UV Light Creates Healthier Buildings for Residents and Staff

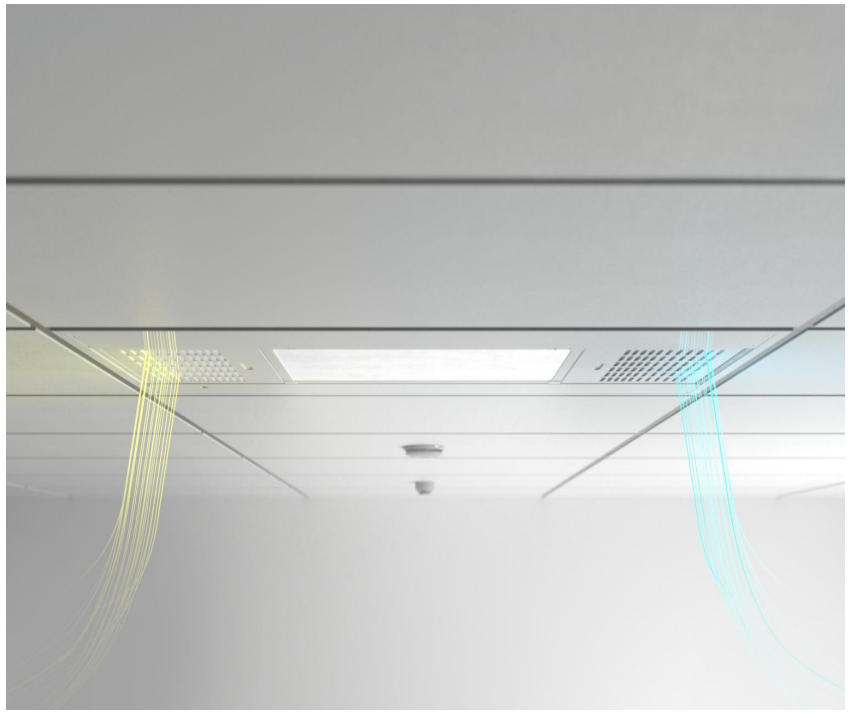
Clean Air USA

Pathogen Control Technology

UVANGEL®

www.CleanAirUSA.com

Clean Air USA



UVANGEL®

Today's Topics

- What is UV Light?
- What Are the Health and Safety Benefits?
- How Effective Is UV Technology on COVID and its Variants?
- How Can I Improve Safety of Resident and Staff?
- How do I Install and Maintain My System?
- How do I Minimize My COVID Liability Risk?
- How do I Procure UV Environmental Protection?

Today's Speakers

Alan Watts
Managing Partner

Clean Air USA

Dr. Linda Lee, MBA
Chief Medical
Affairs & Science Officer

UVANGEL

Dick Santangelo P.E.
President & CEO

APOLLO
Engineering Solutions®

Market leaders prepare for the future

"Experts agree this is likely not the last pandemic, or outbreak, we will face. Going forward innovative companies must shift from response to ***prevention to protect employees and customers"***

McKinsey & Company

Not the last pandemic: Investing now to reimagine public-health systems | Article

The COVID-19 crisis reminds us how underprepared the world is to detect and respond to emerging infectious diseases. We must make smart investments now to simultaneously navigate COVID-19 and prepare for future pandemics.
Go from "Break glass in case of emergency" response systems to "Always on" systems and partnerships.

World Health Organization

WHO warns COVID-19 pandemic is 'not necessarily the big one' December 29, 2020 | Article

"This pandemic has been very severe , "It has spread around the world extremely quickly and it has affected every corner of this planet, but this is not necessarily the big one."
He stressed that while the virus is "very transmissible, and it kills people … its current case fatality (rate) is reasonably low in comparison to other emerging diseases.
"We need to get ready for something that may even be more severe in the future," Ryan added.

UVANGEL

WHAT WE DO

We design and develop pathogen prevention technology to reduce viruses, bacteria, and fungus on surfaces and in the air we breathe.

By neutralizing harmful pathogens, we create measurably cleaner and safer environments and reduce the risk of exposure for employees, customers, and families.

Hilton · CORNING · DELL · Steelcase · CENTRAK · Marriott · HermanMiller · xenial · TOUCH DYNAMIC · globalpayments · Schindler · Flexfab · ergotron · surfacide · SKYTRON · SEAL SHIELD · Whirlpool · MASTERBRAND · Stanford MEDICINE · Henry Ford HEALTH SYSTEM · VA U.S. Department of Veterans Affairs · Driscoll Children's Hospital · Northwestern Medicine · Shriners Hospitals for Children

UV Angel - Designed With Clinical Collaboration

Dr. Linda D. Lee, MBA
UV Angel Chief Science & Medical Affairs Officer

- The University of Texas MD Anderson Cancer Center
- Founding Member Stericycle, Inc.
- University of Arkansas Medical Sciences
- CH2M Hill
- Waste Management Healthcare Solutions
- VidaShield, Inc.

- Doctorate of Public Health in Occupational and Environmental Health from University of Texas Health Science Center, School of Public Health
- Masters in Operations Management from University of Arkansas – College of Engineering
- MBA – Healthcare Management – Western Governors University
- Bachelor of Science – Environmental Health Science, Indiana State University

- University of Texas Health and Science Center, School of Public Health
- University of Houston College of Engineering
- American Hospital Association
- American Industrial Hygiene Association
- Board Committee Member ASHRAE

- Early Platform Development
- Validation and Data Collection

- In Hospital Clinical Validations
- Select Clinical Studies

- OEM Partnerships
- Strategic Healthcare Partnerships

- Strategic Pilots
- Integrated Software Input

UV ANGEL CLINICAL COLLABORATORS

Curtis Donskey
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Department of Veterans Affairs

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Mel & Enid Zuckerman College of Public Health

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Northwestern Medicine
Feinberg School of Medicine
Stanford HEALTH CARE

Bob Rothstein, MD
Northwestern School of Medicine
University of Chicago, Emergency Medicine
Chairman EM UCLA Medical Center
Johns Hopkins, VP of Medical Affairs

Lucy S. Tompkins
MD
Stanford HEALTH CARE

WHAT IS THE INVISIBLE THREAT?

DISEASE TRANSMISSION

Source of Pathogen

Reservoir: dirty surfaces, air, water or insects

Volume of Pathogens Left Behind

Some survive or are missed during cleaning

Route of Entry

Ingestion, inhalation, puncture or contact

Infectious Pathogen

Bacteria, Viruses, Fungus, Parasites

Portal of Exit

How pathogens exit body: coughing, bleeding, open wounds

Susceptible Host

Pathogens travel on air currents and land on surfaces

FEDERAL RECOMMENDATIONS FOR ENGINEERING CONTROLS

Adding Engineered Room Level Source Control is a vital component in disease transmission prevention

Federal recommendations for engineering controls

COVID-19 Response

OSHA

The most effective protection measures are (listed from most effective to least effective). In most cases, a combination of control measures will be necessary to protect workers from exposure to SARS-CoV-2.

