

The Utah Society For Health Care Engineering is committed to developing long-range plans and programs that meet the needs of members and the future challenges of the health care facilities management profession.

A MESSAGE FROM USHE President Ken Casper

Where has 2020 gone? I think almost all of us can say that 2020 has not gone anything like we envisioned, expected, or planned. Covid 19 has dramatically impacted not only Healthcare but every business across the United States and World. I am immensely proud of all our members and the challenges you have had to endure over the past year. We have excelled in supporting our healthcare organization beyond the normal operation level through Emergency Management, Engineering, or Maintenance. I am very honored to work with some fantastic USHE Board of Directors as well. While we could host the Winter Conference just before CV19 took over, we, unfortunately, had to cancel both the Spring and Fall 2020 Conferences. The Board members are working strategically to put together the next Winter Conference by virtual tour. Throughout the year with Look n Learns and other web-based training, USHE is committed to providing members with continued support and resources during these challenging times. We all hope to be once again able to gather in person and shake hands with our comrades.

I want to give a big thanks to Larry Knowlden for his leadership as President of USHE for the past two years. Under Larry's watch, USHE has made several large impacts on the national level with ASHE. USHE not only has received the 2019 Platinum Elite status recognition for all the support we provided to members, but it also shows the commitment from our volunteer Board of Directors. Countless hours go into planning, preparing, and executing our goals to support members. Larry was also the recipient of the 2019 Region 9 Engineer of the Year Award from ASHE. Not an easy accomplishment from a small market Chapter when going against chapters like California. Congrats, Larry, on these achievements. We also had several local hospitals reach the Energy to Care Award for 2019, another national recognition that shows our commitments.

Our USHE Board is growing. We will be adding more members to the Education Committee (the heart of the USHE Chapter). I do need help from each of you as members, however. If any member has a recommendation, suggestion, thought, or idea, we are open to them anytime. No suggestion goes without consideration. Please reach out to me or

any Board Member. I look forward to serving each of you and all the great sponsors in 2021.

I am very honored to serve as your USHE President. The opportunity to work alongside some very amazing people like the Board of Directors, Professional Members, and our fantastic Business Partners (sponsors) without each of you, we have no USHE Chapter. 2021 will continue to be a challenge for all of us; however, that challenge and others that may come along, we, together, will overcome as we are Healthcare Engineers who make a difference every day to take care of our Hospitals, patients, and staff.

I hope that you can find time and chances to be close to your family this holiday season. I know it will be different and limited for many of us as we follow the CDC and Governor's direction on safety and social distancing. Santa will still visit, I am told! Happy Holidays and I look forward to connecting with all of you again soon.

Sincerely,

Ken Casper, **USHE President**



PG2 / REDUCING
TRANSMISSION OF THE COVID 19
VIRUS WITH A BUILDINGS HVAC
SYSTEM



PG6 / ASHE OPPORTUNITIES
ASHE Annual On-Demand, ASHE
YOUTUBE Channel, and Energy-
to-Care New Tools



PG8 / USHE CONFERENCE
USHE Winter Conference Update
and Monthly Look & Learns



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Reducing Transmission of the Covid 19 Virus with a Buildings HVAC System

Mechanical systems installed in offices, schools, hospitals, and other buildings are designed to control temperature, hold specific levels of relative humidity, and provide proper ventilation among other things. The spread of COVID-19 has many building owners and occupants asking what can be done to the mechanical system to help prevent the spread of the COVID-19 virus. Most people want assurance that they are being protected as much as possible. The science is still evolving, and sometimes well-meaning politicians share information that, at best, confuses the rest of us. HVAC engineers are not virologists, but they do have extensive experience with such things as building pressurization, filtration, humidification and ventilation rates. Proper implementation of these concepts may help control the spread of air-borne diseases such as COVID-19. This article explores these mechanisms. For clarity's sake, we will mostly stay away from the math, rather just go through broad concepts.

INDUSTRY STANDARDS:

ASHRAE (American Society of Heating, Refrigeration, and Air Conditioning Engineers) and FGI (Facility Guidelines Institute) are the industry leaders setting design standards. ASHRAE has made the following official statement:

ASHRAE leadership has approved the following two statements regarding transmission of SARS-CoV-2 and the operation of HVAC systems during the COVID-19 pandemic.

Transmission of SARS-CoV-2 through the air is sufficiently likely that airborne exposure to the virus should be controlled. Changes to building operations, including the operation of heating, ventilating, and air-conditioning systems, can reduce airborne exposures.

Ventilation and filtration provided by heating, ventilating, and air-conditioning systems can reduce the airborne concentration of SARS-CoV-2 and thus the risk of transmission through the air. Unconditioned spaces can cause thermal stress to people that may be directly life threatening and that may also lower resistance to infection. In general, disabling of heating, ventilating, and air-conditioning systems is not a recommended measure to reduce the transmission of the virus.

