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MAY/JUNE 2023
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IAQ REVOLUTION?

As CDC and ASHRAE put forth new recommendations for ventilation in buildings, the industry now finds itself at a post-pandemic crossroads. *See pg. 8*

Clark's Remarks: A Decade of Sustainability

See Page 40

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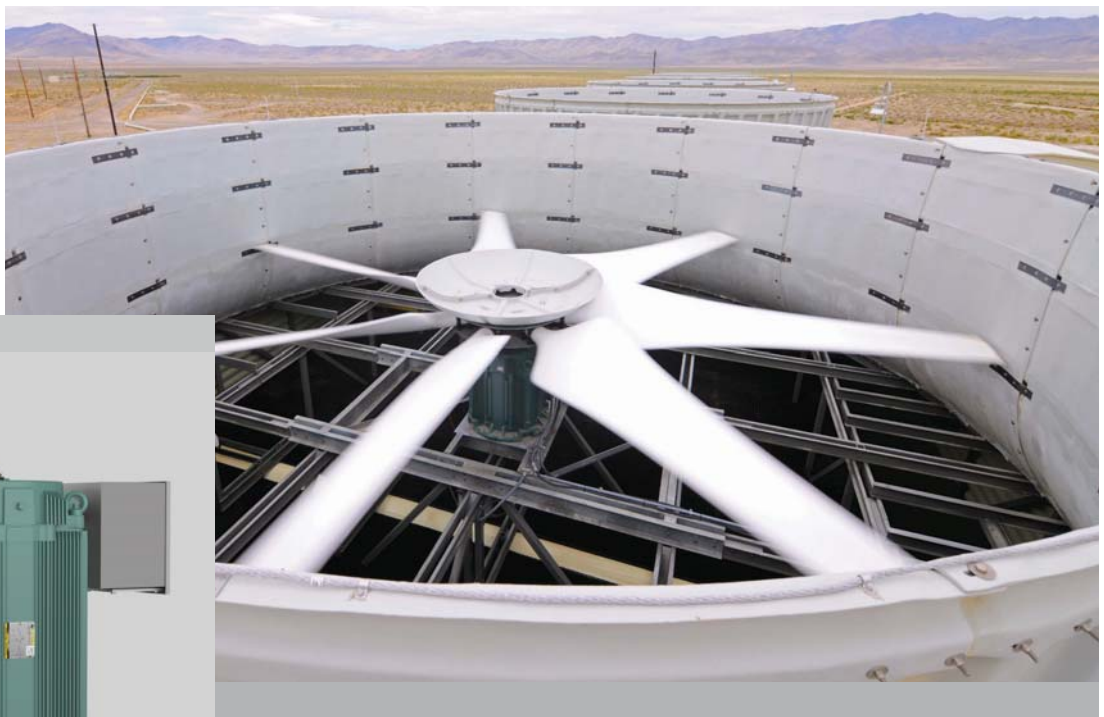

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By Rob McManamy

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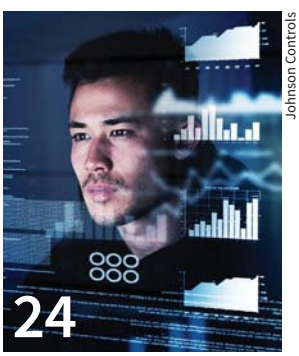

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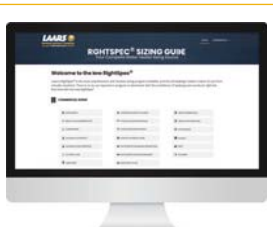

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As Industry Holds Its Breath, Project Pipeline Begins to Slow

MARKETS REPORT With a debt ceiling deal still on hold, anxiety among economists and AEC firms now is rising, raising the stakes for developers and employers, alike.

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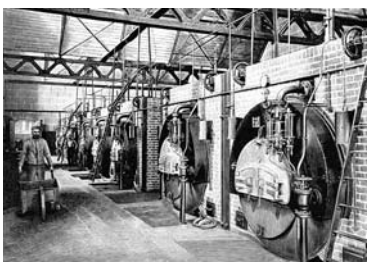

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Silver Linings... and a PSA

As I write this, Congress *still* has not voted to raise the federal debt ceiling. This, despite the most dire warnings of global economic calamity that I have ever heard, coming from the most sober and measured group of experts out there: economists.

Yet here we are, again. Nevertheless, I have faith that our dysfunctional government will avoid the cliff at the last moment and return us all to "normal" in early June.

Of course, one would think after three years of a nerve-wracking and tragic international pandemic, that we might go easy on ourselves this year. But politics is politics.

Rob McManamy
Editor-in-Chief

Still the pandemic also has yielded significant opportunity for positive change, which is cause for hope within both the engineering and public health fields. Indeed, as noted on this issue's cover, some believe we are now on the cusp of an "indoor air quality revolution" that will lead to healthier buildings and occupants worldwide.

Just released in May, new ventilation guidelines for buildings from both the Centers for Disease Control and ASHRAE are now recommending significant increases in the number of daily system air changes, as well as raising the minimum filter goal to MERV-13. *For more details on the CDC and ASHRAE recommendations, see page 8.*

If and when such changes are implemented, they would also go a long way toward coaxing wary, post-pandemic, remote workers back into shared downtown office spaces. That is, if anxious building owners first agree to make such investments. So, it remains to be seen if both the will and the capital will be there in the marketplace to make this transformation a practical reality.

But hope springs eternal, as they say, especially this spring for me.

On that note, as a public service announcement, let me take a detour here to recommend to all our male readers over the age of 50 that they get their prostate checked for cancer sooner than later. The Prostate-Specific Antigen (PSA) test detects cancer cells and it can be easily added to your annual physical exams.

My own latest PSA in January yielded an alarming score, which started me down an unexpected and accelerated medical path this year that resulted in a successful prostatectomy in April. I am now still on the mend, of course, but enormously relieved and thankful to have the cancer (hopefully) behind me and additional years now ahead.

So, please be proactive. Your loved ones and colleagues will thank you.

Not surprisingly, my most recent detour also has had me pondering some bigger questions about life, family, work and priorities. Questions that had already been stirred by the pandemic, of course, but now with an even greater sense of personal urgency.

During my medical leave, I re-watched the 1995 film *The American President* with **Michael Douglas**. At one point, during a press conference, the POTUS character says, "We have serious problems to solve and we need serious people to solve them."

I was struck by that line, in a way that did not hit me 28 years ago when I first saw the movie in an actual theater.

Today, our planet… our nation… our industry… ALL have truly serious problems to solve. Climate change. Public health. Public safety. Sustainability, et al. If anyone tells you that these problems don't need solving or that they can be kicked down the road for the next generation to address, well, then they are not serious people.

As we all know, however, engineers are serious people. They are problem solvers. So when they see something that needs fixing, they want to get right to it. And frankly, that is an essential ingredient of human progress.

So, as we enter another anxious summer, I urge all of you to be proactive in your jobs and communities, to defy the cynics and remind us all that solutions are still possible.

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Big News: CDC Updates Key Recommendations for Improving Ventilation in Buildings

Are we "on the verge of an IAQ revolution"? One expert thinks so, now that CDC and ASHRAE have both issued important new strategies for healthier buildings.

In a significant development coinciding with ASHRAE's own release of its first-ever pathogen mitigation standard (in draft form), the Centers for Disease Control and Prevention (CDC) on May 12 updated its own key recommendations for raising indoor air quality (IAQ) in buildings via improved ventilation.

Among other important strategies, CDC now specifically recommends that buildings have "at least 5 air changes per hour of clean air in occupied spaces." The agency also says that the minimum filter recommendation for such spaces should now be MERV-13.

Taken together, the ASHRAE and CDC actions might put us "on the verge of an indoor air quality revolution and could be among the most important public health victories of the 21st century," wrote **Joseph G. Allen** on May 15 in a *Washington Post* op-ed. An associate professor in public health, Allen is director of Harvard University's Healthy Buildings Program. "This represents a monumental shift. The floor for minimum clean air standards is being raised, beginning to correct a mistake from several decades ago that has had disastrous consequences," he added.

For its part, *The Washington Post*'s own editorial board also weighed in, calling the new CDC updates "pathbreaking new guidance" that "can make a difference the next time a novel virus strikes — or even when a bad flu is going around." The editorial concluded by challenging readers. "Do you know the air exchanges per hour at your workplace or classroom? The CDC is now giving us a yardstick to measure by. Americans should use it."

Of note, the federal declaration of a COVID-19 Public Health Emergency (PHE) officially ended on May 11. The next day, CDC posted its updates. *What follows are just some of those highlights:*

Ventilation Mitigation Strategies

When indoors, ventilation mitigation strategies can help reduce viral particle concentration. The lower the concentration, the less likely viral particles can be inhaled into the lungs (potentially lowering the inhaled dose); contact eyes, nose, and mouth; or fall out of the air to accumulate on surfaces.

Although it isn't known exactly how much the concentration of viral particles in air needs to be reduced to start reducing risk of viral infection, ventilation mitigation strategies still provide a reasonable approach to reducing risk. Not all interventions will work in all scenarios and their selection must be carefully evaluated prior to adoption.

These ventilation interventions can reduce the spread of disease, but they will not eliminate risk completely. These interventions are intended to lower transmission risk by lowering the concentration of infectious aerosols in a room. However, the overall transmission reduction is less likely to apply to people who are very close (e.g. face-to-face) to the infectious source. Some of the following interventions are based on COVID-19 Technical Resources published by ASHRAE.

In addition to buildings, vehicles — including public transportation such as buses, subways, trains, school buses, carpools, and rideshares — are also areas where ventilation improvements can be applied to reduce the spread of airborne viruses and lower the risk of exposure.

The recommendations presented here are not intended to replace guidance that may already exist in national, state, and local standards and guidelines. For example, some healthcare spaces have specified ventilation requirements intended to prevent and control infectious diseases. For spaces where existing standards and guidelines specify lower ventilation rates than the recommendations presented here, building owners and managers are encouraged to consider adoption of the more protective guidance.

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• **Important:** For interventions listed below that are marked with **, consulting with professionals experienced in the proper selection, implementation, and commissioning of HVAC improvements is strongly encouraged. Their experience should preferably include the building, system, and occupancy types under evaluation. Other interventions may require similar consultation, depending upon the knowledge and experience of the individuals responsible for implementing changes to the building.