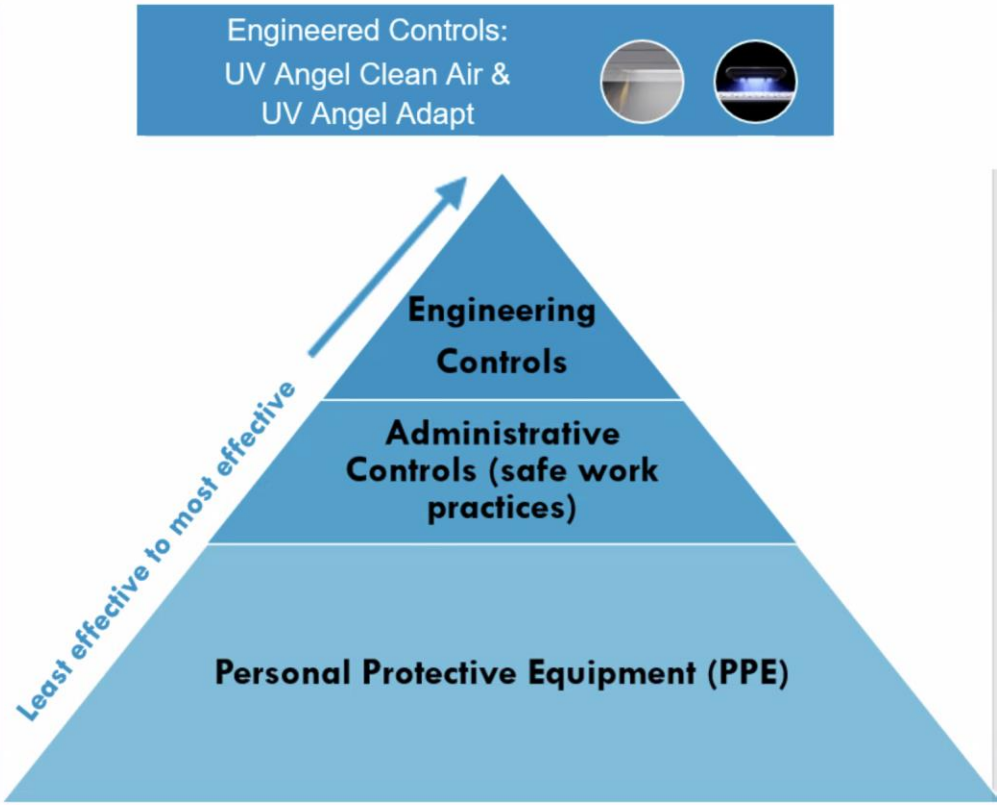
These types of controls reduce exposure to hazards without relying on worker behavior and can be the most cost-effective solution to implement.[1]

CDC

Consider using ultraviolet germicidal irradiation (UVGI) as a supplement to help inactivate the virus.[2]

ASHRAE

Strongly recommend; good evidence – Upper-room UVGI (with possible in-room fans) as a supplement to supply airflow



[1]OSHA Guidance on Preparing Workplaces for COVID-19, (OSHA 3990-03 2020)

