

Building Confidence with Indoor Air Quality

IAQ Considerations, Technologies and Strategies for Opening Up Your Campus

Webinar hosted by Trane's Greater Northeast Region

August 6th, 2020





Today's Speakers





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Agenda

- IAQ Guidelines and Considerations
- IAQ Systems and Technologies
- IAQ Control Strategies
- Funding Considerations
- Trane IAQ Assessment





IAQ Guidelines & Considerations



What Makes an Building "Healthy"

Harvard Business Review

Minimizing Risk and Maximizing Business



57% of all sick leave is attributable to poor ventilation

Benefits from better ventilation are estimated at \$7K per person per year



Healthy Buildings are the New Minimum

https://hbr.org/2020/04/what-makes-an-office-building-healthy

Ventilation Has Largest Impact on Infection Probability

Ventilation Effect on Infection Probability



Increasing the amount of outdoor air to the space can materially reduce the rate of infection for small airborne particles.



Temperature and Humidity Influence Droplet Nuclei How can we mitigate?



- □ Various studies indicate the overall survivability, transmissibility and host infectivity decrease with a rise in %RH.
- Some studies indicate that relative humidity that is toward the higher end may allow virus to remain dormant longer and may impede the effectiveness of some disinfection strategies.



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ASHRAE Position Document on Infectious Aerosols

Conclusions – 4.1 ASHRAE's Positions

The following modifications to building HVAC system operation should be considered:

- Increase outdoor air ventilation...
- Improve central air and other HVAC filtration to MERV-13...
- Keep systems running longer hours...
- Add portable room air cleaners...
- Add ...UVGI devices in connection to in-room fans in high-density spaces...
- Maintain temperature and humidity...
- Bypass energy recovery ventilation systems...

https://www.ashrae.org/file%20library/about/position%20d ocuments/pd_infectiousaerosols_2020.pdf

https://www.ashrae.org/technical-resources/resources



Why is a Comprehensive IAQ Strategy Important Today? The Four Key Areas of IAQ





Poll Question



IAQ Systems & Technologies



IAQ Systems & Technologies to be Reviewed Today

- Filters
- Bipolar Ionization
- Ultraviolet Germicidal Irradiation (UVGI)
- Photocatalytic Oxidation (PCO)



Filters







Cartridge (MERV 8-16)

Best	High Efficiency Particulate Filter (HEPA)
Better	Mechanical Particle Filtration (MERV 9-16)
Good	Mechanical Particle Pre-Filter (MERV 1-8)



MERV 13 Filter

Effect on Influenza A Virus





Source: Modeling Immune Building Systems for Bioterrorism Defense; Kowalski, Bahnfleth, Musser, Journal of Architectural Engineering, June 2003, v9(2), pp222-227.

* HEPA was not part of the study above. It's a graphical representation of 99.97% efficiency HEPA filter (defined by DOE) with particulates in 0.3µm which is the toughest size to catch.

Bipolar Ionization

- \checkmark Ion Production Produces both Positive and Negative Ions
- Pathogen Control Ions kill Virus, Mold/Fungus and Bacteria in the plenum, ductwork & the work/living space.
- Allergen Control Ions allows particles to agglomerate making particles larger for more effective filtration.
- Odor & Smoke Control Odors & smoke are converted into atmospheric gases.



Ultraviolet Germicidal Irradiation (UVGI)

Microbiological reduction

- Effectiveness is dose-related (intensity x time)
- "Destructive" dosage varies widely by species of microbe
- Designed for specific duty
 - o Surfaces: low intensity, effective
 - o On-the-fly reduction consult with manufacturer and test data





virus

vegetative bacteria

mycobacteria

bacterial spores

fungal spores

Least

susceptible

Photocatalytic Oxidation (PCO)

- Combines UV and Titanium Dioxide
- UV light creates photons, a form of light energy
- Photons are "catalyzed" by the TiO₂ forming hydroxyl radicals
- Radicals last less than 1/10 of a second and react with carbon-based compounds
- Organic compounds (anything with a carbon atom) can be reduced to CO₂ and H₂O







Graphic Courtesy of Steven Welty, Green Clean Air © 2010

Control Strategies for IAQ



Why is a Comprehensive IAQ Strategy Important Today? The Four Key Areas of IAQ





Controls Strategies for IAQ Dilute: Increase Ventilation with Outdoor Air



- Disable demand-control ventilation
- Raise minimum outdoor air damper (or air flow) setpoints
- Operate mixed-air air-handling units with 100% outside air (no recirculation), when conditions allow
- Keep ventilation system operating 24/7
- Implement a pre-occupancy purge sequence to flush the building with outside air



Controls Strategies for IAQ Exhaust: Keep Local Exhausts Running



• Keep restroom exhaust operating 24/7



Controls Strategies for IAQ Contain: Control Indoor Humidity



- Install humidity sensors and update control sequences to control indoor humidity in a desired range
- Disable discharge air temperature reset for VAV systems during humid weather
- Ensure hot water heating system is enabled to provide reheat humidity control





Based on Trane analysis of industry guidelines from ASHRAE, REHVA, CDC

Secure Remote Access

Why is Remote Access Important?

