

CLEAN AIR

The Clean Air vs.
Outside Air
Conundrum

Air Cleaning Options

- HEPA Filtration
- Hydrogen Peroxide Gas
- MERV Filtration
- Bi-Polar Ionization (BPI)
- Ultraviolet Germicidal Irradiation (UVGI a.k.a. UVC)

DECISIONS

WHEN YOU REACH THE CROSSROADS, CHOOSE CAREFULLY.

Choosing the Wrong Option is Like Throwing Money in the Air

There are new to the market products that have not been peer reviewed or applied in commercial or educational settings. We need to be effective with what really works.

Why Your Job is About to Become More Important!

- Your responsibilities will include Staff and Student Safety.
- Decreasing energy consumption while electricity costs go up.
- Extending the lifetime of equipment
- All while providing a comfortable, learning environment.

Outside Air Pros and Cons

Poor Outdoor Air Equals Poor Indoor Air

Pros

- No new equipment needed for newer buildings
- Helps with sick building syndrome
- Does have a positive effect on reducing airborne pathogens

Cons

- Vapor Offloading
- Increased Energy Consumption
- Increased Humidity
- Increased Odors
- Decrease in equipment life
- Decreased Comfort Levels
- Poor Outdoor Quality

Sick Building Syndrome

the woolroom™

SICK BUILDING SYNDROME

VOCs are a large group of carbon based toxins that are invisible and often have no odour. They are found in a number of everyday household products and furnishings including synthetic carpets and cannot be eradicated by traditional cleaning methods. VOCs are responsible for sick building syndrome and have a number of negative effects on our health, causing skin allergies including eczema, respiratory problems and even cancer.

XYLENE
Nose/throat irritation
Loss of co-ordination
Liver damage

METHYLENE CHLORIDE
Memory loss
Headaches
Damage to nervous system

TOLUENE
Dry cracked skin
Dizziness
Nausea
Respiratory tract irritation
Eye irritation

ACETONE
Burning sensation in eyes/skin
Dizziness
Nausea
Cancer

FORMALDEHYDE
Burning sensation in eyes/skin
Dizziness
Nausea
Cancer

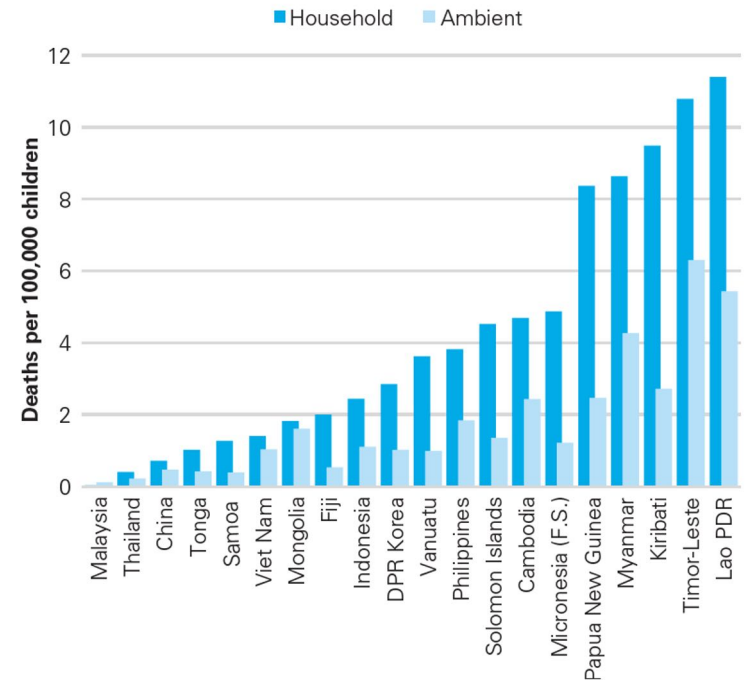
ETHYLENE GLYCOL
Depression
Vomiting
Respiratory failure