CURRENT CLEANING PROCEDURES… We still have problems

HANDWASHING

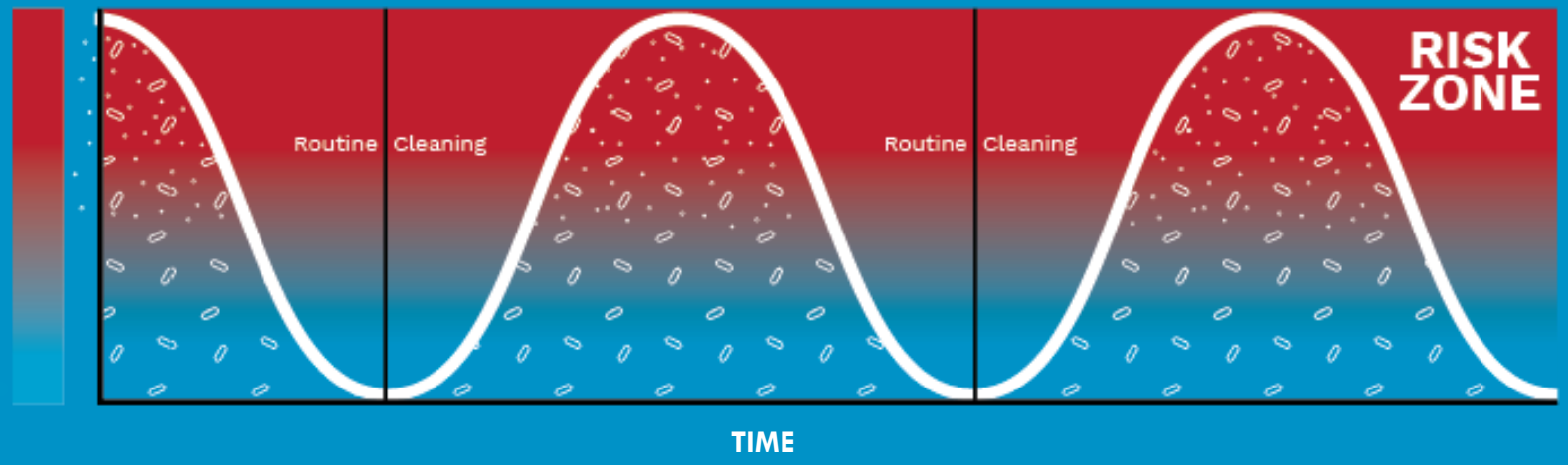
DAILY CLEANING

DEEP CLEANING

HIGH-TOUCH SURFACES

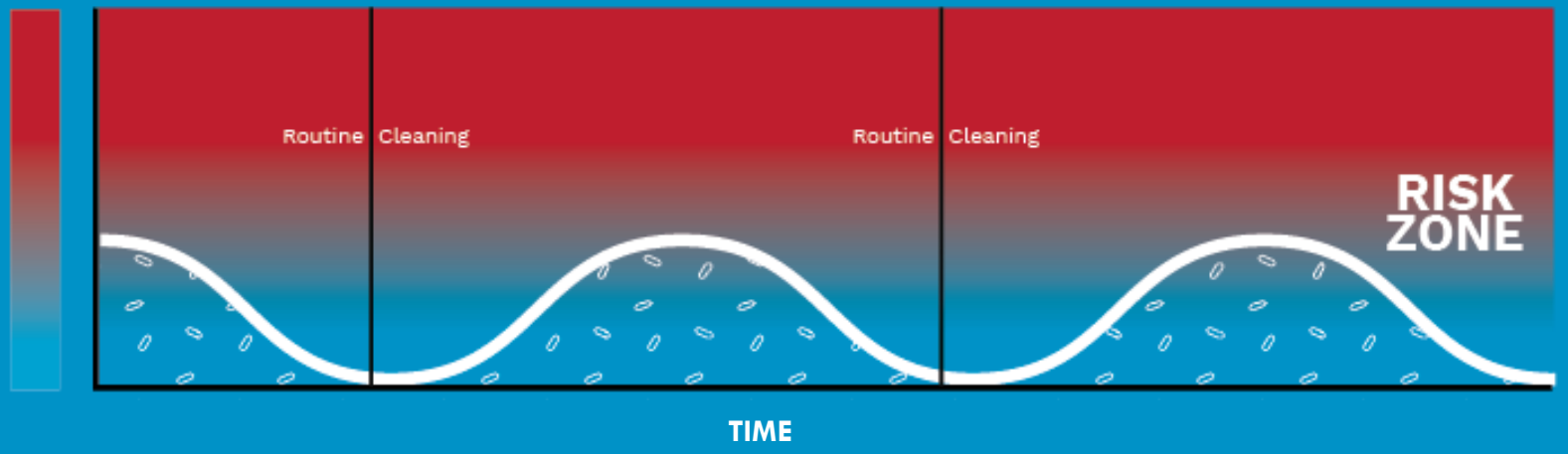
Manual Cleaning Creates Inherent Risk

Without UV Angel Technology



Continuous, Automated Treatment **Lowers Risk**

With UV Angel Technology



PEOPLE ARE A SOURCE OF INFECTIOUS CONTAMINATION

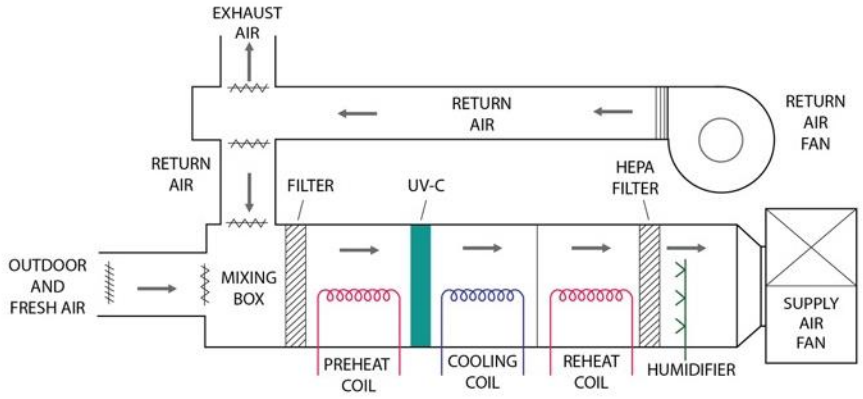