A network-based Trane® Tracer® Building Automation System (BAS) has the power to transform the way your building is operated. It allows authorized personnel to manage the systems that keep your building comfortable, whether they are onsite or offsite.

- Your facilities management team will be able to monitor the system 24/7, even when they're away from the building
- Trane technicians can service your systems faster, and more cost effectively, even when they are not at your building, to preempt any potential occupant comfort complaints

Simplified and Secure

Remote access to the Trane® Tracer® BAS gives authorized employees—both your company's and Trane's service personnel—greater flexibility to check on the Building Automation System when they are away from the Building Automation System.



Intelligent Services

Turning building data into an action plan

- Reduce energy use and operating costs
- Identify actionable insights
- Continuously improve building performance







Poll Question



Funding Considerations



College Challenges

COVID-19 Roundup: Outbreaks and iPads

Two colleges report outbreaks and a third reports its president hospitalized. Duke adjusts plans.

Washington State U will go online while backpack. Bowdoin will issue iPads.

By Lilah Burke // July 27, 2020



No Boyfriends or Girlfriends in Dorm Rooms. Limited Use of Dining Halls. No Parties: What Colleges Plan for Campus

SHEILA NOONAN | JULY 27, 2020 | EDUCATION, CORONAVIRUS IN NJ

Based on state guidelines, schools have been making plans for life with the coronavirus. 'We're in a fluid situation that could change at any time'

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New Jersey Higher Education Developments



A STUDENT-CENTERED VISION FOR HIGHER EDUCATION



Caring Funds for New Jersey Independent Higher Education Institutions

- CARES Funds for Higher Education
- CARES Beyond
 - Federal Competitive Grants
 - Private Sector Funds COVID 19
 - Other Bonds, Loans

CARES Higher Education Grants

Higher Education Emergency Relief Fund (HEERF)

\$14 Billion Colleges and Universities 9.30.2022

Governor's Emergency Education Relief Fund (GEERF)

\$3 Billion

New Jersey \$68,864,994
Schools, Colleges and Universities
9.30.2022

CARES Project SERV

- \$100,000,000 to prevent, prepare, and respond to COVID-19
- States, school districts, and postsecondary institutions
- Later this year
- Focus on significant unmet needs

Cares Competitive Funds

Education Stabilization Fund-Reimagining Workforce Preparation Grants (ESF-RWP)

- Total Funds: \$127,500,000. Grants up to \$20,000,000.
- Eligibility: State Workforce Boards
- Deadline: August 24, 2020
- Programs to build new capacity within the state to offer short-term postsecondary programs that are responsive to the needs of individuals and to more rapidly adapt and evolve to ever changing workplace and community needs.
- <u>https://cte.ed.gov/grants/funding-opportunities</u>

Other Federal Sources

• U.S. Department of Treasury

- New Jersey Total Allocation \$3,444,163,690.30
- <u>https://home.treasury.gov/system/files/136/Payments-to-States-and-Units-of-Local-Government.pdf</u>

• U.S. Department of Commerce

- \$1.5 Billion
- <u>http://www.eda.gov/funding-opportunities/index.htm</u>

• U.S. Department of Homeland Security

- More than \$45.8 billion primarily to the Federal Emergency Management Agency (FEMA)
- Nearly 90% focused on the areas of Architecture Engineering and Construction; Medical and Scientific Equipment; and Health Services

U.S. Department of Health and Human Services

- New Jersey Allocation \$63 Million
- State by State Use of Funds Child Care and Development Block Grant
- <u>https://bipartisanpolicy.org/blog/state-by-state-use-of-cares-act-supplemental-ccdbg-funds/</u>

Funding Beyond



https://www.forbes.com/sites/ericbrotman/2020/03/30/covid-19-crashed-the-market-now-what-should-i-do/#39aa8b1d7cc3