BENZENE
Headaches
Rapid/irregular heartbeat
Unconsciousness

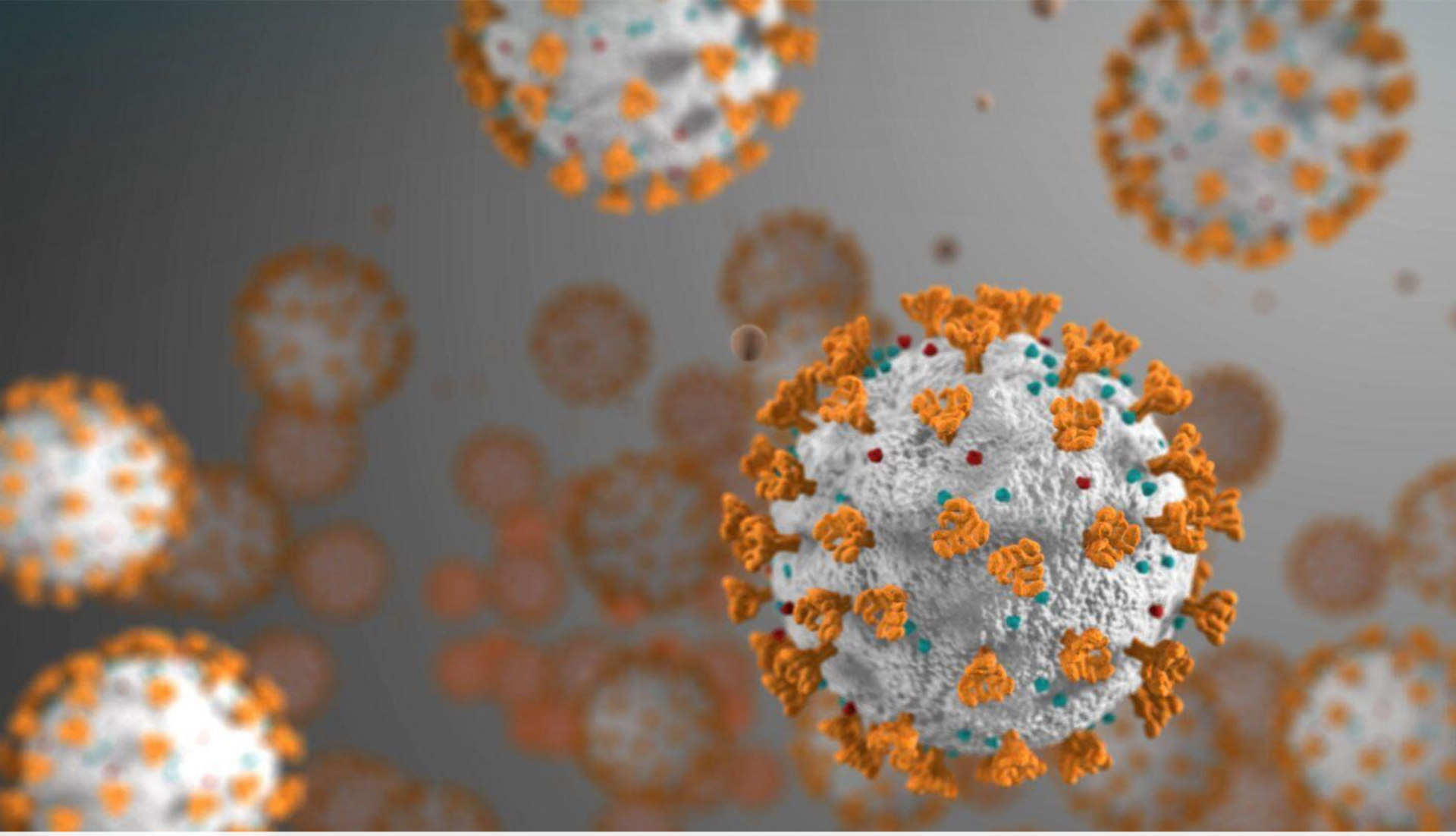
PERCHLOROETHYLENE
Mood/behavioural changes
Eye/throat irritation
Drowsiness

Wool is the only fibre able to naturally absorb VOCs and reduce their presence in the home, eradicating the risks to health and boosting wellness. These effects are observed just through the presence of wool bedding or carpets in the home. Not only does wool neutralise contaminants more quickly and completely than synthetic fibres, wool does not re-emit them, even when heated. Wool beds, bedding, mattresses and 100% wool carpets can continue to purify the air for up to 30 years.