Many Indoor Air Quality (IAQ) problems are associated with indoor contaminant sources

- Foot traffic sends 100,000 particles per step into the air
- Humans shed **37 million bacteria** per hour

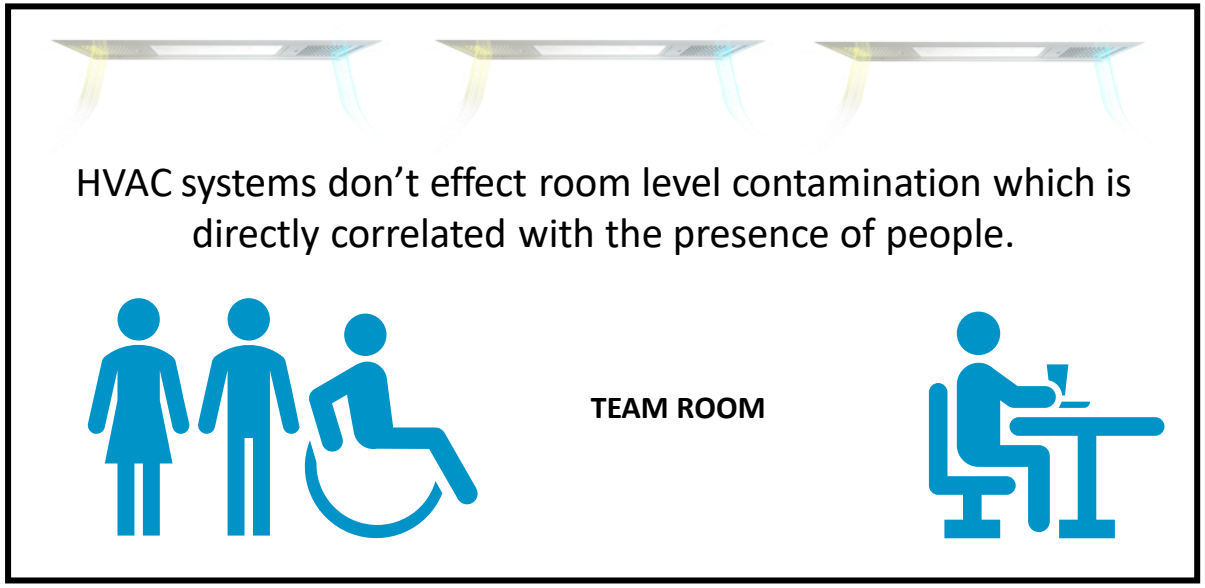
UV ANGEL VS HVAC SYSTEM ADDITIONS

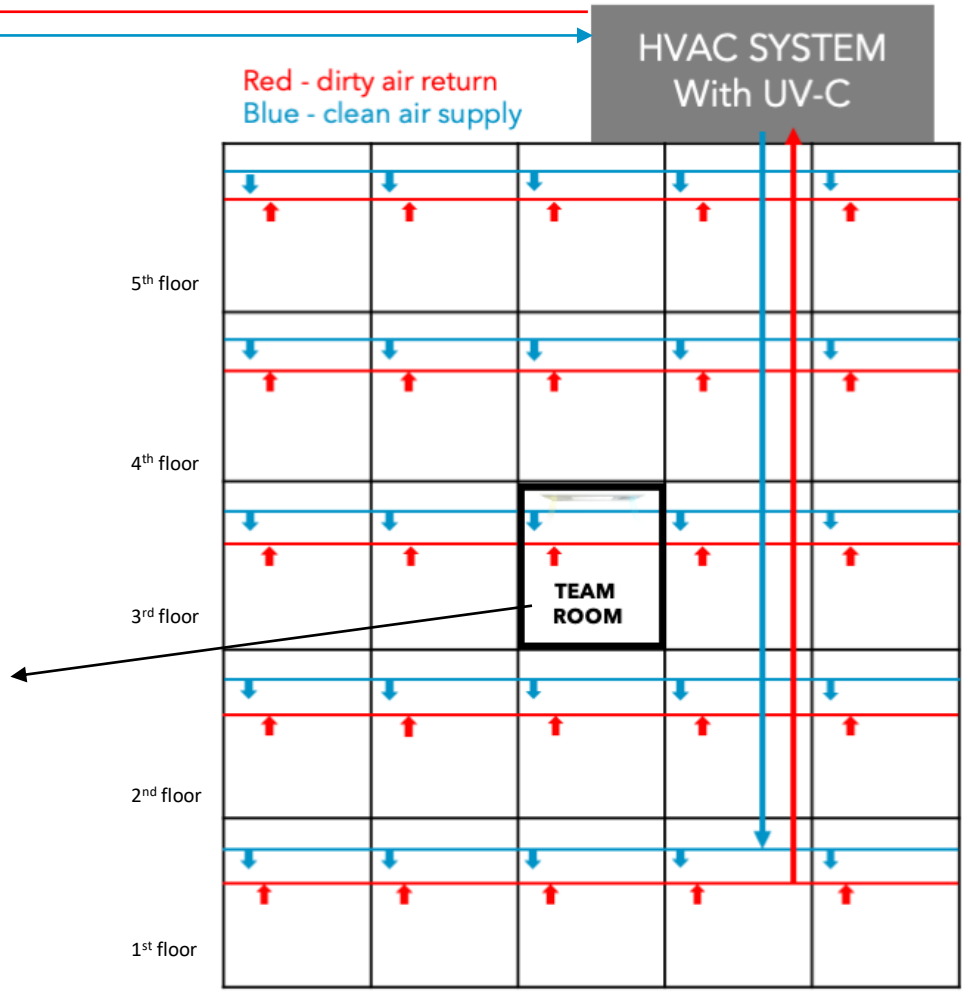
Air Handling Technologies

- UV-C
- Ion
- HEPA
- H_2O_2
- Ozone



HVAC system supplies air for entire building.
Air travels from one source to reach all areas.