Strengthening Community Colleges Training

- Purpose: Builds the capacity of community colleges to collaborate with employers and the public workforce development system to meet local and regional labor market demand for a skilled workforce.
- Total Funds: \$40,000,000, Awards up to \$5,000,000
- Applications due: October 8, 2020
- Eligible applicant: A single institution lead applicant *must partner* with one or more workforce development system partners, and employer partners including and public and private, non-profit four-year IHEs
- URL:

https://www.dol.gov/sites/dolgov/files/ETA/grants/pdfs/SCC%20FOA-ETA-20-07.pdf

Funding: Grants/Loans and Government Relief

- U.S. Small Business Administration (SBA) Coronavirus Relief Options
- State of New Jersey Economic Assistance for Businesses portal (includes non-profits). In particular, see the <u>eligibility wizard</u> covering many major state and federal relief programs. Many programs are in high demand, and some are oversubscribed but with a waitlist, so consider applying to be considered if more funds become available. It may be possible to receive <u>technical assistance in completing the application process</u>.
- Federal CARES Act Stimulus Summary from the Center for Non-Profits
- <u>Summary of Available Loans for Nonprofits in the CARES Act</u> from the National Council of Nonprofits
- Garden State Relief Fund from New Jersey Community Capital
- Employee Retention Tax Credit under the CARES Act FAQs from the IRS
- <u>Paycheck Protection Program Toolbox</u> from FMA, including their guide on how to apply.
- Paycheck Protrection Loan Forgivness Implementation Guide from Mercadien
- Paycheck Protrection Loan Forgivness Application
- <u>COVID-19-Related Tax Credits for Required Paid Leave Provided by Small and</u> <u>Midsize Businesses</u> - IRS overview of payroll tax credits available to certain employers providing paid leave under the Families First Coronavirus Relief Act (FFCRA)
- The IRS has extended key filing deadlines, including Form 990, from May 15 to July 15.
- <u>Paul, Weiss COVID-19 Relief Guide</u> comprehensive listings of COVID-19 government relief actions. <u>Federal</u> <u>New Jersey</u>

https://www.njnonprofits.org/COVID-19.html#Foundations

Coronavirus (COVID-19) Relief Center

Relief Center | Federal | New York State | New York City | California | Washington State | Other States | Charitable



New Jersey

These resources – like the public health crisis itself – are constantly evolving and are only current as to the date of publication. This page was last updated on July 14, 2020.

We recommend that you monitor this site, as well as the sites referenced in these resources, for updates and changes as we expect the situation and solutions to change over the coming weeks and months. For information on specific programs, we encourage you to visit the websites of the organizations or government entities that are responsible for the relief.



Private Funders Step Up

- George L. Aden Trust, Deadline August 15
- Baruch Fund, Deadline Ongoing
- Arthur Vining, Letters of Inquiry August 28
- The Lebensfeld Foundation, Deadline Ongoing
- E.J. Grassmann Trust, Deadline October 15
- Green Family Foundation, Deadline August 31
- Insperity Corporate Contributions Program, Deadline Ongoing

Funding: NJ Relief Funds and Philanthropic Response

I number of New Jersey funders have set up special COVID-19 elief funds to respond to the financial need of the New Jersey non profit community and residents during this pandemic. Additionally, everal major funders are also loosening the restrictions on their trants and reporting requirements. Check with your funders and back here for updates.

Compilation of NJ-focused response funds from the Council of New Jersey Grantmakers

Member Actions - A summary of responses from the Council of New Jersey Grantmakers

New Jersey Pandemic Relief Fund

Civic Spring Project

South Jersey COVID-19 Response Fund from the Community Foundation of South Jersey



Congress considers COVID recovery bond program

Jul 22nd 2020 | Posted in Mary Scott Nabers' Insights, Opportunities by Mary Scott Nabers





New Jersey

On April 3, the **New Jersey Economic Development Authority** (NJEDA) launched several COVID-19 relief programs for small businesses. The \$10 million **New Jersey Small Business Assistance Loan** program provided working capital loans of up to \$100,000 to businesses and nonprofits with less than \$5 million in annual revenues. Loans have a 10-year term and are interest-free for the first five years, then no more than three percent annually after that. Repayment is deferred for 12 months. Certain types of businesses are not eligible, including adult, gambling, and auction businesses, traveling merchants, and Christmas tree sales. The \$5 million **New Jersey Small Business**