Improving Air Circulation

1. If you do nothing else, ensure existing HVAC systems are providing at least the minimum outdoor air ventilation requirement in accordance with ventilation design codes.

• Applicable codes are based on the year of building construction or latest renovation and intended building occupancy;

• Preferably, upgrade HVAC system performance to meet current ventilation code requirements at current occupancy levels;**

• This will develop a strong and lasting baseline upon which further interventions can be implemented.

2. Increase the introduction of outdoor air beyond code-minimum requirements.

This measure will potentially increase energy costs. Use of an energy recovery ventilator (ERV) can lessen the potential energy and system implications of increased outdoor air.

• Open the outdoor air dampers on your HVAC equipment beyond minimum settings to reduce or eliminate HVAC air recirculation. In mild weather, this will not affect thermal comfort or indoor humidity. However, this may be difficult to do in cold, hot, or humid weather;**

• Open windows and doors, when weather conditions allow, to increase outdoor air flow. Even a slightly open window can introduce beneficial outdoor air;

• Do not open windows and doors if doing so poses a safety or health risk (e.g., risk of falling, triggering asthma symptoms) to building occupants. Use caution in highly polluted areas when increasing outdoor air ventilation.

3. Use fans to increase the effectiveness of open windows.

• To safely achieve this, fan placement is important and will vary based on room configuration;

• Avoid placing fans in a way that could potentially cause contaminated air to flow directly from one person to another;

• One helpful strategy is to use a window fan, placed safely and securely in a window, to exhaust room air to the outdoors. This will help draw outdoor air into the room via other open windows and doors without generating strong room air currents. Similar results can be established in larger facilities using other fan systems, such as gable fans and roof ventilators.

4. Rebalance or adjust HVAC systems to increase total airflow to occupied spaces when possible.

• Increase total airflow to increase room air mixing and reduce viral particle concentration and subsequent exposure potential;**

• Turn off any demand-controlled ventilation (DCV) controls that reduce air supply based on occupancy or temperature during occupied hours;**

• In homes and buildings where the HVAC fan operation can be controlled at the thermostat, set the fan to the "on" position instead of "auto," which will operate the fan continuously, even when heating or air conditioning is not required;

• Ensure restroom exhaust fans are functional and operating at full capacity when the building is occupied;

• Inspect and maintain exhaust ventilation systems in areas such as kitchens, cooking areas, etc. Operate these systems any time these spaces are occupied. Operating them even when the specific space is not occupied will increase overall ventilation within the occupied building;

• In non-residential settings where an infectious source was not known to have been present, run the HVAC system at maximum outside airflow for 2 hours, or until the building has achieved at least 3 air changes, after the building is no longer occupied. *(If an infectious source was present, see the answer to FAQ #2 on our online list)*;

• Generate clean-to-less-clean air movement by evaluating and repositioning as necessary, the supply louvers, exhaust air grilles, and/or damper settings.** *(See the answer online to FAQ #4 re Directional Airflow. This recommendation is easier to accomplish when the supply and exhaust points are included as part of a "drop ceiling.")*

Improving Air Cleanliness

1. Upgrade central HVAC filter efficiency to a Minimum Efficiency Reporting Value of (MERV)-13 or better. When compatible with your HVAC system, increased filtration efficiency is especially helpful when enhanced outdoor air delivery options are limited.

2. Inspect HVAC systems.

• Ensure ventilation systems operate properly and are up to date on maintenance;

• Make sure air filters are properly sized and within their recommended service life;

• Inspect filter housing and racks to ensure appropriate filter fit and minimize air that flows around, instead of through, the filter.

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3. Use portable or built-in high-efficiency particulate air (HEPA) fan/filtration systems (also called air cleaners or air purifiers).

- Use HEPA systems to enhance air cleaning (especially in higher risk areas such as a medical office or areas frequently inhabited by people with a higher likelihood of having COVID-19 and/or an increased risk of getting COVID-19). *See FAQ #5 online re HEPA filters and in-room HEPA air cleaners*;
- In-room air cleaners that use filters less efficient than HEPA filters also exist and can contribute to room air cleaning. However, they should be clearly labeled as non-HEPA units;
- Some air cleaners/air purifiers use technologies other than filtration. *See FAQ #8 for a detailed discussion of factors to consider before using these other technologies.*

4. Use UVGI (also called GUV) as a supplemental treatment to inactivate airborne viruses, such as SARS-CoV-2. UVGI can be effective in many spaces, but it is especially useful as an additional layer of protection to reduce infectious particles in indoor spaces that host large gatherings or where the risk of disease transmission is high. It is also helpful when options for increasing room ventilation and filtration beyond code requirements are limited.**

- Upper-room UVGI systems can be used to provide air treatment within occupied spaces;
- In-duct UVGI systems can help enhance air cleaning inside central ventilation systems;
- *See detailed discussions online in FAQs #6 and #7.*

How Much Ventilation Is Enough? Aim for 5 Air Changes per Hour (ACH)

When possible, aim for five or more air changes per hour (ACH) of clean air to help reduce the number of germs in the air.

This can be achieved through any combination of central ventilation system, natural ventilation, or additional devices that provide equivalent ACH (eACH†) to your existing ventilation. Supplying or exhausting an amount of air (use the larger of the two values but do not add them together) that is equal to all the air in a space is called an air change. Multiplying that amount by 5 and delivering it over one hour results in 5 ACH. HPAC

For more on calculating ACH and estimating costs, go to www.cdc.gov/coronavirus/2019-ncov/community/ventilation.html.

ASHRAE Completes Draft of First Pathogen Mitigation Standard for Healthier IAQ

First draft of new 'Standard 241P, Control of Infectious Aerosols' eyes likely approval.

ASHRAE announced May 15 the completion of the first draft of its standard for maintaining healthy indoor air quality (IAQ), with final approval expected in June and publishing anticipated in July.

ASHRAE Standard 241P, *Control of Infectious Aerosols* provides minimum requirements for HVAC-related measures to reduce the risk of transmission of COVID-19, influenza, and other airborne viruses in homes, offices, schools, hospitals, etc., during periods of high risk. The standard offers guidance for creating healthier environments in the buildings where we work, live, and play.

"The entire world was touched by the effects of the pandemic and we learned that an effective approach in protecting ourselves from the spread of pathogens is to improving the indoor air quality and ventilation in the buildings that we occupy," said 2022-23 ASHRAE President **Farooq Mehboob**, Fellow Life Member ASHRAE.

"No where in the world do we have a standard that universally addresses the concept of mitigating pathogen spread and IAQ, and ASHRAE is proud to lead in the development of the guidance."

The standard will address long-range transmission of infectious aerosols and provides minimum requirements for:

- Equivalent outdoor air (combined effect of ventilation, filtration, and air cleaning) for use during Infection Risk Mitigation Mode;
- Room air distribution to reduce risk;
- Characterization of filter and air cleaner effectiveness and safety;
- Commissioning, including development and implementation of a Building Readiness Plan;
- System operation in Infection Risk Mitigation Mode during periods of high risk;
- Maintenance tasks and their minimum frequency;
- Residences and health care facilities.

"Standard 241P is built on ASHRAE's longstanding leadership position as a developer of consensus IAQ standards and the guidance developed by the ASHRAE Epidemic Task Force (ETF) in response to the COVID-19 pandemic," said ASHRAE Standard Project Committee 241P chair **William Bahnfleth**, Ph.D., P.E., who previously had served as ETF chair. "This experience, combined with the efforts of a truly world-class international project committee, have allowed us to produce this review draft in only 10 weeks. It is a groundbreaking document that we expect to have significant impact. "

Toward that end, the committee sought comments on the normative portions of the standard. The public review draft was posted and comments were welcomed online through **May 26**.

For all standards related activities including announcements, public review drafts open for comment, call for members and more, sign up for ASHRAE Standards Actions at ashrae.org/StandardsActions. HPAC

About ASHRAE

Founded in 1894, ASHRAE is a global professional society committed to serve humanity by advancing the arts and sciences of heating ventilation, air conditioning, refrigeration and their allied fields.

As an industry leader in research, standards writing, publishing, certification and continuing education, ASHRAE and its members are dedicated to promoting a healthy and sustainable built environment for all, through strategic partnerships with organizations in the HVAC&R community and across related industries.

As Industry Holds Its Breath, Project Pipeline Begins to Lose Forward Momentum

With a debt ceiling deal still on hold, anxiety among economists and AEC firms now is rising, raising the stakes for developers and employers, alike.

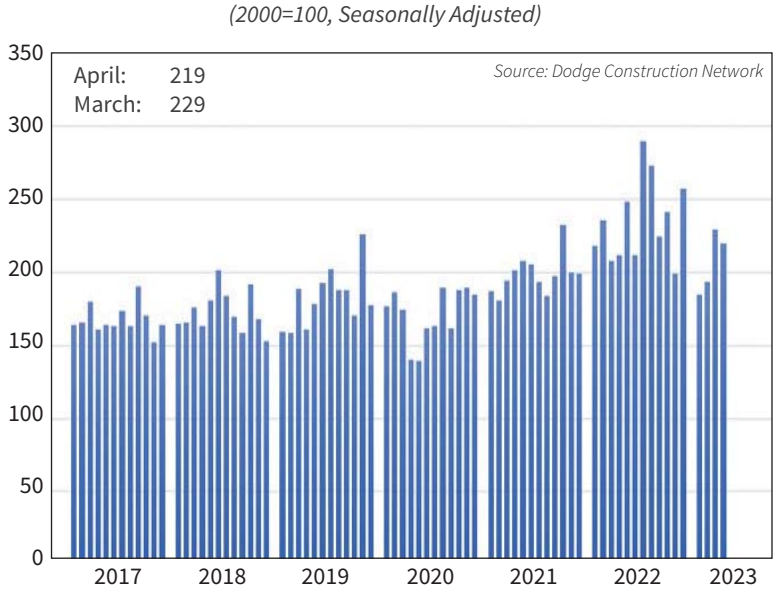
Two months ago here, I referenced a 'Godot Recession', the long-predicted economic downturn that so far had yet to materialize. Well, at press time, perhaps tired of waiting, the U.S. government seemed poised finally to bring on that recession for little reason other than political spite.