BENEFITS OF IN-CEILING UV-C

- Unobtrusive and saves space
- No operator needed
- Works 24/7 at the source of contamination
- 50 cfm speed over UV lamp
- MERV 6 filter
- 27 watt UV lamp

Portable UV air purification

- 45 lbs., 2 ft. high
- 560 cfm speed over UV lamp
- HEPA filter, carbon filter
- 2 air exchanges per hour
- Noisy at 28-63dB
- No peer-reviewed studies
- 20 watt UV lamp

WHAT THE SCIENCE TELLS US

Air transports the pathogens that contaminate people and surfaces

How bad is it?

- Air is up to **8 times more contaminated** than surfaces
- The air is most contaminated in a room **1 hour** after cleaning

All pathogens can become airborne

- NIH reports Coronavirus remains airborne up to **3 hours**
- MRSA counts remain elevated up to **15 minutes** after bedmaking

Even breathing can spread infection

- Influenza patients breathe the virus out in tiny particles that can stay suspended in the air for minutes or hours

Treating the air, cleans the surfaces

- Reducing pathogens from the air can **lower surface contamination** by as much as **66%**

UV ANGEL AIR – VIDEO INTRODUCTION

TESTING

Table 4: Combined UV + Filter Removal Rates

Microbe	Type	Size µm	Filter %	UV Rate %	Total %
Acinetobacter	Bacteria	1.225	21	100	100.00
Adenovirus	Virus	0.079	9	100	100.00
Aeromonas	Bacteria	2.098	35	100	100.00
Aspergillus	Fungi	3.354	45	93	96.30
Bacillus anthracis	Bacteria	1.118	19	61	68.20
Bacteroides fragilis	Bacteria	3.162	44	100	100.00
Blastomyces dermatitidis	Fungi	12.649	50	99	99.65
Bordetella pertussis	Bacteria	0.245	4	100	100.00
Burkholderia cenocepacia	Bacteria	0.707	11	100	100.00
Burkholderia mallei	Bacteria	0.674	10	100	100.00
Burkholderia pseudomallei	Bacteria	0.494	7	100	100.00
Candida albicans	Fungi	4.899	49	79	89.19
Candia auris	Fungi	4.899	49	75	87.31
Chlamydia pneumoniae	Bacteria	0.548	8	100	100.00
Chlamydophila psittaci	Bacteria	0.283	4	100	100.00
Cladosporium	Fungi	8.062	50	98	98.75
Clostridium botulinum	Bacteria	1.975	33	100	100.00
Clostridium difficile	Bacteria	2	34	100	100.00
Clostridium perfringens	Bacteria	5	49	100	100.00
Coronavirus (Wuhan)	Virus	0.11	6	100	100.00
Corynebacterium diphtheriae	Bacteria	0.698	10	100	100.00
Coxsackievirus	Virus	0.027	19	100	100.00
Cryptococcus neoformans	Fungi	4.899	49	99	99.67
Curvularia lunata	Fungi	11.619	50	71	85.57
Ebola virus	Virus	0.09	8	100	100.00
Echovirus	Virus	0.024	20	100	99.89
E. coli	Virus	0.5	7	100	100.00
Enterobacter cloacae	Bacteria	1.414	24	100	100.00
Enterococcus	Bacteria	1.414	24	100	100.00
Enterococcus faecalis	Bacteria	0.707	11	100	100.00
Francisella tularensis	Bacteria	0.2	4	91	91.49
Fusarium	Fungi	11.225	50	92	96.23
Haemophilus influenzae	Bacteria	0.285	4	100	100.00
Haemophilus parainfluenzae	Bacteria	1.732	30	100	99.99
Hantaan virus	Virus	0.096	7	100	100.00
Helicobacter pylori	Bacteria	2.1	35	100	100.00
Histoplasma capsulatum	Fungi	2.236	36	99	99.56
Influenza A virus	Virus	0.098	7	100	100.00
Junin virus	Virus	0.122	6	100	100.00
Klebsiella pneumoniae	Bacteria	0.671	10	100	100.00
Lassa virus	Virus	0.122	6	100	100.00
LCV	Virus	0.087	8	100	100.00
Legionella pneumophila	Bacteria	0.52	7	100	100.00
Listeria monocytogenes	Bacteria	0.707	11	99	98.98

Table 4: Combined UV + Filter Removal Rates

Microbe	Type	Size µm	Filter %	UV Rate %	Total %
Marburg virus	Virus	0.039	15	100	100.00
Measles virus	Virus	0.158	5	100	100.00
MERS virus	Virus	0.11	6	89	90
Mucor	Fungi	7.071	50	95	98
Mumps virus	Virus	0.164	5	100	100
Mycobacterium avium	Bacteria	1.118	19	100	100
Mycobacterium kansasii	Bacteria	1.118	19	100	100
Mycobacterium tuberculosis	Bacteria	0.637	9	100	100
Mycoplasma pneumoniae	Bacteria	0.177	5	100	100
Neisseria meningitidis	Bacteria	0.775	12	100	100
Nocardia asteroides	Bacteria	1.118	19	100	100
Norwalk virus	Virus	0.029	18	97	98
Parainfluenza virus	Virus	0.194	4	100	100
Parvovirus B19	Virus	0.022	21	100	100
Penicillium	Fungi	3.262	44	60	78
Proteus mirabilis	Bacteria	0.494	7	100	100
Pseudomonas aeruginosa	Bacteria	0.494	7	100	100
Reovirus	Virus	0.075	9	99	99
RSV	Virus	0.19	5	100	100
Rhinovirus	Virus	0.023	21	99	99
Rhizopus	Fungi	6.928	50	93	96
Rickettsia prowazeki	Bacteria	0.6	9	100	100
Rotavirus	Virus	0.073	9	100	100
Rubella virus	Virus	0.061	11	67	71
Salmonella typhi	Bacteria	0.806	13	100	100
SARS virus	Virus	0.11	6	100	100
Serratia marcescens	Bacteria	0.632	9	100	100
Stachybotrys chartarum	Fungi	5.623	49	12	55
Staphylococcus aureus	Bacteria	0.866	14	100	100
Staphylococcus epidermis	Bacteria	0.866	14	100	100
Streptococcus pneumoniae	Bacteria	0.707	11	77	80
Streptococcus pyogenes	Bacteria	0.894	14	100	100
Trichophyton	Fungi	4.899	49	71	85
Ustilago	Fungi	5.916	50	46	73
VZV	Virus	0.173	5	100	100
Yersinia pestis	Virus	0.707	11	100	100

THE RESULTS

Tests conclusively support that UV Angel Air treats bacteria, fungus and viruses in the air including:

Gram-negative and gram-positive bacteria, fungal pathogens and viral surrogates.