Death rates attributed to the effects of household and ambient air pollution among children under 5 years of age, 2016



Source: WHO World Health Statistics



Viruses such as SARS-CoV-2

Recirculation of Indoor Air

Pros

- Easy to achieve
- Almost all equipment can do this

Cons

- Will require heavy filtration and frequent changes
- Will result in a reduction of supply air
- Equipment will have to run
- Not effective as a standalone solution
- Increased energy consumption

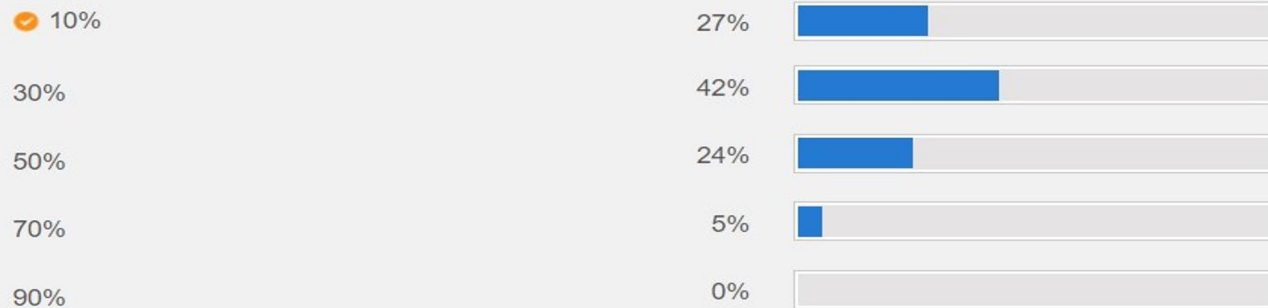
Are Your Buildings Compliant?

In the United States, what percentage of schools are meeting minimum ventilation standards as specified by ASHRAE? (Required)

- 10%
- 30%
- 50%
- 70%
- 90%

This may or may not shock you but it would shock people outside the industry

In the United States, what percentage of schools are meeting minimum ventilation standards as specified by ASHRAE?



HEPA Filtration for COVID

- Pros:
 - Less Initial Hardware Expense Than other Technologies
 - Captures Small Airborne Particulates
 - Reduction in VOCs
 - CDC Recommended
- Cons:
 - Difficult to be Added to Existing HVAC Equipment
 - Extended Run Times on Equipment Required for Effectiveness
 - Decreased CFM at Equipment, causing:
 - Inefficient HVAC Equipment Operation
 - HVAC Equipment to be Replaced More Frequently
 - Higher Consumable Costs (Frequent Replacement of Filters)
 - Must perform a Test and Balance to Accommodate for the Dramatic Pressure Reductions
 - Must be used with other technologies

MERV13+ Filtration for COVID

- Pros:
 - Easily Deployed if Proper HVAC Filter Frame is in Place
 - Less Initial Hardware Expense than Other Technologies
 - Captures Small Airborne Particulates
 - Provides Surface Disinfection in HVAC Equipment
 - Reduction in VOCs
- Cons:
 - Extended Run Times on Equipment Required for Effectiveness
 - Decreased CFM at Equipment, causing:
 - Inefficient HVAC Equipment Operation
 - HVAC Equipment to be Replaced More Frequently
 - Higher Consumable Costs (Frequent Replacement of Filters)
 - Must perform a Test and Balance to Accommodate for the Dramatic Pressure Reductions.

Bi-Polar Ionization / H₂O₂ for COVID

- Pros:
 - Latent Benefit for Odor Control
 - Potential Latent Benefit for CO₂ Reduction
 - Provides Surface Disinfection in HVAC Equipment
 - Reduction in Some Hydrocarbons?