Indeed, if a deeply divided Congress failed to raise the national debt ceiling by June 1, then a self-inflicted "economic catastrophe" was actually possible, said U.S. Treasury Secretary **Janet Yellen**. And its consequences threatened to be far worse than any run-of-the-mill, cyclical setback.

On May 16, industry analyst Dodge Construction Network stated plainly that if the debt ceiling was not raised on time and the dispute was prolonged into

The Dodge Momentum Index

(2000=100, Seasonally Adjusted)



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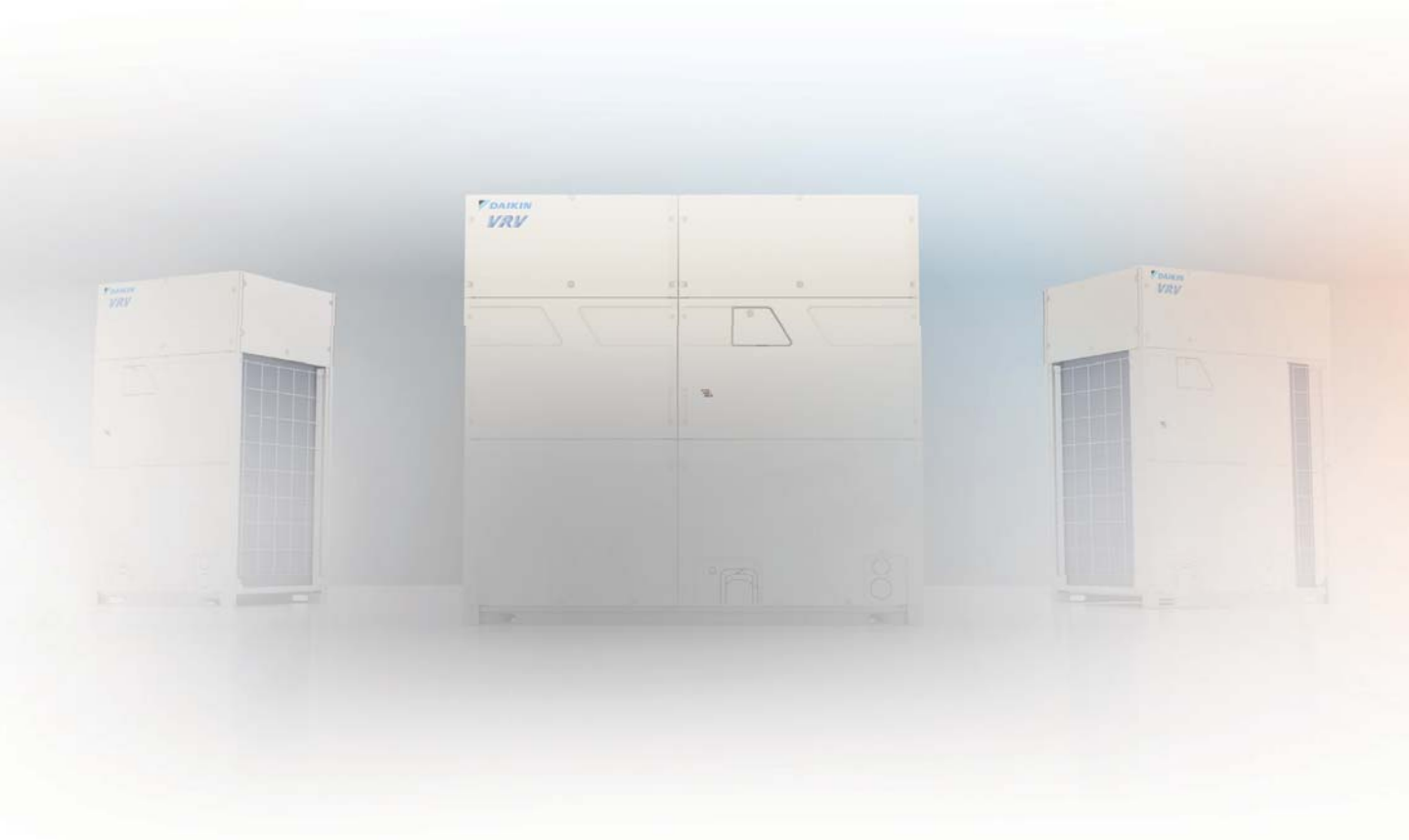

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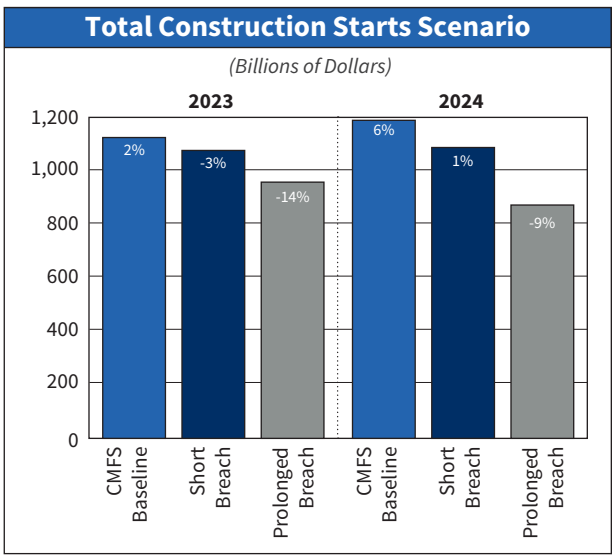
July, then "construction starts would fall 14% in 2023, and a further 9% in 2024. In many ways, this is akin to the impact of the financial crisis on starts in the 2007-2009 period."

Of course, that stretch of U.S. history is now known as the "Great Recesssion."

For its part, Moody's Analytics first looked at those dual scenarios in early May and concluded grimly: "It is increasingly important to consider the possibility that lawmakers fail to act in time and there is a breach of the debt limit. We now assign a 10% probability to a breach. If there is a breach, it is much more likely to be a short one than a prolonged one. But even a lengthy standoff no longer has a zero probability. What once seemed unimaginable now seems a real threat."

On May 20, *The New York Times* added:

It might not take a default to damage the U.S. economy. Even if a deal is struck before the last minute, the long uncertainty could drive up borrowing costs and further destabilize already shaky financial markets. It could lead to a pullback in investment and hiring by businesses when the U.S. economy is already facing elevated risks of a recession, and hamstring the financing of public works projects. More broadly, the standoff could diminish long-term confidence in the stability of the U.S. financial system, with lasting repercussions.



Source: Dodge Construction Network

Emerging consequences, disquieting signs

Dodge reported May 18 that total U.S. construction starts fell 4% in April to a seasonally adjusted annual rate of $1.04 trillion. Nonresidential starts led the way as manufacturing projects dropped 22% following strong performance in March. To balance the decline, nonbuilding starts climbed 7%, and residential building starts gained 12%.

On a year-to-date basis through April, total construction starts were 7% below the first four months of 2022. For the 12 months ending April 2023, total construction starts were 11% higher than the 12 months ending April 2022. Nonresidential and nonbuilding starts both showed gains at 34% and 24%, respectively.

"The construction sector continues to sweep its economic worries under the rug, even with inflation, unstable banking, and the potential breach of the U.S. debt ceiling," said Dodge Chief Economist **Richard Branch**. "While the presence of, or lack thereof, large manufacturing projects each month has made the data more volatile, the underlying trends point to a very healthy sector. However, this is likely transitory. The Dodge Momentum Index, which tracks projects entering the earliest stages of planning, is falling, which should lead to weaker starts in the second half of the year – especially for the private sector."

As measured by Dodge, nonresidential building starts declined 22% in April to a seasonally adjusted annual rate of $383 billion. This sharp decline followed an equally large rise in March, when numerous large manufacturing projects climbed dramatically. In April, however, factory starts plummeted 68%. Institutional starts also dropped 13%, largely due to a pullback in healthcare construction.

Meanwhile, commercial starts actually improved 5% thanks to an increase in retail and office projects.

Year-over-year, from January 2023 through April 2023, total nonresidential starts were 7% higher than in the first four months of 2022. Institutional starts gained 14%, manufacturing starts were still 4% higher, and commercial starts were up 2%. Between April 2022 and April 2023, total nonresidential building starts were 34% higher than April 2021 through April 2022. Manufacturing starts were 118% higher, institutional starts improved 22%, and commercial starts were up by 18%.

Engineering Business Sentiment Split

Passed in late 2021, "the Infrastructure Investment and Jobs Act (IIJA) has absolutely buoyed our industry," said **Joe Bates**, a senior consultant at the American Council of Engineering Companies (ACEC) Research Institute. Speaking on ACEC's May podcast, he added, "If the economy does go into a mild recession, it will not hit our industry this year."

Previewing the institute's soon-to-be-released *Engineering Business Sentiment Study* for the second quarter of 2023, Bates noted that the 500-plus ACEC members surveyed this spring displayed a "huge disconnect" between their feelings about the economy, in general, and the business prospects for their own firms. "For the last year, future sentiment overall has been very pessimistic, but individual firm sentiment for the next 12 months has actually improved," he explained.

Of particular note, Bates added that the latest survey continued to find inflation and recession fears as the main concerns for ACEC members, but a new worry had also emerged. "Political concerns and uncertainty jumped nine points on our list to move into the third slot," he said.

Longer term, Bates said firms appear most worried about worker shortages and resulting wage inflation. "We simply do not have enough engineers in the pipeline in this country, much less in our sector of the economy," he added.

Overall, construction employment increased in 24 states in April from the previous month, according to the latest data released by the Bureau of Labor Statistics (BLS). Compared to April 2022, however, 42 states reported increased construction hiring.

"Contractors continue to report strong demand for projects and have added employees in all but a handful of states over the past year," said **Ken Simonson**, chief economist for Associated General Contractors of America (AGC). So, any slowdown in hiring this spring seems more attributable to worker shortages, he explained.

On May 16, Associated Builders and Contractors (ABC) also entered the economic discussion, reporting that its *Construction Backlog Indicator* had increased to 8.9 months in April, up slightly from 8.7 in March, according to an ABC member survey conducted April 20 to May 3. The latest reading is also 0.1 months higher than in April 2022.

After declining to a seven-month low in March, backlog rebounded in April due to strength in the infrastructure category. Regionally, backlog increased in the Northeast and West, but fell in the South and middle states, ABC reported.

Also in April, the nonunion contractor group's *Construction Confidence Index* for sales and staffing moved higher, while the readings for profit margins inched lower. Still, all three readings remained above the threshold of 50, indicating expectations of growth over the next six months.