If that statement felt a little evasive to you then we agree. Even the experts are yet unsure on an exact answer. Some benefit can be realized by implementing time honored practices. The below experience proven mechanisms can help to reduce the spreading of the COVID-19 virus using a building's HVAC system. Some are easier to implement. These methods are as follows:

1. Ventilation.
2. Sterilization.
3. Air stream filtration.
4. Room filtration.
5. Humidification.

VENTILATION:

Outside air, conditioned and supplied to the inside of a building, is a particularly good way to flush out pathogens from a space. However, the heating and cooling of outside air is often the single highest consumer of energy for buildings, therefore it is almost always reduced to the minimum required by code. Offices typically process about 10% outside air with 90% of the air being recirculated. Yes, that means you are rebreathing your own and other people's previous breathing air. Hopefully it has been filtered and diluted by outside air. School buildings generally bring in 15-20% outside air as required by ASHRAE Standard 62.1 due to higher occupant densities. 80% of the air in schools is usually returned to an air handler, filtered, and then recirculated to the building occupants. Hospitals have the highest outside air use at around 25-30% outside air. This is due to the standards set by FGI and ASHRAE Standard 170 which require higher outdoor air processing rates. FGI specifies both a "minimum total air changes" and a "minimum outdoor air changes" airflow values be provided. The term "Minimum total air changes" refers to all air supplied into a space and may include both recirculated and outdoor air. The phrase "Minimum outdoor air changes" includes only the amount of outside air being drawn from the exterior and then supplied to a space. An air change rate is defined as the volume of air inside a space and completely replaced in an hour's time. A patient room, for example, requires (6) total air changes and (2) outdoor air changes per hour. When the rate of outdoor air changes is increased, recirculated air is in turn reduced. Increasing the outdoor air changes seems like an easy and desirable mechanism especially right now to reduce COVID-19 transmission. However, deciding to increase the amount of outdoor air change rates on a building after design is usually not possible because that building's heating and cooling system was sized on

the minimum outdoor air change rates originally. That is, boilers, chillers, coils, pipes, ducts, and other mechanical elements are specially sized to handle only the minimum outdoor air rates on a building. So, for example, it might be desirable to increase the outdoor air rate of an office building from 10% to 20%, but so doing might double the heating and cooling loads for which the boiler, chiller or other system was never sized. Off-hour flushing may achieve a similar result, however. Off-hour building outside air flushing can occur when the building is unoccupied. That is, the supply of outside air to spaces is maintained at normal levels 24/7 instead of cutting back to match decreased building occupancy rates. Building flushing can be accomplished simply by changing control sequences rather than upsizing equipment so it is an amazingly easy solution.

For the gold standard for controlling COVID-19 transmission we can refer to the FGI Guidelines. All Rooms (Airborne Infection Isolation Rooms) are spaces where patients who have possible air-borne communicable diseases are hospitalized. They exist primarily to protect hospital staff and other patients. All Rooms require the following:

1. (12) minimum total air changes per hour.
2. (2) minimum total air changes per hour.
3. Hold the room under a constant negative pressure, usually around -0.02 in WC.
4. Dedicated exhaust systems.
5. 100% room exhaust.
6. 0% room air recirculation.
7. Electronic monitoring of pressure.

All Room HVAC standards are too stringent to be used on offices, schools or even most hospital rooms as the 100% exhaust requirement would increase energy use by up to (4) times. Such a standard directly competes with the need to conserve energy and building operational costs. That is, there is a limit to how far we have been willing to go in the past with providing fresh breathing air. Perhaps moving forward this standard will change.

Although it is unlikely that a building's ventilation rate can be increased, proper minimum outside air ventilation can be verified and ensured. Experience has shown that often a building's outside air system has become inoperable due to age or lack of maintenance, or may even have been purposely disabled to conserve energy. Repairing and ensuring that a building's outside air system is providing code-mandated ventilation rates is a way to not only bring in more outside air, but it can be an amazingly simple and cost effective to help control COVID-19 virus transmission. The mechanical system is likely designed to handle minimum outside air, and it should be able achieve it.

STERILIZATION:

Sterilization includes ionization, photo catalytic oxidation, germicidal ultra-violet (UV), and similar processes. These processes kill viruses and bacteria in the air by various means. Usually, the processes include installing an electronic device that has indirect contact with the air stream. Two of the most familiar processes used in the industry include ionization and UV filtration. Ionization includes electrically charged ions that react on a molecular level, killing viruses, bacteria, mold, fungi and removing other harmful particles from the air. Ionization process involves installing an ion generator somewhere in the air stream. The ions sterilize all the air because the ions are mixed right in with the air. The UV process involves exposing the air stream to a UV light. The wavelength of the UV light is such that it destroys pathogens much like how a microwave cooks food. Both ionization and UV sterilization processes are new but popular in the health care industry and are gaining momentum. Sterilization process can be installed readily and sometimes inexpensively because they are added to an existing air system. For example, an ionization system can simply be attached to an air handler cooling coil with minimal system upgrades.