Bi-Polar Ionization / H₂O₂ for COVID

- Cons:

- Lack of Peer Reviewed Data. Does it Really Work?
ASHRAE specifically says “Convincing scientifically-rigorous, peer-reviewed studies do not currently exist on these emerging technologies; manufacturer data should be carefully considered.”
- Extended Run Times on Equipment Required for Effectiveness
- May Create Ozone (O₃) [technology dependent]
- Increases Oxygenated VOCs Downstream
- Continual Maintenance (Ionization Probes Must Be Kept Clean)
- Only Breathable Zone Effectiveness
and this is not well described in the peer review literature

UVC for COVID

- Pros:

- Many Peer Reviewed Studies
- Recommended by ASHRAE, FDA, CDC, NIH, WHO
- Has Been Used for Decades in the Medical World
- Easily Deployed (Many Applications are ‘Drill-n-Fill’)
- Low Maintenance (Easy Lamp Replacement)
- Works for Air Cleaning
 - Bench, translational and practical data available
- Works for Surface Cleaning in Unoccupied Rooms
- Provides Surface Disinfection in HVAC Equipment
- No Ozone (O₃) Production (requires 254nm light)
- Best Long Term ROI

UVC for COVID

- Pros:

- Odor Control when Combined with TiO₂ Filtration

- TiO₂ well supported by peer reviewed literature

- Inactivates COVID and all COVID Variants

- Kills Black Mold

- Inactivates Cold and Flu Viruses

- Kills Legionnaire's Disease

- Kills Coli and Staphylococcus

- Kills Salmonella

- 99.9% to 99.9999% Effectiveness

- Studies Indicate Better Employee/Student Attendance
(not sick as often)

- Controlled studies available from commercial settings

UVC for COVID

- Cons:
 - Not All UVC Products are the Same
(Buyer Beware!)
 - Not Safe for Direct Viewing
 - Higher Initial Investment
 - Requires Evidence-Based Approach for Efficacy
 - ‘Radiation’ Stigma

UVC for COVID with NetX

- Network Thermostat Controls UVC*
 - NetX IAQ Controls embedded in X7 Thermostat
 - NetX External Controller (NT-IAQ) can be Added to NetX X5 and X7 Thermostats
 - Resides on NetX Remote Sensor Bus
 - Manages UVC Lamp Operation
 - Monitors UVC Lamp Operation
 - Data Logs UVC Lamp Operation
 - Alerts (email / SMS) When Lamp Needs to Be Replaced
 - Alerts (email / SMS) When Lamp is Not Working
 - Extends Lamp Life by Up To 4.5 X (Over Typical Applications)