"Based on ABC member sentiment, one would not be able to discern that interest rates are high, the nation's banking sector is in tumult, politicians are arguing over the nation's debt limit and recession fears remain pervasive," said ABC Chief Economist **Anirban Basu**. "Despite many headwinds and an active news cycle, contractors continue to express confidence in the near term."

The only thing that threatens to shatter that confidence this spring is the ominous debt ceiling debate dominating the news. If cooler heads failed to prevail there by June 1, then our nation will have likely suffered its first-ever default.

And none of us truly know what is on the other side of that dark door. HPAC

RAINEY JOINS INTERFACE ENGINEERING

Interface Engineering announced that **Teresa M. Rainey**, PE, LEED Fellow, has joined its DC office as an associate principal, team leader and senior mechanical engineer. With more than 30 years of experience developing optimal systems for new construction and modernization projects, she is an expert and advocate for sustainability and high-performing buildings.

Rainey

Just prior to joining Interface, Rainey was director of engineering and Green Lab, senior principal for a national engineering design firm. She led a team of more than 50 engineers to meet today's most pressing climate challenges. By employing next-generation technologies and partnering with research institutions and national laboratories, Rainey provided industry guidance across market sectors.

NCCER NAMES DIRECTOR OF PHILANTHROPY AND PARTNERSHIPS

The National Center for Construction Education and Research (NCCER) has hired Dr. **Melissa L. Perkins**, CFRE, as its director of philanthropy and partnerships. A 501(c)(3) nonprofit organization, NCCER relies on philanthropic investments from corporations, foundations and individuals to advance its mission. The need to provide rigorous and relevant workforce development solutions for the construction industry is central to economic growth in this country.

Perkins

"We are extremely excited to have such a distinguished and experienced philanthropic leader join our team to help us identify and market opportunities for philanthropic partnerships to expand our impact on the construction industry," said NCCER President and CEO **Boyd Worsham**.

Perkins' role will build on the important work that has already been done to create a successful workforce of diverse individuals whose lives were improved through construction education. Toward that end, she will work with like-minded supporters to grow the reach of NCCER's programs and impact through financial support.

A certified fundraising executive (CFRE) with more than 15 years of experience in fundraising, marketing and communications, Perkins began her career at Pomfret School in Connecticut. There, she grew increased philanthropic revenue by 122%, funding operational, capital, estate and endowment initiatives. She expanded her work to Girl Scouts of Connecticut in 2019, where she served as chief marketing and revenue officer.

In 2021, Perkins moved to Florida and launched *Transformation. Together. 2026.*, the first capital campaign for Gulliver Preparatory School in Miami. At Gulliver, she increased annual giving by 106% and raised more than $12 million in capital support.

Throughout her career, Perkins has led fundraising and communications teams to think creatively about the role philanthropy can play in supporting the mission of a nonprofit organization. In 2021, she published "The Viability of Venture Philanthropy in a Nonprofit Organization," her doctoral dissertation that explores opportunities for nonprofit organizations to expand revenue streams through mission-related businesses.

UPONOR ANNOUNCES NEW VP ROLE FOR INTEGRATED SUPPLY CHAIN

Plastic pipe manufacturer Uponor North America announced that **Jon Sillerud**, VP of operations, recently agreed to accept the additional responsibilities of leading the supply chain function for the company, effective March 28. He had been filling the supply chain leadership role on an interim basis for several months, proving that his experience and extensive knowledge made him the ideal person to lead both functions. His new title is Vice President, Integrated Supply Chain, Uponor North America.

Sillerud

Since 2017, Sillerud has led North American operations, a critical function that includes manufacturing, maintenance, quality, process engineering, real estate, security and safety. In his newly expanded role, he will also guide the supply chain strategy and team, building partnerships with suppliers and leading continuous improvement initiatives that cover supply planning, production scheduling, distribution, transportation and inventory.

"Under Jon's leadership, our business will accelerate its lean manufacturing journey and ensure we continue to drive our growth trajectory under the priorities of safety, quality, delivery, productivity and continuous improvement," said **Andres Caballero**, president, Uponor North America. "I am thrilled to have Jon expand his leadership role and look forward to the success he will bring for the Integrated Supply Chain functions in North America."

BREEGER NAMED CEO OF MITSUBISHI ELECTRIC POWER PRODUCTS

Sustainable energy systems provider Mitsubishi Electric Power Products (MEPPI) promoted current President **Tricia Breeger** as its new chief executive officer, effective April 1, 2023. Former CEO Brian Heery remains as chairman of the board for the organization.

Breeger

This announcement marks company history as Breeger is the first female CEO to be appointed throughout the Mitsubishi Electric Group Companies.

Serving as president since 2022, Breeger led the company's operating groups and shared services while gaining a deep understanding of MEPPI's diverse customers and markets. As CEO and President, she will now oversee business strategy, growth and development while transitioning the company toward digitization and decarbonization. Breeger will continue to drive the creation of high value for MEPPI's North American customers through solutions, systems, products and services with the long-standing quality of the Mitsubishi Electric brand.

"I am honored and excited to lead MEPPI as we continue to transform and enhance the way we serve our customers," Breeger stated. "We are committed to innovation and providing solutions that meet the needs of our customers and the energy transition happening in our markets."

MEPPI is a U.S. affiliate of the Mitsubishi Electric Corp. of Japan and serves the North American power systems, critical power and rail transportation industries with electrical and electronic products, systems, and services.

During her more than 20-year career at MEPPI, Breeger became a leader in the electric power industry by serving as general manager of the company's Electrical Distribution Division. In 2018, she was promoted to general manager of the Uninterruptible Power Supplies Division, where she oversaw the day-to-day operations and expanded the division's market share. In 2020, she was promoted to vice president, participating in the company's long-term strategic planning with a focus on expanding technology-driven solutions.

Breeger serves as vice chair to the board of directors for Catalyst Connection, a Western Pennsylvania nonprofit supporting the manufacturing sector. HPAC

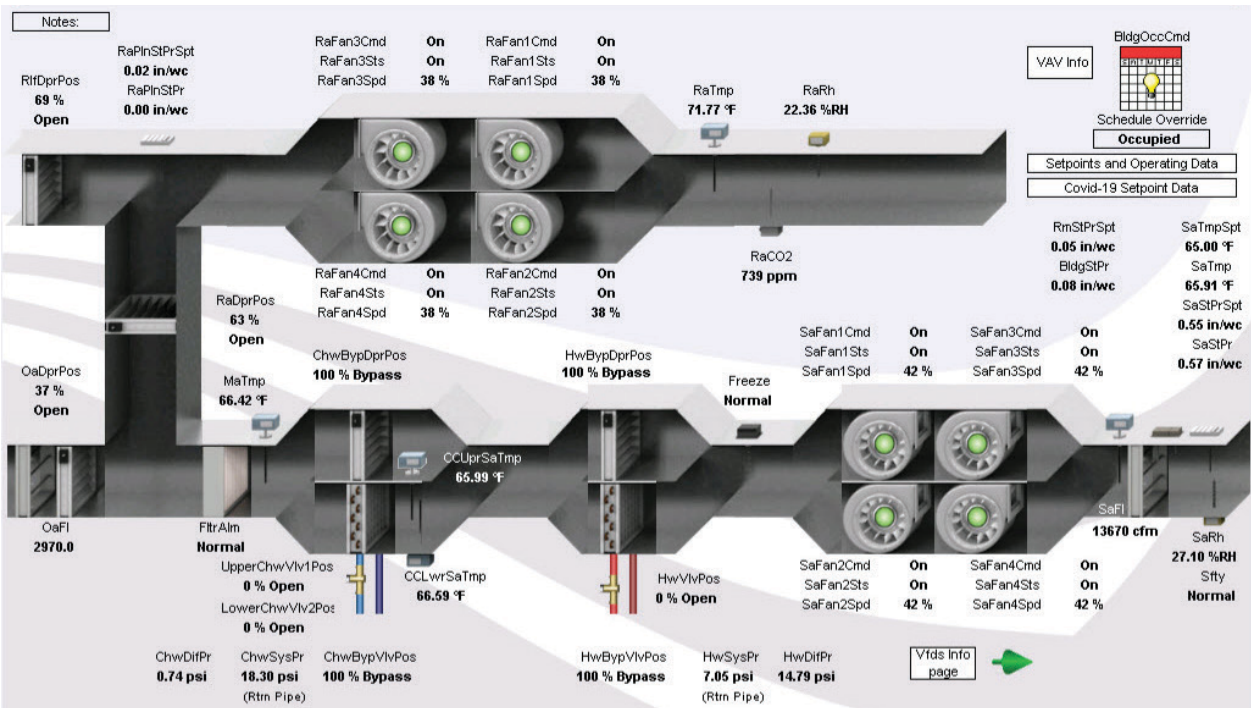


Figure 1: Both coils in full bypass.

Don't Bypass This Novel AHU Performance Improvement

Fifteen years in the making, one veteran mechanical engineer's novel idea about improving basic AHU performance seems to be bearing fruit, so far.

By EDWARD H. COOK, P.E., BCxP

It's not often that an improvement on the basic air-handler comes into my imagination. But as an engineer who has been around them for nearly 50 years now, it seems like it was about time.

The concept actually first took flight about 15 years ago, but it took that long to get a client to agree to try it, and then actually to put it all into practice. Now that this has been in place and functioning for two and a half years, I can announce that it has proven to be an unqualified success.

As you read on here, you will see how the concept grew from a simple field observation to now a full-fledged AHU modification.

Years ago, while watching the operation of a 100% make-up AHU with a steam coil, face and bypass damper connected to a single actuator, it struck me. When the steam coil was not in use, it would be easier for air being delivered by the AHU if it could go through *both* the coil and the bypass.

Certainly, there would be less friction since the air could take two paths instead of only one. I had never seen an air-handler before where the face and bypass dampers each had their

Based in St. Paul MN, the author is President of Edward H. Cook & Associates, P.A., and a registered mechanical engineer with nearly 30 years experience in the fields of building systems, energy supply and demand side management, and utility infrastructure for institutional and commercial facilities. Holding both a BME and an MBA from the University of Minnesota, Mr. Cook has served on multiple ASHRAE Technical Committees, the International District Energy Association (IDEA), and the Institute of Environmental Sciences (IES). A recipient of two Energy Management Awards from ASHRAE, he has written previously for HPAC Engineering, and has delivered several presentations and papers at technical conferences throughout the U.S. Contact him at edward@cookconsultants.com.

own actuator, but it seemed to make sense to me. The leap to a complete variable air volume heating and cooling air-handler was the next logical step.