https://ilsr.org/information-on-covid-19-small-business-assistance-programs/



Loans Available for Nonprofits in the CARES Act, as Amended

Program	Paycheck Protection Program (Emergency SBA 7(a) Loans) Secs. 1102, 1106	Expanded EIDL & Emergency Grants (SBA 7(b) Loans) Sec. 1110	Mid-Size Loan Program Sec. 4003
Description	Emergency loan program for nonprofits and for-profit entities to secure funds to pay staff and operating costs for 24 weeks, and secure full loan forgiveness under certain circumstances.	Existing Economic Injury Disaster Loan (EIDL) program expanded to more for-profit entities, applies looser credit standards, and creates a rapid grant procedure.	Largely undefined loan program to be created by the Treasury Department to fill the gap between the Paycheck Protection Program for smaller employers and the industry stabilization loans to big business.
Size Eligibility	500 or fewer employees	Existing EIDL limits for nonprofits*	Between 500 and 10,000 employees
Dollar Amount	The lesser of \$10 million or 2.5 times the average total monthly payroll costs from the one-year period (look back) prior to the date of application. Alternative look-back periods may also be selected.	Normal EIDL loans available up to \$2 million (limited by SBA). EIDL advances of \$10,000 paid within 3 days (limited by SBA to \$1,000 per employee up to limit).	Unspecified
Loan Processor	Local financial institutions	Small Business Administration	Local financial institutions
Nonprofit Eligibility	Must have been in operation on 2/15/2020 and had paid employees and/or paid independent contractors. Expressly available for charitable nonprofits with 500 or fewer employees, but requires that employees of affiliated nonprofits may be counted toward the 500 employee cap, depending on the degree of control of the parent.	In operation before 1/31/2020. Loans can be based solely on credit score. Existing EIDL program applies to "private nonprofit organizations" that excludes religious institutions and some other charitable organizations.	Expressly applies to "nonprofit organizations"
Personal Guarantee	No collateral or personal guarantee required.	Waives personal guarantee up to \$200,000, and requirement of inability to obtain credit elsewhere.	Unspecified
Certification	Good-faith certification that economic uncertainty makes request necessary; funds	Self-certification under penalty of perjury.	Good-faith certification that need is based on economic conditions; funds to be used

https://www.councilofnonprofits.org/trends-policy-issues/loans-availablenonprofits-the-cares-act-public-law-116-132

Still Caring, Still Funding

Welcome to RFPMatch OnDemand

Your resource for All Things Funding

Fastest way to unlock \$114,336,924,344

Advanced Technological Education (ATE)

Grant State(s) Category: Competitive All Type: Federal Source: National Science Foundation

View All Grants Visit Website

Cluster(s) Well Rounded, College & Career Readiness, Professional Development, Instruction

Award

\$66,000,000

Timing Published Date:

Published Date: 07/16/2018 Deadline: 10/01/2020

Eligibility

- Institutions of Higher Education (IHEs)
- Non-profit, Non-academic Organizations
- For-profit Organizations
- State and Local Governments State educational offices or organizations and local school districts
- Unaffiliated Individuals
- Foreign organizations
- Other Federal Agencies

IAQ Assessment



Summarizing IAQ

🔫 Dilute

- Disable demand-controlled ventilation (DCV)
- Raise minimum outdoor-air damper (or airflow) setpoints
- Operate mixed-air air-handling units with 100% outdoor air (no recirculation), when outdoor conditions allow
- Install additional cooling and/or heating capacity (or a Horizon packaged dedicated OA unit), if needed to enable 100% outdoor air
- Keep ventilation system operating 24/7, even if at lower airflows
- Implement a pre-occupancy purge sequence to flush the building with outdoor air



• Keep restroom exhaust operating 24/7



- Install humidity sensors and update control sequences to limit indoor humidity to less than 60% RH
- Disable discharge-air temperature reset for VAV systems during humid weather
- Ensure hot-water heating system is enabled to provide reheat for humidity control, if necessary



- Upgrade filters to MERV-13 (or higher, if possible) and ensure effective air seals
- Add portable room air cleaners with HEPA or high-MERV filters
- Add UVGI devices in ductwork, airhandling units, or upper room
- Retrofit air-handling unit with Trane Catalytic Air Cleaning System (TCACS) or other suitable air cleaning device

Based on Trane analysis of industry guidelines from ASHRAE, REHVA, CDC



Building Confidence, Resilience and Sustainability



Trane[®] Indoor Air Quality Assessment

- Fact based, data-driven analysis of your building's indoor air quality
- Aligned to latest CDC and ASHRAE guidelines for operating HVAC systems
- Recommend ways to improve IAQ today
- Highlight opportunities for future investment



Why an IAQ Assessment?



Confidence

Tenants, employees, customers want to know buildings leaders are preparing facilities for their return



Resilience

Today it's a global pandemic; what's next? IAQ is an ongoing priority for building owners



Sustainability

Ensure clean indoor air efforts are in tune with building sustainability goals



Wrap Up / Q&A

Contact Us: GreaterNortheastRegion@trane.com



The transmission of Covid-19 may occur in a variety of ways and circumstances, many of the aspects of which are currently not known. HVAC systems, products, services and other offerings have not been tested for their effectiveness in reducing the spread of Covid-19, including through the air in closed environments