* Patent Pending

UVC Reference Materials

with shortened links

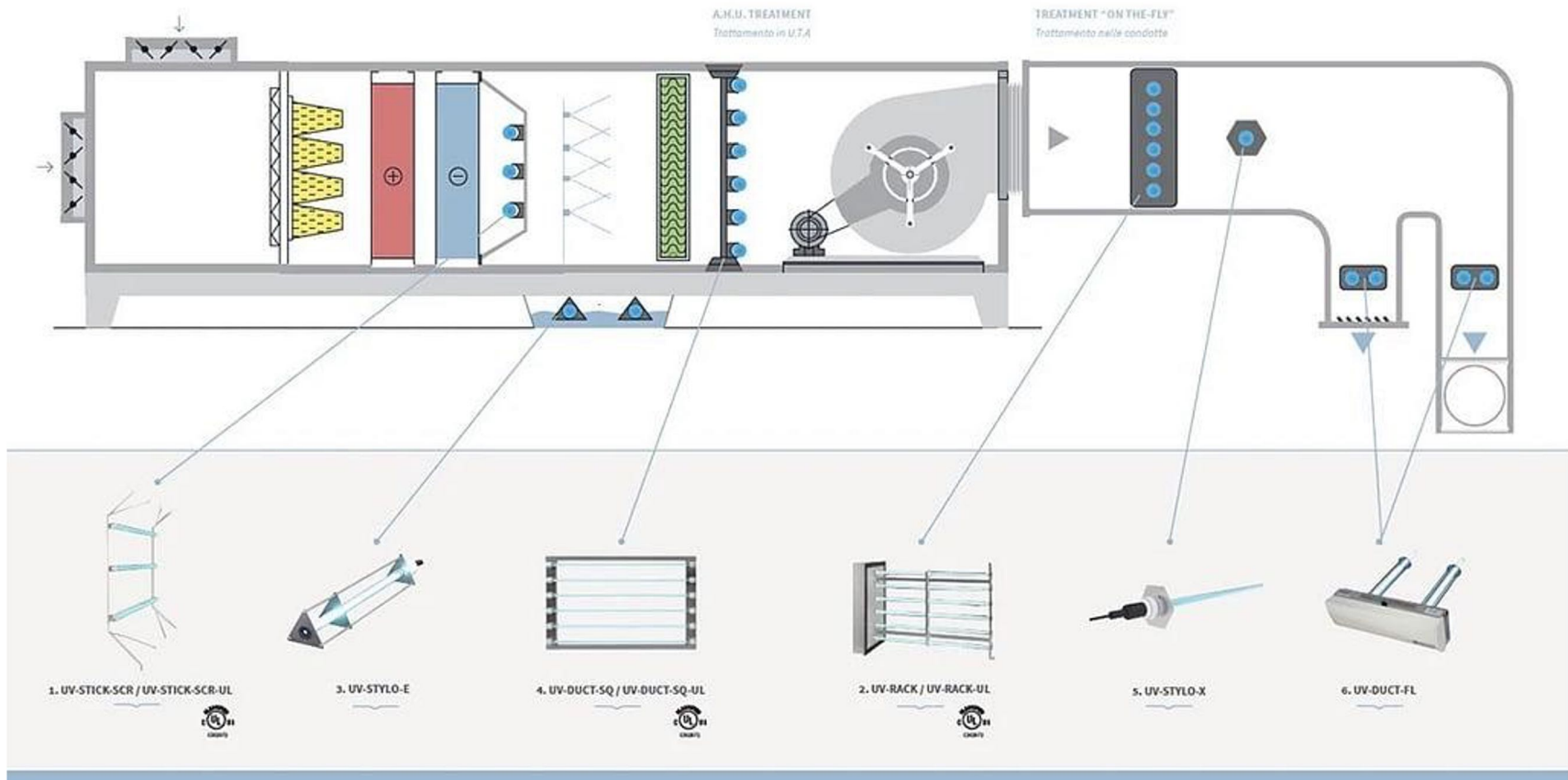
- [Ten scientific reasons in support of airborne transmission of SARS-CoV-2](#)
t.ly/iw58
- [FDA: UV Lights and Lamps: Ultraviolet-C Radiation, Disinfection, and Coronavirus](#)
t.ly/ynFv
- [Coronavirus in Public Restrooms](#)
t.ly/mVrk
- [CDC: Covid Data Tracker Weekly Review](#)
t.ly/ilzo

UVC Reference Materials

with shortened links

- [ASHRAE: Ultraviolet Air and Surface Treatment](#)
t.ly/tKKE
- [AMCA: Ultraviolet Air and Surface Treatment](#)
t.ly/4mFr
- [UV-C irradiation is highly effective in inactivating SARS-CoV-2 replication](#)
t.ly/WQhN
- [Effect of ultraviolet germicidal lights installed in office ventilation systems on workers' health and wellbeing: double-blind multiple crossover trial](#)
t.ly/NoBP

UVC for COVID with NetX



UVC for COVID with NetX



UVC Cleaning with NetX

- **Additional UVC Products Available**
 - **Surface Disinfection**
 - **Water Disinfection**
 - **Boxes and Cabinets for Device Sterilization (medical equipment, masks, phones, etc.)**

UVC Project Design

- **Factory Guidance, Including:**
 - **Building Analysis**
 - **Equipment Recommendations**
 - **Complete Parts Lists**
 - **Complete Accessories Kitting**
 - **Unit Location Labeling**
 - **Direct Factory Support**

All Content Can Be Found Here!



networkthermostat.com/tema2021