Since most air handlers need neither heating nor cooling for many months a year, why not let the air bypass around those coils when they are not needed for heating or chilled water? A six- or eight-row cooling coil will have over 0.5" of pressure drop. But a heating coil is in the range of 0.3", which with an airflow bypass will reduce airflow resistance in the air-handler. That is bound to add up over time.

I discussed this with a few of my colleagues and they thought it had some merit. But it never went anywhere until a few years ago when a long-term client was planning a building remodeling project involving new air handlers. I explained the concept to the client and he was willing to give it a try on his renovation project. At first, the design engineer was hesitant, but slowly warmed to the concept. He designed two air handlers with bypass dampers and actuators around both coils. *(See below.)*

Although there was no need for a face coil, and the submitted drawings showed them eliminated, apparently the concept was so foreign to the manufacturers that they installed them anyway!

This was easily corrected in the field, and so finally we now had a test apparatus which we could use to track and determine the benefit of this modification. The installation included a robust digital automation system, so there was ample sensing of key parameters and a full trending of all components.

The sequence of control for the bypass dampers was elementary: Any time either coil was not calling, the damper would be in full bypass. From years of experience of watching when coils need to be in service, it was expected that between seven and nine months a year, each of the coils would be in full bypass.

> **"As we all strive to boost energy efficiency, a simple and sound improvement for air-handling equipment may already be at hand."**

Open to Consistent Results

After over a year of observation, that is exactly what happened. As soon as either the cooling or heating coil valve closed, the bypass went to full open. At any one time, one of the bypasses was always open, and for possibly six months a year, **both** were open.

Readings taken over a two-year period were conclusive: Opening the damper caused the supply fan to slow down. Of course, the magic question was how much?

After observing this under multiple scenarios over a period of almost two years, the results were consistent. The supply fan slowed down in the range of 2 Hz, when operating at around 45 Hz.

That said, it will require a detailed and extended research project to quantify all of the savings that can be achieved with this simple improvement and to determine the payback. But it will definitely add up over time. It requires simply the additional cost of some sheet metal and turning vanes, two dampers and two actuators.

As the world seeks ways to continuously improve energy efficiency, there is no doubt that this is a simple and sound method that can be applied to all variable volume air-handlers. I encourage my design colleagues to give this a try, and to record their results.

We may very well end up with the basis for a whole new standard for air-handling equipment. HPAC

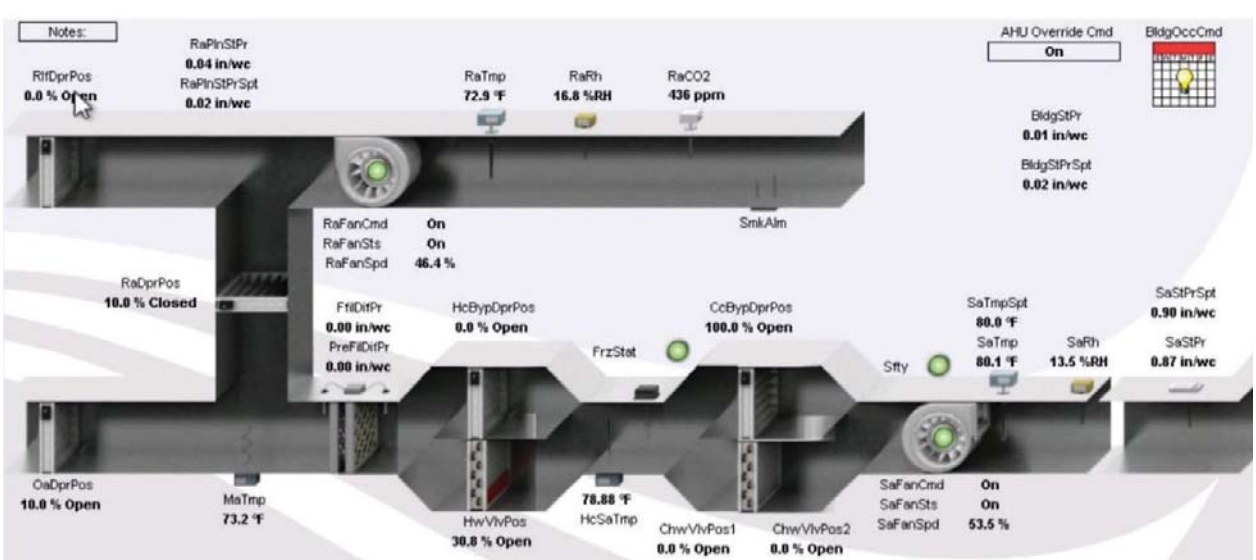


Figure 2: Heating coil in use, no bypass.

Illegal Refrigerants? How to Avoid the Harm and Hassle

As the North America phasedown of high-GWP hydrofluorocarbon refrigerants continues, one manufacturer cautions about an expected increase in illegal cannisters flooding markets here.

By BRANDON MARSHALL,
The Chemours Company

When I mention illegal refrigerants to acquaintances outside of our industry, I typically get a raised eyebrow and a grin. To the average person, the topic of illegal trade and smuggling evokes images of drugs, exotic gems, and the like—not something as ubiquitous as refrigerants.

It's at this point that I share with my friends a story from the 1990s, when the phaseout of chlorofluorocarbons (CFCs) ramped up in the U.S. At that time, cocaine smugglers actually started using their routes and equipment to bring in illegal R-22, realizing the risk-reward for refrigerants was more appealing.

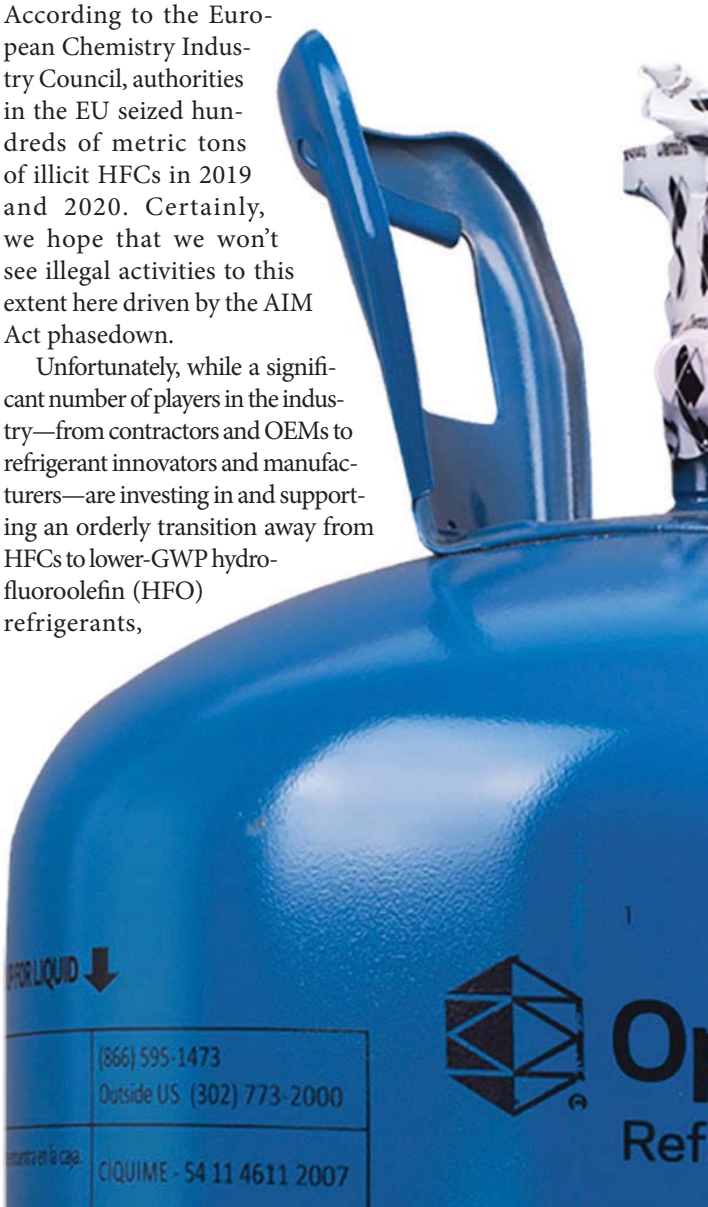
Why bring this up 30 years later? Because the market for illegal and counterfeit refrigerants is real—and a new wave could be on the horizon now. As the North America phasedown of high global warming potential (GWP) hydrofluorocarbon (HFC) refrigerants continues, we expect that the limited supply will cause illegal activities to increase in the U.S. and Canada.

Fortunately, by drawing on lessons from the past, we can take proactive steps that allow everyone invested in HVACR to be prepared and to protect their people, customers, and businesses.

To start, let's look at the dynamics that brought us to this point. This past January, the industry experienced a significant phasedown in HFCs under the American Innovation and Manufacturing (AIM) Act. The next phasedown will require an additional 30% reduction in HFC production and consumption, starting Jan. 1, 2024. The progression of phasedowns—reducing the supply of HFCs available for equipment service and maintenance—will elevate the risk of illegal materials coming into the country.

We saw this happen at some level when hydrochlorofluorocarbons (HCFCs) were phased out in the U.S. More telling, however, are recent developments in the European Union (EU), where the HFC phase down began in 2015. According to the European Chemistry Industry Council, authorities in the EU seized hundreds of metric tons of illicit HFCs in 2019 and 2020. Certainly, we hope that we won't see illegal activities to this extent here driven by the AIM Act phasedown.