AIR STREAM FILTRATION:

Media, electrostatic and gas phase filtration include process that physically remove particles from the air stream. Most common and familiar is the use of in-air stream media filters. Media filter are installed in line with furnaces, air handlers and other air-moving equipment. When air passes over filters the media traps some of the airborne contaminants reducing the pathogens passed on to the breathing zone. Filters are rated using a MERV (Minimum Efficiency Reporting Value) system. Lower MERV numbers such as MERV 6 are typically installed in residential furnaces. MERV 13 might be normal for a commercial building's air handler. MERV 14-rated filters are installed in

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a hospital. HEPA filters fall in the MERV 17 to 20 range. Often it is reported that HEPA filters are used extensively in hospitals. This is only partially true. HEPA filters are used in pharmaceutical cleanrooms but are usually not installed elsewhere. One may think that an easy way to provide protection from the COVID-19 virus would be to install filters with higher MERV ratings. Filters of existing similar static pressure drop (how hard the fan must push) only may be installed on most air systems. Static pressure values usually increase with a MERV rating increase. Fan motors are installed handling only a maximum specific static pressure therefore additional filtration may not be added without increasing the fan motor size. Electrostatic filters offer the advantage of low static pressure and therefore higher MERV ratings may be achieved by employing them. Installing electrostatic filters in existing can present challenges as they require increased space over the more traditional filter and power. Although installing new filters can be difficult, proper filter maintenance is an easy way to reduce the transmission of COVID-19. As has been stated a percentage of the virus is filtered out and collected on the filter media. Dirty filters sometimes actually improve the capture rate of particles, but only to a certain point. Pushing a filter's particle capture standard beyond the manufacturer's filter static pressure rating results in the reduction of airflow. This, in turn, greatly reduces a space's air change rate. The simple act of replacing filters at the proper time can have a large effect on the building's mechanical system performance including increasing ventilation and, in turn, reducing transmission of the COVID-19 virus. Changing filters can be very cost effective and offers the additional benefit of saving energy over time.

ROOM FILTRATION:

Beyond air stream filtration, room filters may be installed right in spaces. Local room recirculation filtration units are used frequently in the microelectronics industry and even during construction. Room filtration units may boost a room's air filtration rate by recirculating room air and therefore increase the total air filtration of the space. The addition of room filtration units can often be achieved at a moderate cost as changes to existing mechanical systems are not required.

HUMIDIFICATION:

Providing additional building humidity has been shown to separate virus from air molecules via gravity. Adding building humidification can be expensive and increase the maintenance efforts of a large building however adding it for a residence can be fairly cost effective. When the relative humidity (RH) level is maintained above 50% RH it has been shown that COVID-19 transmission is reduced. Unfortunately achieving a 50% space relative humidity level in a dry and cold climate is difficult and can damage building envelopes long term if the building is not properly constructed. While a 50% relative humidity level can be maintained in a humid climate, a likely sustainable relative humidity level in a dry climate is more around 30% RH. The thought is 30% is better than 10% which will happen often during the coldest outside air conditions.

CONCLUSIONS:

There are mechanisms and strategies both simple and complex, which can be implemented in a building's mechanical system to better protect owners and occupants from the spread of the COVID-19 virus including ventilation, sterilization, air stream filtration, room filtration and humidification. Each method may have impacts on other systems so the implementation of any should be carefully considered for viability, cost, and possible impact on other systems.

Ben Davis, P.E., VBFA Consulting Engineers, Salt Lake City, Utah, bdavis@vbfa.com



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- Re-visit and watch educational sessions
- Visit exhibitor booths to see all the resources they have to offer

Attendees can use the ASHE Annual Virtual Conference login link to retrieve on-demand access. Visit <https://www.ashe.org/ashe-annual> to view conference information.

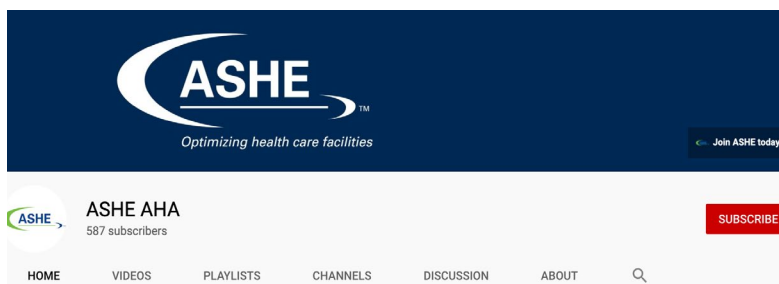


SUBSCRIBE TODAY | ASHE NEW YOUTUBE CHANNEL

ASHE has a new YouTube video series. The ASHE Video Channel provides access to interviews, code interpretations, and other media that focuses on the planning, design, construction, and maintenance of health care facilities.

