occupied environments and should only be considered for terminal cleaning applications in unoccupied spaces.

2019 ASHRAE Handbook—HVAC Applications

- **Energy Source Created Ions**
- **Location of Reaction in the Space**
- **Single Pass Efficacy = Little**

UNIQUE CENTERPOINT® PCO DESIGN

NOT ALL PHOTO CATALYST PERFORM EQUALLY

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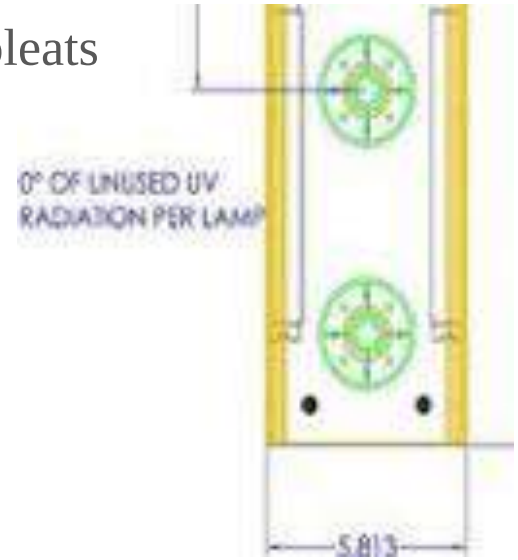
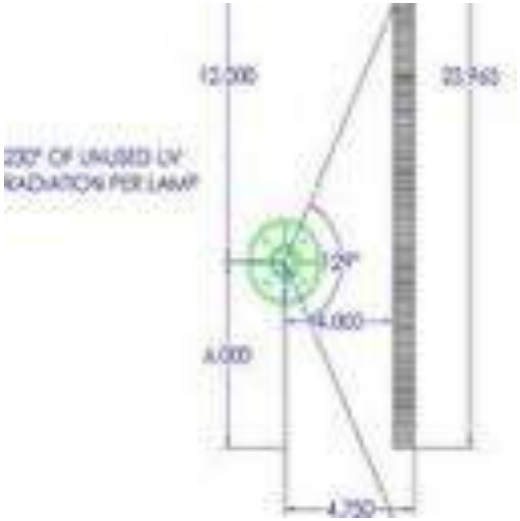
- UVGI lamp through center of pleats (center point)



UNIQUE CENTERPOINT® PCO DESIGN

NOT ALL PHOTO CATALYSTS PERFORM EQUALLY

Honeycomb Photocatalyst



UVGI Lamp Illumination Radius

Available Surface Area for Illumination

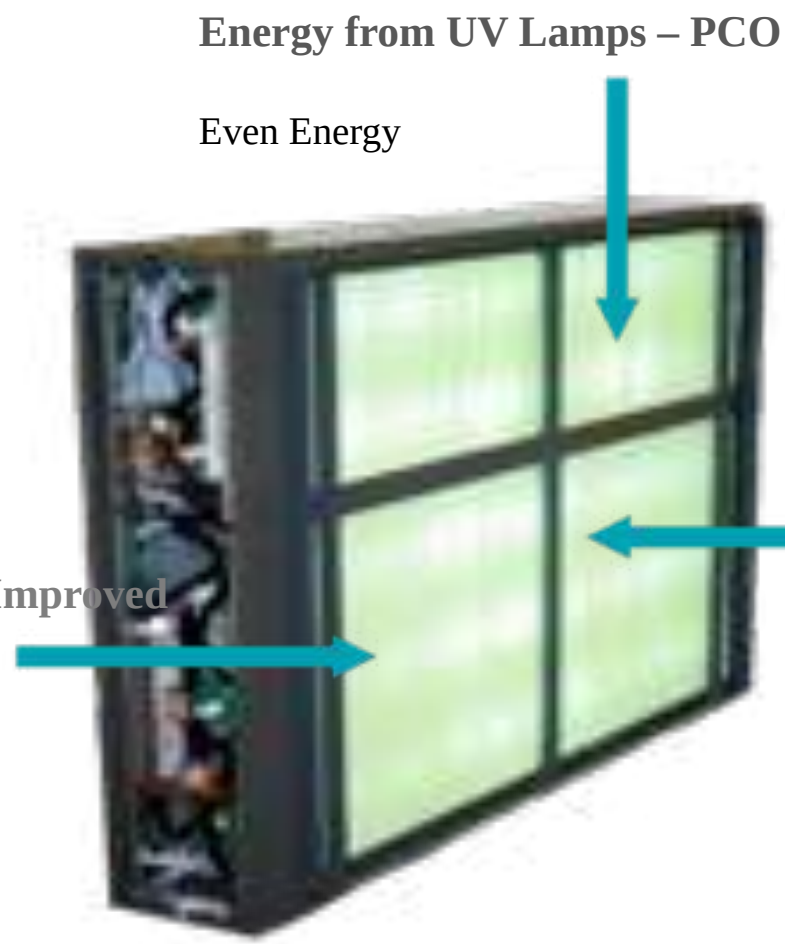
12% Illumination Cross Section of a Honeycomb Catalyst

GENESIS AIR

TRADITIONAL DESIGN

CENTERPOINT® PCO

- Proven destruction of bioaerosols using CenterPoint® PCO panels
- New and retrofit
- Single pass efficacy? Yes – varies by test agent



PROOF IT WORKS

3RD PARTY TESTING CONFIRMED IN BOTH LABS AND THE FIELD.

We are concerned that the lack of recognition of the risk of airborne transmission of COVID-19 and the lack of clear recommendations on the control measures against the airborne virus will have significant consequences:

people may think that they are fully protected by adhering to the current recommendations, but in fact, additional airborne interventions are needed for further reduction of infection risk.


QUESTIONS?
Email or call your Trane account manager
GENESIS AIR
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