Unfortunately, while a significant number of players in the industry—from contractors and OEMs to refrigerant innovators and manufacturers—are investing in and supporting an orderly transition away from HFCs to lower-GWP hydrofluoroolefin (HFO) refrigerants,



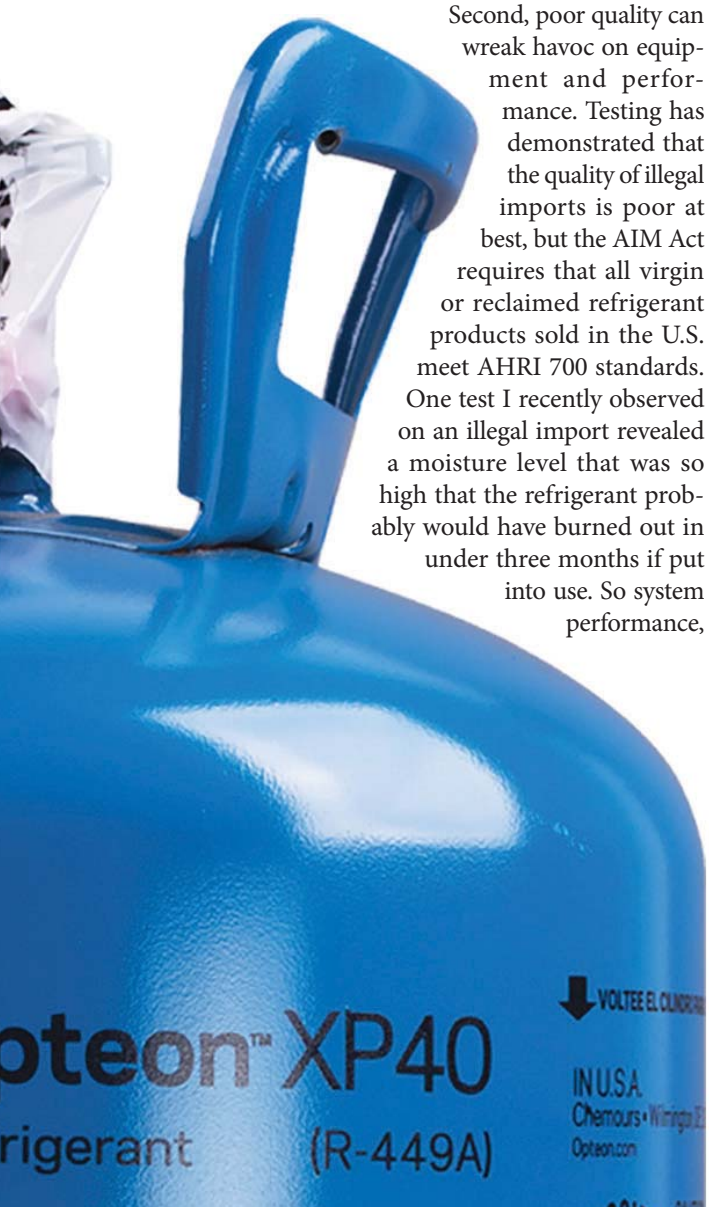
Based in Wilmington DE, the author is Americas Marketing Manager, Stationary and Specialty Applications, for The Chemours Company. He holds an MBA from Maryville University of St. Louis and a BS in HVAC Design Technology from the Pennsylvania College of Technology. An experienced refrigeration engineer, Marshall is now focused on helping the HVACR industry to navigate the complex technological and regulatory landscape and to implement new and intelligent systems that will reduce impact on the environment.

there are still entities seeking to capitalize on the situation by offering illegally imported refrigerants. Awareness and efforts to avoid these illegal activities, coupled with enforcement protocols, can help everyone avoid unnecessary "hassles" and potentially devastating harm.

Understanding the Impact

To put it bluntly, the use of illegally imported refrigerants can be damaging to your people, your business, your reputation, the environment, and your bottom line. Let's break that down a bit more.

First, illegal imports can be extremely dangerous. Illegal products may have unknown flammable contents, such as hydrocarbons, impurities, and other contaminants. In addition, to increase profitability, individuals may mix the HFC with alternative refrigerants that are less expensive to buy. This creates significant safety risks for both technicians and end users. To see just how damaging this can be, do a quick internet search for "unapproved refrigerant explodes."



Second, poor quality can wreak havoc on equipment and performance. Testing has demonstrated that the quality of illegal imports is poor at best, but the AIM Act requires that all virgin or reclaimed refrigerant products sold in the U.S. meet AHRI 700 standards. One test I recently observed on an illegal import revealed a moisture level that was so high that the refrigerant probably would have burned out in under three months if put into use. So system performance, energy efficiency, and overall system life can all be negatively affected by poor quality.

Third, we must consider the purpose of the phasedown—to protect the environment. Illegal products upend regional, national, and global efforts to ensure a sustainable, healthy planet. The more unregulated volumes of product that enter the market, the greater the delay in meeting climate objectives in the U.S. and Canada.

Keep in mind, illegal imports are, in fact, illegal. The EPA, in coordination with Customs and Border Protection and other agencies, has initiated enforcement protocols to stay ahead of illegal activities. Moreover, under the AIM Act and Ozone-depleting Substances and Halocarbon Alternatives Regulations (ODSHAR), import, distribution, and/or sale of illegally imported HFCs are subject to penalties including confiscation, imprisonment, and fines.

Steering Clear of "Illegals"

Step one is to be wary of an unbelievably low price, an "unlimited supply" suddenly being available in a market undergoing reduced production, internet "deals," and other too-good-to-be-true situations. Be wary of any offer you get that doesn't align with current industry pricing.

Next, follow these five golden rules:

1. Make sure to select a reputable refrigerants distributor for all purchases;

2. Don't leave it up to chance; ask for a genuine refrigerant;

3. Closely examine refrigerant packaging to find key security features and authentication labels. (All Chemours cylinders include an anti-counterfeiting security shrink sleeve, while disposable cylinders also include an Izon® security label;)

4. Take a moment to ensure the authenticity of a refrigerant's package by scanning the QR code on the Izon® security label or by entering its seven-digit code at GenuineRefrigerants.com;

5. Don't wait until it's too late. The danger with illegal refrigerants is that you have no way of telling what's actually in that cylinder until the damage is already done. So, it is imperative to rely only on wholesalers with whom you have a proven relationship, and to only use brands you trust.

Lastly, if you see something, say something.

The EPA website (echo.epa.gov) offers resources for reporting environmental violations, including a hotline (1-800-424-8802). Plus, if you are worried you've come into possession of a questionable refrigerant product, consult with a different, trusted source. Several refrigerant manufacturers, including Chemours, are invested in preventing the damage illegal imports can do to our industry, customers, and environment.

So, one discussion can mean all the difference in protecting your people, customers, and business. HPAC

BACnet Secure Connect Offers Next-Level BAS Cybersecurity

As BAS rapidly becomes integrated with broader IT systems, the need to provide a holistic approach to cybersecurity is critical. BACnet/SC aims to do just that.

By CHRIS LANE, Director of BAS Product Management, Johnson Controls

The evolution and IT convergence of Digital Building Technologies started in earnest in the mid-90s, with more and more basic building systems, including telephony, physical security, lighting as well as HVAC and other building automation sensors and equipment migrating to internet protocol (IP).

As building owners sought more advanced ways to accumulate and access data, the increased bandwidth and speeds of IP were the most logical solution. Compared to the BACnet MS/TP protocol, BACnet/IP is the fast communication protocol that meets the needs of today's building systems and has been an ANSI standard since 1995 and an ISO standard since 2003.

Increasing demand for detailed information on operations and costs is driving facility managers to task today's Building Automation Systems (BAS) with providing more data, more often, from more devices. BAS are becoming increasingly sophisticated and are now shifting from IP-based to cloud-hosted systems, and often need to be integrated with other IT infrastructures.

As BAS rapidly becomes integrated with broader IT systems, with more than 95% of BAS now residing on shared networks, the need to provide a holistic approach to cybersecurity is critical. In addition, the U.S. Executive

Chris Lane is the director of product management for Building Automation System (BAS) products at Johnson Controls. In this role, Lane leads a team of product managers responsible for defining strategy and direction for the firm's global portfolio of BAS products.

Order 14028, published in May 2021, focuses on improving the nation's cybersecurity and will lead to additional enforcement of standards to prevent cybersecurity incidents, enhancement of supply chain security and more.

To adhere to evolving cybersecurity standards and help protect vulnerable networks, facility managers need to consider the most up-to-date technology and security protocols, including the latest standard, BACnet Secure Connect (BACnet/SC).

What is BACnet/SC?

A decade in development and first launched in November 2019 by the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) and BACnet International, BACnet/SC enables secure communication between different devices and systems in a building automation network, protecting against cyber threats such as hacking, data breaches, and other types of cyber-attacks.

It also provides the flexibility to choose from different security levels based on specific requirements, making it an adaptable solution for a wide range of building automation systems. BACnet/SC adds a significant level of cybersecurity protection, while still maintaining communication interoperability between BAS nodes.

BACnet/SC is defined in Annex AB of the ASHRAE 135-2020 BACnet protocol standard. That identifies it as a secure, encrypted datalink layer specifically designed to meet the requirements, policies, and constraints of IP networking infrastructures.

How It Works

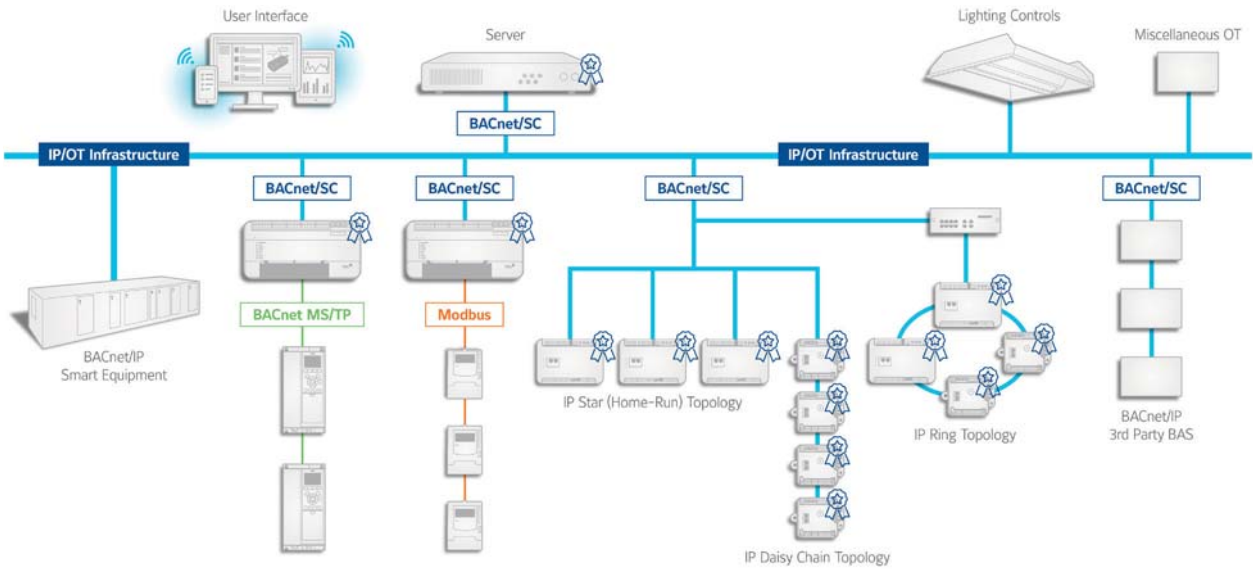
BACnet/SC allows two BAS devices to establish a highly secure and encrypted connection using TCP-based WebSocket protocol. The devices exchange certificates and authenticate each other using Transport Layer Security (TLS). Once the devices are authenticated, they can begin exchanging encrypted messages.