ASHE has teamed up with Legacy FM to create a new publicly available series of "how to" videos for facilities managers. The first round of videos are now available on ASHE's YouTube channel.

Check out the channel https://www.youtube.com/channel/UCvDY5uRM8LX_2rGGLZfrTSg



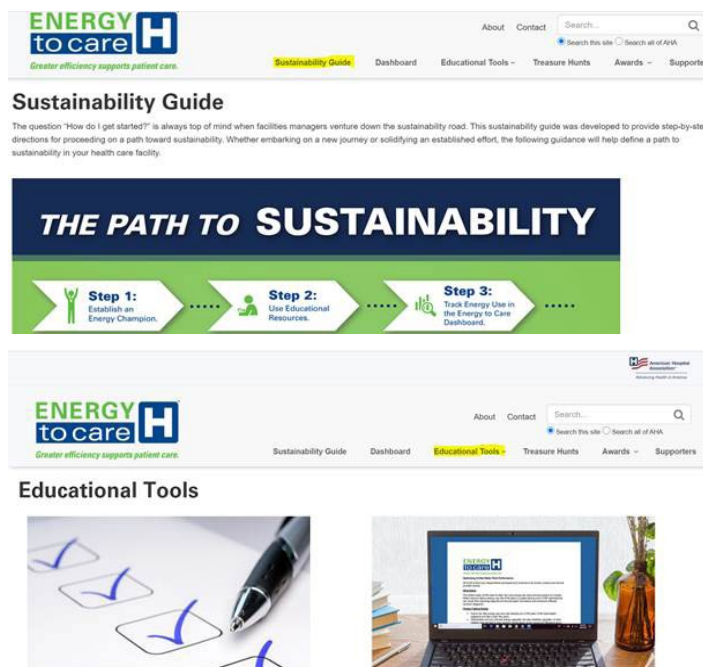
ASHE ENERGY TO CARE

Recently, Energy to Care has added new tools to help track and manage your energy usage that is now available on their website. The Energy to Care program reduces energy reduction in your health care facility by assisting hospitals and health care facilities track, manage, and communicate energy savings.

Here is what is new on ASHE Energy to Care website in 2020:

- All-new robust step-by-step Sustainability Guide.
- Added energy conservation measure suggestions.
- Improved Energy to Care Toolkit.
- Added success stories

Interested in the Energy to Care program for your facility but do not know where to start. Visit <https://www.energytocare.org/> and view step-by-step guides to getting started.





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USHE WINTER CONFERENCE UPDATE

To stay vigilant and conscious of our all members and business partners during the pandemic, we have decided to have a virtual winter conference. The USHE Board of Directors has been closely following the developments of the COVID-19 pandemic, listening to the recommendations from State and local leaders and health departments, and having ongoing discussions regarding our upcoming events.

In our members' best interest, our presenters, and our community, we will have a virtual winter conference. The virtual program will have the same standard of education and training opportunities for our members.

MONTHLY VIRTUAL LOOK & LEARN

Did you know that USHE has monthly Look & Learns free to members?

USHE is providing educational and learning opportunities to our members monthly through Zoom. Be sure to stay up-to-date on our up-and-coming offers. The webinars are hour-long, and you can get CEU credit and cover topics that are beneficial to healthcare engineers, managers, and operations. Some of the topics we have covered are Firestops with STI Firestop, Innovations in Medical Gas Piping with Meditrac, COVID-19 recommendations, healthcare facility updates, and more.

To view our past, look & learn webinars and see what is coming up, visit ushe.org. Stay up-to-date on our monthly virtual look & learns for educational and training opportunities and an opportunity to receive CEU credits.

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Passing of the Baton: USHE has been blessed to have some of the most dedicated and strong leaders. Every USHE president has built a more resilient chapter that continues to be valuable for members to learn and grow in their careers. Larry Knowlden has been one of those leaders. Over his term, he has shown us all how to develop a chapter through guidance. ASHE noticed this leadership, and Larry received the 2020 Regional Leader Award. Along with our chapter earning Platinum Elite status for 2019.

These might be big shoes to fill for our president-elect, Ken Casper, now USHE President. But Ken Casper has shown incredible leadership while being president-elect and will continue to guide the chapter through his term.

It has been a challenging year for all our healthcare facilities, but the one thing that our members can count on is USHE is always here to support you.

USHE EXECUTIVE BOARD MEMBERS

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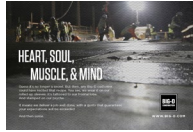
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