The UV Angel Air results show laboratory elimination rates up to 99.99%

EFFICACY

A peer reviewed study conducted on ceiling mounted UV-C systems resulted in overall airborne fungus and bacteria reductions of 78% and 62% respectively.[1]

Infection reduction rates - Hospital ICU, KY[2]

- C Diff Reduced 88%
- MRSA Reduced 54%
- CAUTIs Reduced 55%
- CLABSIs Reduced 44%
- VREs Reduced 14%

Overall Infections Reduced **60%**

[1]Don Guimera, MSN, RN, CIC, CCRP, FAPIC, Jean Trzil, PharmD, Joy Joyner, RN, CIC, Nicholas D. Hysmith, MD, FAAP, *Effectiveness of a shielded UV-C air disinfection system in an inpatient pharmacy of a tertiary care children's hospital*, American Journal of Infection Control, August 2017 [2]Tina Ethington, MSN, RN, CEN, NE-BC, Sherry Newsome, BSN, RN, MBA/MNA, Jerri Waugh, BSN, RN, MBA/MHA, Linda D. Lee, DrPH, MBA, *Cleaning the air with ultraviolet germicidal irradiation lessened contact infections in a long-term acute care hospital*, American Journal of Infection Control, December 2017

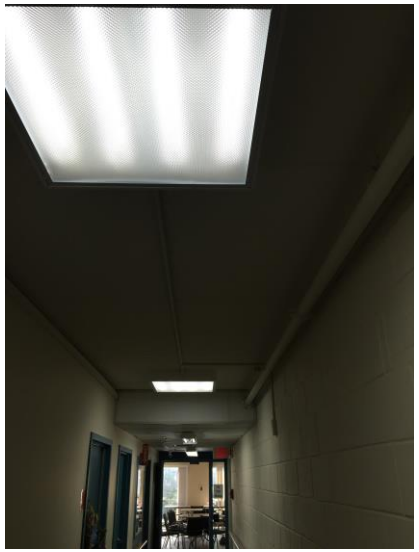
Keeping Residents and Staff Safe

Clean Air USA

Computer Labs

Laundry Rooms

Conference Rooms

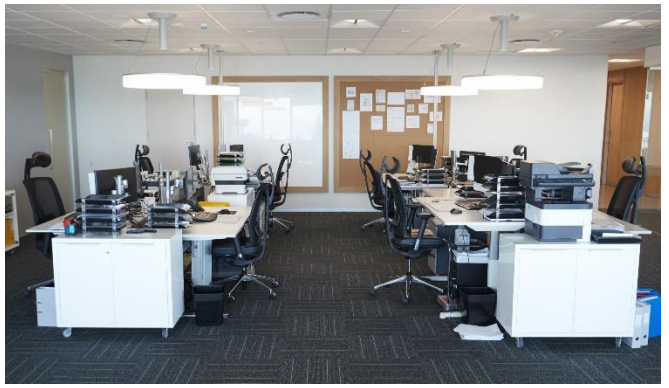


Hallways

Stairwells

Elevators and Lobby Area

Restrooms



Office Workspace

Community Spaces

TECHNICAL OVERVIEW UV ANGEL AIR

UV Angel Clean Air - DOWNLIGHT, NO-DOWNLIGHT

- Dimensions: 23.8” x 47.75” x 4”; Weight 25.4, 23.5 lbs.
- Operates 24/7/365
- MERV6 Filter
- Fully shielded 27-watt ultraviolet germicidal lamp (UV-C) operates at 254 nanometers
- Door Interlock switches deactivate UV-C Lamp when UV-C chamber and/or fan chamber is accessed
- Treated air is pushed through the exit area, a louvered panel on the down-light fixture, designed to disperse treated air throughout the room.
- EPA Registered as a pesticide device
- ETL Listed

Downlight

No-downlight

Hard ceiling, surface mounts

- Hard ceiling and surface mount accessories for the standard recessed Air unit available through UV Angel

- **Drywall Frame Kit** allows the unit to be recessed into the hard ceiling

- **Surface Mount Kit** can be mounted to the surface of the ceiling (wood, plaster, cement, etc.) has slotted holes to accept hardware to suspend the unit

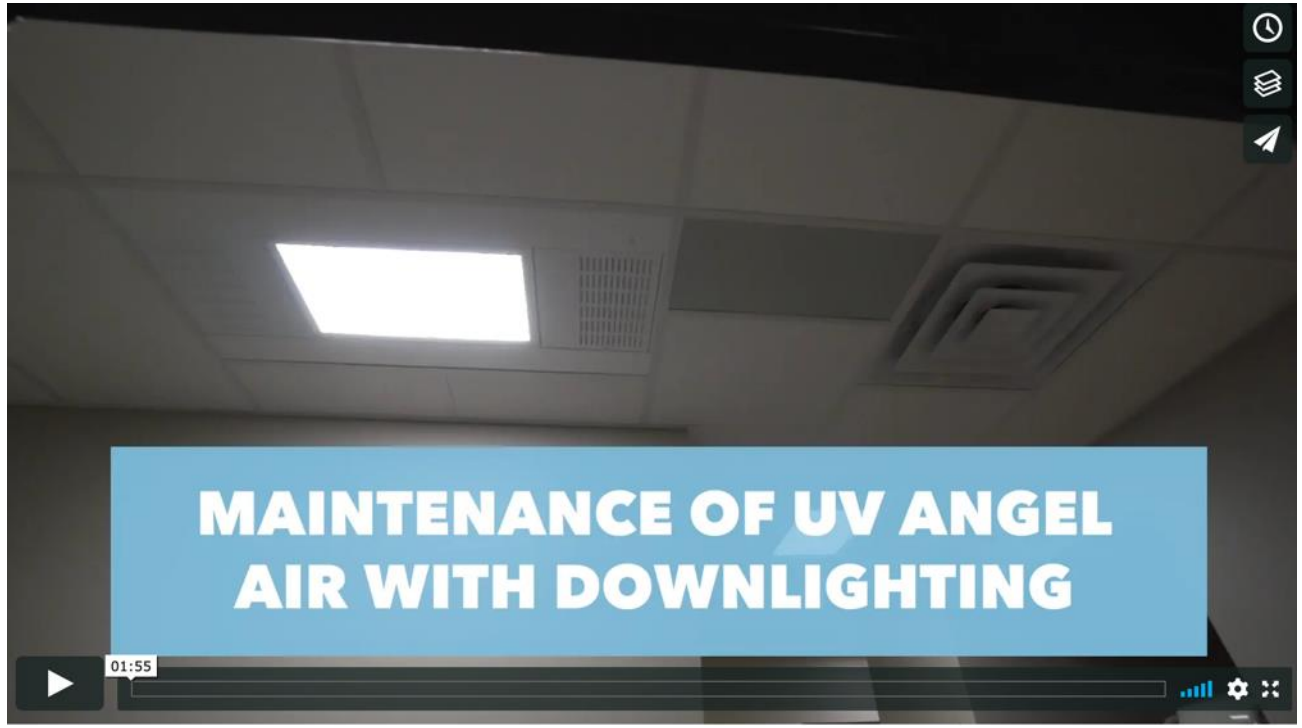
INSTALLATION

- Easy installation, average takes 15 minutes
- Downlight version requires 2 electrical lines, 1 hot switch
- The end with the green indicator light, must be positioned closer to the rooms HVAC's return air grill

https://vimeo.com/432272670

MAINTENANCE

- UV lamp lasts 9000 hours
- MERV 6 filter lasts 1 year



https://vimeo.com/432272598

UV Angel will put you on auto-fill based on your installation date to replenish your maintenance kits so you never lose efficacy with your UV Angel Air system.