BACnet/SC is a sophisticated network security solution that uses standards widely accepted by the IT community, and it addresses many concerns IT professionals had with the original BACnet/IP protocol.

Benefits of BACnet/SC

While not every BAS installation may benefit from BACnet/SC – generally only those with higher-than-average security needs — adopting BACnet/SC allows for better integration and interoperability between different devices and systems. It can provide many benefits for building owners, facility managers and IT professionals, including:

- **Security:** BACnet/SC uses strong encryption to protect data and provides secure message transport using



BAS System Architecture with BACnet/SC.

the standard IP application protocol, Secure WebSocket, which is an extension to HTTPS and runs over Transport Layer Security (TLS). A major difference in BACnet/SC compared to previous BACnet iterations is the use of asymmetric cryptography. This cryptographic system uses two different keys, a public key and a private key, to encrypt and decrypt data. The public key can be shared with anyone, while the private key is usually only known by the device or owner. This allows for highly secure communication between two parties, even if they do not trust each other;

- **Reliability:** BACnet/SC uses a reliable connection-oriented protocol to ensure that messages are not lost or corrupted, it works easily with common firewall devices and is not dependent on network broadcast messaging;
- **Ease-of-Implementation:** Utilizing BACnet/SC reduces the burden on IT teams by eliminating the need for static IP addresses and simplifies configuration by eliminating BACnet/IP Broadcast Management Devices (BBMDs). The technology also easily handles changes in network topology;
- **Compatibility:** BACnet/SC is fully compatible with existing BACnet systems and devices through normal BACnet routing and uses shared IP networks with no VPN setup required. It can also be implemented on any IPv4 or IPv6 network.

Planning for a Cybersecure Future

The bottom line: BACnet/SC is the newest standard for BAS cybersecurity, it can help minimize cyber risk and should be considered alongside a number of other IT best practices as part of a comprehensive BAS cybersecurity strategy.

For those customers who are looking to gain a higher level of security and help protect their BAS against unauthorized access, data piracy, or other cyber threats, BACnet/SC is an appropriate solution.

ASHRAE standards for BACnet/IP are expected to continue to evolve. Leading BAS providers like Johnson Controls have adopted BACnet/SC compatibility and can help building owners and facility managers determine when and how best to adopt BACnet/SC to ensure a cybersecure future. HPAC

Comparison of BACnet/IP to BACnet/SC

Features	BACnet/IP	BACnet/SC
Data security	Messages are transmitted in an unencrypted manner	Messages are encrypted using TLS 1.3 with options for 128-bit and 256-bit elliptic curve cryptography (ECC)
Network protocol	IP/UDP	IP/TCP
Application protocol	BACnet-defined protocol, not well understood by IT departments	Standard IT protocols: HTTPS and secure Web Sockets
Network communication through routers	BACnet uses network broadcasts that can add network load	No broadcasts are sent, no BACnet Broadcast Manament Devices (BBMDs) or static IP addresses are used

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Boiler Efficiency: Unlocking Both Cost Savings and Sustainability

Most plants operating today have untapped potential for significant savings.

Thermogenics

By JOE McMULLEN, Vice President, U.S. Operations, Thermogenics

Boiler efficiency has always played a crucial role in many industries, directly impacting operating costs, product pricing, and overall profitability of the business.

But the need for boiler efficiency extends beyond fiscal considerations.

It holds equal importance in terms of environmental impact, as well. The efficiency of a boiler must not only be looked at in terms of combustion but also from an overall steam system perspective. Poor combustion in boilers leads to increased fuel consumption, higher operating costs, and a larger impact on the environment both in the form of exhaust levels and thermally. An efficient system will reduce both costs and environmental impact.

Efficiency Through Innovation

In recent years, burner manufacturers and combustion management systems have made significant strides in enhancing boiler efficiency. Burner manufacturers continue to produce units that operate with lower excess air, higher turndown ratios, and lower NOx and CO emissions than ever before.

Combustion management systems enhance performance with tunable linkage-less control platforms that match the selected burner's capacity. Both contribute to improved efficiency and substantial savings.

Optimizing the entire steam system offers additional fuel-saving opportunities. Strategies such as reducing blowdown rates, proper selection of water treatment, leveraging condensate return systems, and utilizing heat recovery products can yield impressive results.

Condensate Return, Waste Heat Recovery

Efficient condensate return systems effectively reduce operating costs by minimizing energy waste from failed steam traps and contaminated condensate often seen in manufacturing facilities. High rates of condensate return save on chemical treatment costs and reduce the amount of BTUs required for steam transformation upon reintroduction to the boiler.

Based in Cincinnati OH, the author has been an integral part of operations management at Thermogenics since 2010.

Additionally, they lower effective blowdown rates, which directly minimize the loss of chemical treatment and fuel input associated with controlling conductivity and solids in the boiler water.

Certain systems inherently exhibit a low rate of condensate return, often due to steam injection into the process without the possibility of recovery. Consequently, these systems experience higher blowdown rates due to additional makeup water and solids introduced. However, implementing reverse osmosis pre-treatment in such systems can significantly decrease blowdown rates, resulting in reduced chemical treatment costs and substantial fuel savings.

Also, incorporating heat exchangers in the boiler stack enables the utilization of "free heat" in the boiler exhaust to preheat boiler feedwater or make-up water. A properly sized economizer can yield returns of 5-7% gains in efficiency and fuel savings.

Case Study: Food Manufacturing Plant

A major food manufacturing facility in Texas recently achieved remarkable efficiency gains by combining various technologies. With 85% of the generated steam utilized in the production process, Thermogenics implemented the following solutions:

- High turndown burners;
- Linkage-less burner management systems;
- Reverse osmosis pre-treatment system;
- Two-stage heat recovery system.

The implementation of the reverse osmosis treatment dramatically reduced the effective blowdown rate from 12% to less than 2% compared to the previous system. Here's a breakdown of the process:

- The first stage stack economizer captures free heat from the boiler stack and raises the feedwater temperature from 227°F (fed by the deaerator supply) to 290°F before entering the boiler;
- The flue gas temperature leaving the first stage economizer is reduced from 520°F to 320°F while operating at 120 psig steam in the upper firing range;
- The flue gas then flows into the second stage condensing economizer;
- The high-flow reverse osmosis (RO) water is preheated using the remaining available heat, raising the make-up water temperature from an average inlet temperature of 60°F to 135-180°F before being introduced to the deaerator for scrubbing.

This significantly reduces the amount of pegging steam required to complete the deaeration process, while also lowering the exhaust temperature of the flue gas to 100-120°F. Under optimal conditions, this plant operates with a thermal efficiency well above 92%, resulting in lower emissions and a reduced environmental impact.

Investing in Efficiency

Despite upfront costs, a proper system survey often demonstrates that the ROI of these systems can be achieved in a few short years or even months. With rising fuel costs and tighter emission regulations, the utilization of these technologies not only offers attractive ROI but also ensures emissions compliance.

Grants and environmental incentives are often available to assist in funding these improvements.

Of course, the examples provided here are only some of the ever-advancing technologies in boiler efficiency. Most plants operating today have untapped potential for enhancing efficiency and achieving substantial savings. HPAC

ABMA Summer Meeting Heads for Great White North

The manufacturers group meets in Canada this June, bringing members together to learn more of what they need to know to stay ahead.

By SHAUNICA JAYSON, ABMA

Venturing north of the border for the very first time for its annual Summer Meeting, the American Boiler Manufacturers Association (ABMA) this June will convene at the Fairmont Chateau Whistler in beautiful British Columbia.

Attendees will learn about current and emerging industry trends and provide networking opportunities for members to enhance and grow their existing business relationships. In mid-May, ABMA confirmed that its keynote speakers for this special event will be **Dr. John Grotzinger**, chief scientist and lead strategic science planner for NASA's $2.5 billon *Curiosity* rover mission to Mars, the most complex spacecraft to ever land and operate on another planet; and the Pike Place Fishmongers, the inspirational and innovative crew that shares the team-building secrets behind the

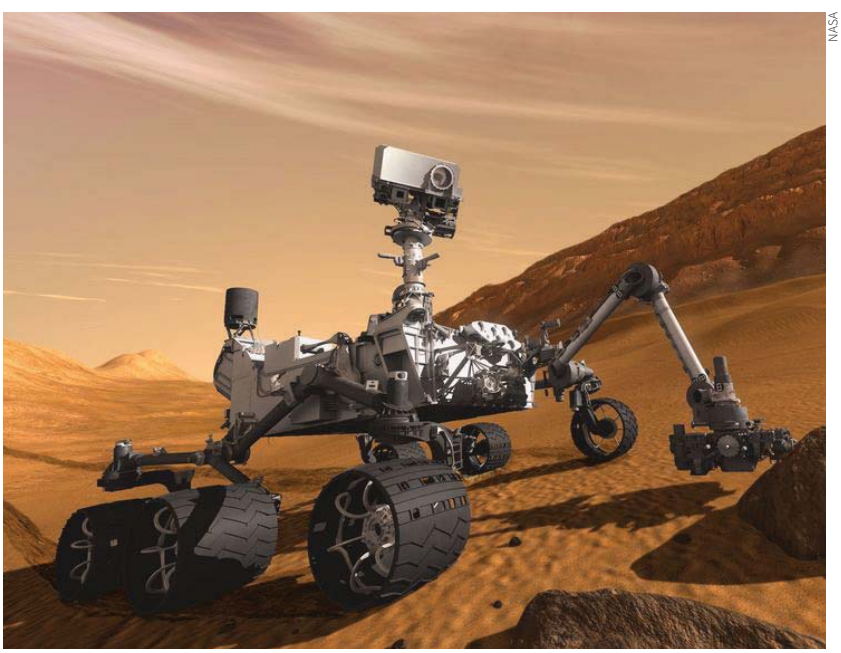
Fairmont Chateau Whistler

The stunning beauty of the Fairmont Chateau Whistler in British Columbia will make this event even more memorable.

nationally renowned success of Seattle's Pike Place Fish Market.