PRODUCT OVERVIEW UV ANGEL ADAPT

THE SOLUTION: SURFACE TECHNOLOGY

Adapt Series

Using an intelligent, automated UV-C light treatment platform, UV Angel continuously monitors to detect when surfaces have been used and safely treats them hundreds of times a day to reduce levels of viruses, bacteria and fungi, without any assistance from staff. Attaching directly to devices like keyboards, touchscreens and equipment, the UV Angel Adapt Series is as unobtrusive as it is effective.

Our Software Platform

UV Angel Cloud

Cloud Platform enabling users to access their UV Angel data, diagnostics, and history from anywhere with an internet connection

UV Angel IOT

An Integrated connectivity platform allowing every UV Angel device to connect to the internet, send and receive data, and stay updated with the latest technology

UV Angel Analytics

A purpose-built analytics platform allowing deep analytics of both UV Angel data, and additional Infection Prevention Data

Housing – Case Studies

Case Study –
100 Unit Public Housing Building

Five Story Public Housing

Common Areas Only
(20) UV Angel Air Units - $37,000

20 Units Total - $37,000

Clean Air Financing*

Zero upfront cost | 100% Financed
60-month term / 3.53% APR
$690.30 per month

*Financing will vary based on sale amount and current rate.

Case Study –
250 Unit Multi-Family Building

Five Story Mid-Rise

Apartments
(250) UV Angel Air Units - $462,500

Common Areas
(60) UV Angel Air Units - $111,000

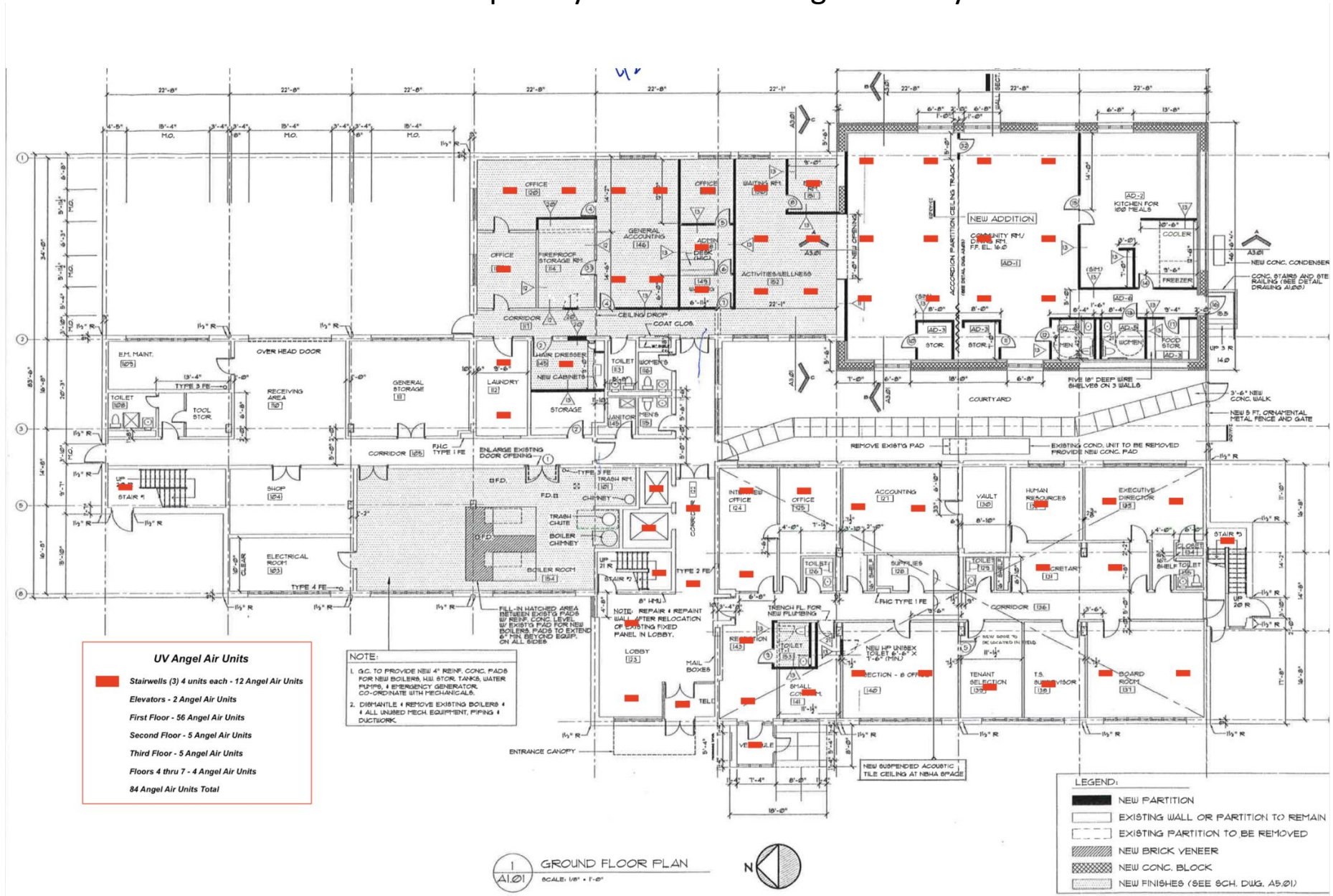
310 Units Total - $573,000

Clean Air Financing*

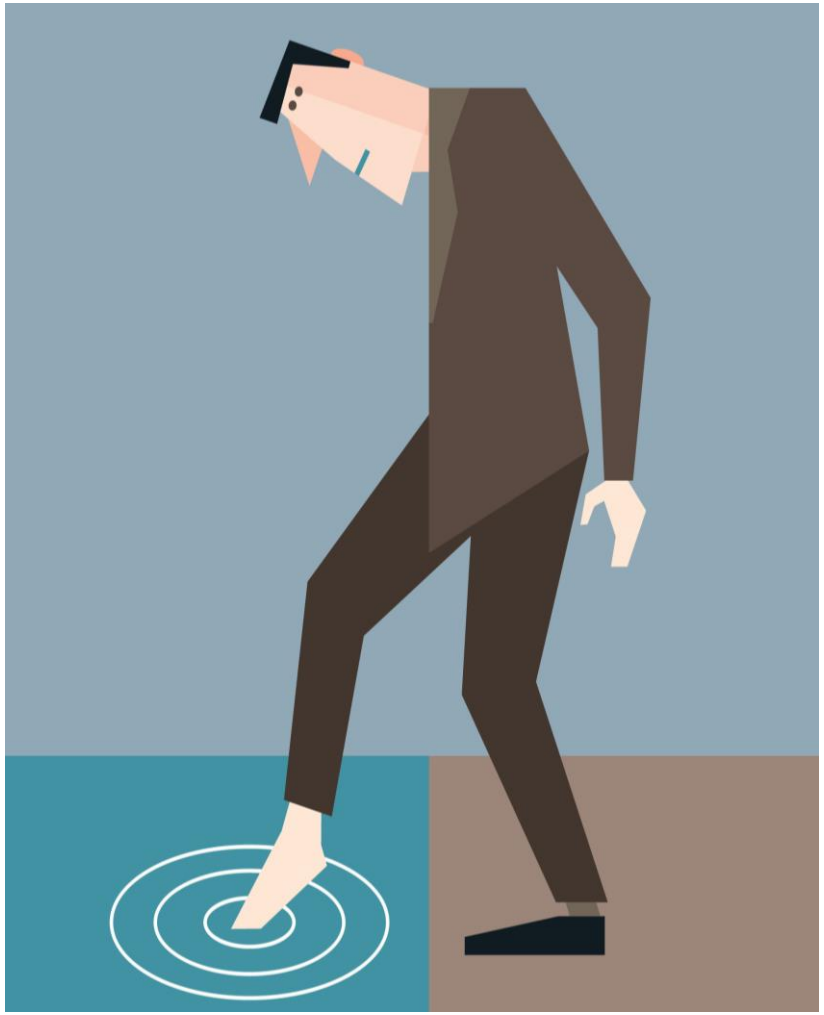
Zero upfront cost | 100% Financed
60-month term / 2.78% APR
$10,197.40 per month

*Financing will vary based on sale amount and current rate.

Sample Layout for a Housing Authority



Unprecedented Times for Multifamily and Commercial Property Owners



- **What is a property owner's risk?**
  - **A risk which could be foreseen by a reasonable person is a risk for which an owner can be held liable.**
- An unforeseen risk for which an owner is warned, can be a source of liability, such as HUD, Federal (CDC), and State or county notices related to COVID.
  - Coronavirus warnings have been so strident that no one can claim not to have known the risk.
  - Owners who fails to act and warn residents are risking not only a lawsuit but also the lives and health of residents.
- Coronavirus is most likely to spread not through maintenance faults, but through the risky behaviors of people.
- Some states have new legislation or executive orders giving businesses immunity from liability for claims related to COVID-19. Protections vary by Industry, for example:
  - **Healthcare.** In California, hospitals and healthcare professionals have no liability absent a willful act or omission (Cal. Gov't. Code § 8659).
  - **Adult Care.** In New York, nursing homes are provided the same liability protection as offered to healthcare facilities (N.Y. Pub. Health Law §§ 3080 to 3082).
  - **Hospitality.** In Nevada, Senate Bill 4 protects hospitality businesses, including hotels and casinos, and employees.

Risk Mitigation Strategies

- **We don’t know, what we don’t know about the future of pathogen infections**.
  - McKinsey and Company article entitled “*Not the last pandemic: Investing now to reimagine public-health systems”.*
- **Communicate with residents.**
- **Comply with city, county, State and Federal laws/regulations.**
- **Document! Document! Document!**
- **Know what is covered/what is not in your insurance policies.**
- **Residents to sign a liability waiver and consult with your attorney.**
- **Too soon to know how courts will interpret COVID-19 practices for Multifamily and Commercial Property Owners as casualty events for insurance purposes. COVID case law is still evolving.**

CARES ACT Funding

Clean Air USA

- CARES Act signed into law on March 27,2020
  - $685M for Public Housing; PHAs received funding in May
- CARES Act gives TDHEs and their government-owned enterprises access to $8 billion to support COVID-19 response
  - Prevent, prepare for, and respond to coronavirus, including to maintain normal operations under ICDBG Program
  - HUD - $200 million for the NAHADSA Block Grant program
  - $100 million to the Indian Community Development Block Grant to respond to COVID-19 in tribal communities
- Congress appropriated additional funding for several Multifamily Housing programs
  - Increased rental subsidy to cover tenants' loss of income
  - HUD authorized designated funding to address unusual operating costs
  - $1 billion to support Project-based Rental Assistance properties (Section 8 project-based properties),
  - $50 million to support Section 202 Supportive Housing for the Elderly properties (with $10 million of that amount for additional service coordinator support), and
  - $15 million for Section 811 Supportive Housing for Persons with Disabilities.
- **https://www.fema.gov/disasters/coronavirus/supplemental-resources**

CARES ACT Funding

Clean Air USA

- **PIH Notice 2020-05** provide administrative relief and allow for alternative approaches to various aspects of PHA, Tribal, and TDHE operations to continue using available funding to house families, keep families in their homes, and conduct critical operations that can be done remotely and safely.
  - **Permits eligible use of IHBG funds to** for necessary equipment, supplies, and materials, including personal protective equipment
- **PIH Notice 2020-24** September 14, 2020 extended deadline (**PIH-2020-07)** to December 31, 2021
  - Eligible uses include, but not limited to:
  - Creation or update of infectious disease outbreak plan;
  - Sourcing and purchasing personal protective equipment for PHA staff;
  - Coordination with providers of services needed to support residents as a result of coronavirus, including cost of delivery of goods, supplies, and equipment;
- **MF Notice 2020-11** announces continued availability of supplemental operating funds for Section 8, Section 202, and Section 811 properties to prevent, prepare for, and respond to the coronavirus disease discovered in 2019 (COVID-19).
  - Office technology and other equipment needs to facilitate social distancing
  - Cleaning and disinfecting common areas and property management offices as a preventative measure.

Delivery of Goods, Supplies, and Equipment

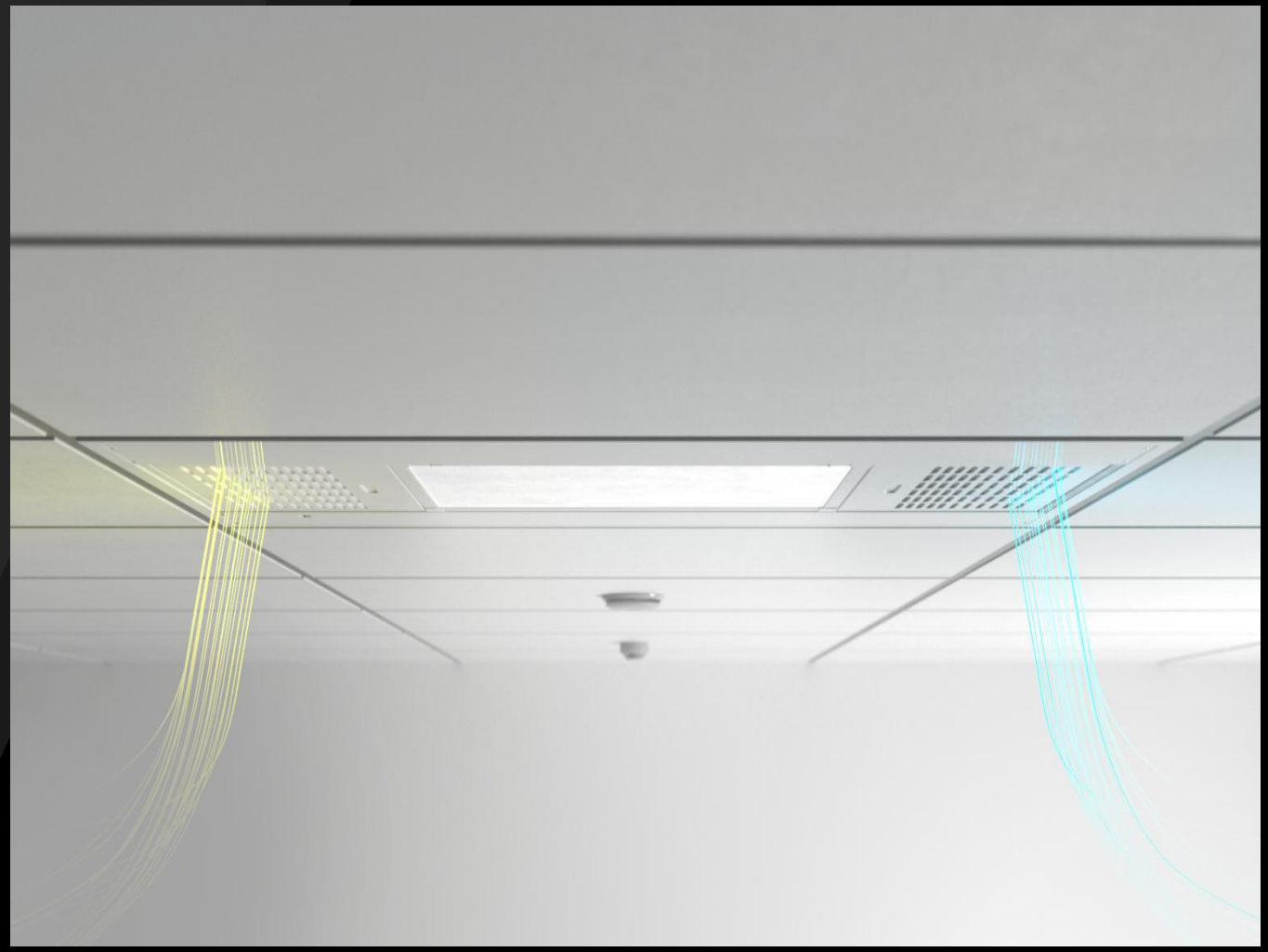
FAR (2 CFR 200.320); HUD Handbook 7460.8 REV 2 (2/2007);

- Traditional competitive bid process
- Noncompetitive Proposals – The public exigency or emergency for the requirement will not permit a delay resulting from publicizing a competitive solicitation.
- Consult with your procurement specialists

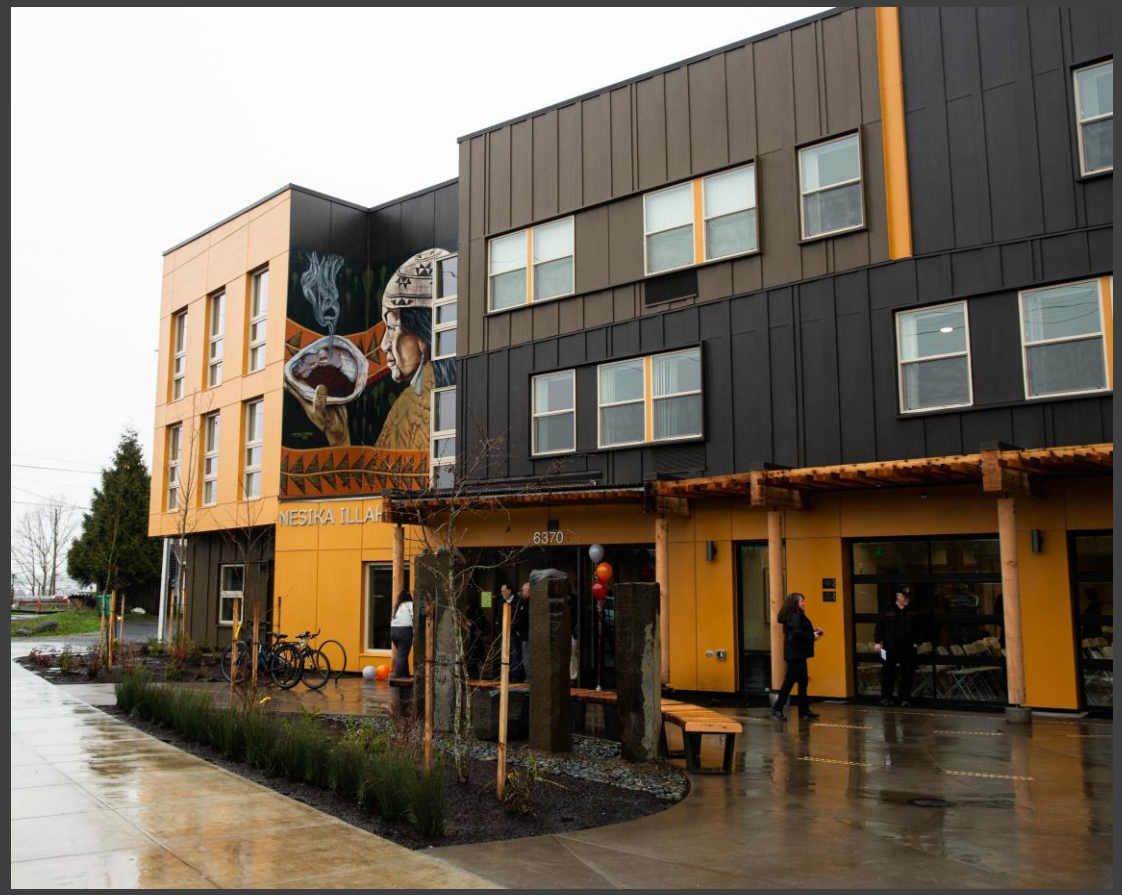
Clean Air USA

Compelling Factors for Considering UV Angel

- 40 years of use in the medical facilities, hospitals, etc.
- Extensive research on the efficacy of UV technology
- Provides ease of installation and maintenance
- Ceiling installation - Non-intrusive to business working environment (e.g., tripping hazard; frees electrical receptacles; 24/7 operation)
- UV Angel's compliance to CDC guidelines
- Provides peace of mind for management and staff
- Brand name recognition of clients employing UV Angel technology (St. Jude's Children's Hospital, ESPN, Starbucks, Tishman Speyer, Phillips Edison, McDonald's, VA Hospitals and Nursing Homes)



UV Light Creates Healthier Buildings for Residents and Staff



Clean Air USA

Pathogen Control Technology

Ask the Experts - Questions and Answers

For Free Project Estimates – Contact Alan Watts

Contact: Alan Watts
alan@cleanairusa.com
914-525-4444