"We are excited for our members to hear from these very different speakers about their separate paths to excellence and success in their chosen fields," said ABMA President **Scott Lynch**. "We know attendees will be as fascinated by these stories and presentations as they are motivated to use their lessons.

In between the Fishmongers and Dr. Grotzinger, a stellar array of engaging speakers will address a variety of compelling industry topics. Subjects include *The Importance of Proper Water Chemistry in Rentals; The Supply Chain of Workers Compensation (and How to Use It to Your Advantage); Cybersecurity for Control Systems; 2023 Changes to the ASME Boiler and Pressure Vessel Code/International Codes;* and *Alternative Fuels for Packaged Boilers.*



NASA

NASA scientist Dr. John Grotzinger will detail what 'Curiosity' found on Mars.

Meetings Momentum

The summer meeting will build on the momentum gained in mid-April at ABMA's revived Manufacturers Conference (MC2023), the group's first such event since in 2018. Held at the Hyatt Lodge Oak Brook in the suburbs of Chicago, IL.

Focused on middle managers and those entering leadership at their companies, MC2023 this spring featured presentations on such topics as peer collaboration, streamlining operations, improving profitability, reducing NOx, advancing energy sustainability and adapting next-generation technology.

Chicago's own legendary improv group, *Second City Works,* also added entertainment and education to the proceedings, facilitating more collaboration and team-building exercises for our attending manufacturers. Other highlights of that event included successful tours at ABMA members **SCC, Inc.** and **Vapor Power International**, as well as an end-user tour of the boiler room at AMITA Health / Alexian Brothers Medical Center in Elk Grove Village, IL. HPAC

For more information on both meetings, visit www.abma.com.

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Series e-90E Smart Pump

Bell & Gossett launches the Series e-90E Smart Pump is available in 12 combinations of high RPM e-90 models combined with the Xylem Smart Motor ranging up to 3 hp. Installed in either horizontal or vertical piping applications, the pump uses a mechanical seal to help lower maintenance costs and increase the lifecycle of the pump. Sustainable-forward design, including a permanent magnet assisted synchronous reluctance motor with integrated variable-speed drive that meets IE5 specifications. The pump design eliminates the need for a stub-shaft or shaft sleeve. Rated for 250° F and 175 psi.

Bell & Gossett/Xylem

88 Water Series Commercial Cast-Iron Boiler

The 88 Water Series commercial cast-iron boiler from Weil-McLain offers a performance range of 960 to 5,845 MBH. Available in steam or water boiler configurations with gas, oil and gas-oil fuel options from a broad range of power burner vendors. Standard features include a combination pressure and temperature gauge, HXT-bars for optimized heat transfer, low-water cut-off, 30 psi working pressure, and observation ports at the front and back for quick inspection without having to disrupt heating system operation.

Weil-McLain

BenchPressG Product Line Expansion

NIBCO expands its BenchPressG carbon-steel fittings line to include 2-in. sizes to its existing product assortment, bringing press technology to fuel and gas carbon-steel pipe applications. The technology gives users consistent joint integrity and a professional appearance. Since it requires no threading equipment and lubricants, it offers easier, cleaner and faster installation. The fittings feature a yellow HNBR (hydrogenated nitrile butadiene rubber) seal that provides a permanent leak-proof connection to support a wide range of fuel and gas applications.

NIBCO

RCB-Series Commercial Boiler

The RCB-Series commercial boiler from Rinnai is a high-efficiency, wall-hung condensing boiler that delivers reliable, energy-saving performance. A stainless-steel water tube heat exchanger and 97% thermal efficiency maximize productivity within a compact design. Premix burner performance reduces greenhouse gas emissions and increases turndown ratio—set at 10:1 for precise load tracking and energy savings. Multiple boiler configurations can be accommodated with the Integrated Cascade Logic, which distributes runtimes equally for optimal application diversity.

Rinnai America Corp.

eco-Air Double-Stack Dry Cooler

EVAPCO's eco-Air double-stack dry cooler includes coil sections stacked vertically, and is designed for applications with very large cooling requirements and reduced footprint. The product line now offers custom ECM fan assemblies on double-stack units through a collaboration with Multi-Wing. The equipment offers high electrical efficiency, high airflow, integrated control package for fan speed control, and BAS communications. Certified by the Cooling Technology Institute.

EVAPCO

Ultonium Glass Tank Lining With Microban

The Ultonium glass tank lining with Microban from Niles Steel Tank provides additional protection against the growth of bacteria, mold and mildew on the surface of the interior tank lining. The lining prolongs the life of water storage tanks by keeping corrosive elements from reaching the steel of the tank and other components. Silver-based Microban antimicrobial technology is integrated into the Ultonium formula and then applied to the inside of the tank, coils and/or flue tubes during the manufacturing process. After application, the lining is baked on at approximately 1,600° F for a hardened, long-lasting finish.

Niles Steel Tank

Aquaport System

The Aquaport System from Uponor is a self-contained unit that converts a building's hydronic heating supply to on-demand domestic hot water. It eliminates centralized domestic hot water and recirculation piping in a structure. Incorporating the system can reduce hot-water energy use by up to 35%, eliminate up to 40% of unnecessary piping, and remove more than 50% of the total DHW volume in a building. The compact, in-wall design is 25.6-in.-tall by 14.5-in.-wide and 5.4-in.-deep to maximize overall square footage. It is lightweight at 47 lb. for the 100,000 Btu/hr. version and 57 lb. for the 180,000 Btu/hr. version.

Uponor

Commercial Radiant Stainless-Steel Manifold

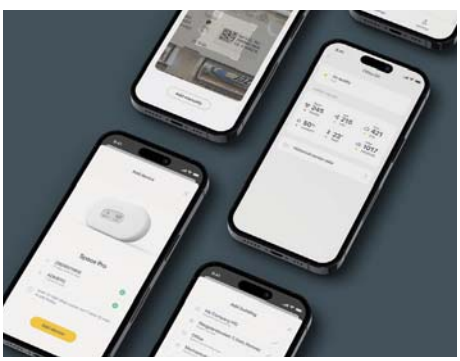
The commercial radiant stainless-steel manifold from Uponor provides more than double the gal./min. of standard manifolds to meet the demanding applications of large commercial hydronic distribution, radiant heating and cooling, snow and ice melting, permafrost prevention (cold storage) and Radiant Rollout Mat systems. Handles 48 gpm total flow with up to 4 gpm flow meters, 1 1/2-in. distribution ball valves, and 1-in. loop isolation ball valves that reduce loop pressure drops without impact to pump head pressure. Available in loop configurations of 3-8, 10, and 12. Features R25 connections for outlet fittings available in 5/8-in. and 3/4-in. compression or 5/8-in., 3/4-in. and 1-in. ProPEX (sold separately).

Uponor

0026e ECM High-Efficiency Circulator

Taco adds the 0026e to its expanded family of high-efficiency ECM. With a maximum of 26 ft. of head and 44 gal. per minute, the new variable-speed circulator offers up to 85% energy savings over a conventional circulator. It is available with cast iron or NSF/ANSI 61 and 372-certified stainless-steel volutes, ideal for either closed-loop heating systems or domestic hot water systems. Features five simple settings: low, medium, high, activeADAPT self-adjusting proportional pressure, and 0-10v control. Dual-voltage 115V/230V, and the 6 1/2-in. rotated flange-to-flange dimension retrofits most circulators in its class.

Taco Comfort Solutions



Business Mobile App

Airthings unveils its Business mobile app, allowing facility managers to monitor the energy efficiency and health of their buildings directly through their smartphone. It also expedites air quality monitor installation by simply scanning an Airthings device and snapping it to the wall. The app provides users with real-time air quality data that they can access anytime. Key data points for facility managers such as temperature, CO2, humidity, PM, radon, light and noise will now be readily available for anyone in the building to access immediately. Available to download on the App Store and Google Play Store.

Airthings

CarbonPress Fittings

CarbonPress fittings from Merit Brass are suitable for use on steel pipe conforming to ASTM A53, A106, A135, a795 (schedule 10 to 40) or constructed of black iron, epoxy-coated or galvanized steel. They are made from ASTM A420 carbon steel with a Zn-Ni plating, and provide corrosion resistance, strength and ductility. The fittings are compatible with a wide range of fluids, gases/oils and lubricants, making them ideal for use in applications where traditionally joined carbon-steel products are specified. Features include a patented Visual Indicator Press Ring that is color-coded to the application, no welding or brazing required, and designed to be compatible with standard industry fittings.

Merit Brass Co.

NOBLE Floor-Mount Fire-Tube Combi Boiler

The NOBLE floor-mount fire-tube combi boiler from Lochinvar includes models ranging from 110,000 Btu/hr. to 199,000 Btu/hr. The water connection, venting and gas connection are strategically placed on the top of the unit. Additionally, the unit's universal vent connector allows for a variety of connections directly to the appliance flue without adapters. The new model has a smaller footprint than most floor-mount boilers, simplifying installation and service, especially in homes with smaller mechanical rooms. The SMART CONTROL platform presents setup, system status and diagnostic information in words, not codes. It features a 10:1 turndown ratio, domestic hot water delivery rate of 4.8 gal./min. and an efficiency rate of 95%.

Lochinvar

ProPress Valves

ProPress Valves from Viega are for use with copper and stainless CTS pipe. Can be used for potable water, hydronic water, and many other applications. Available in a variety of configurations, including ball, check, butterfly, thermostatic balancing and manual balancing. Zero-lead bronze, brass and stainless alloys available, in two- and three-piece configurations. Zero-lead valves certified to NSF/ANSI 61 and 372 (includes Annex G). Available in sizes 1/2 in. to 4 in.
Viega

ArmaFlex UT Pipe Insulation

Armacell introduces its new EPDM-based, upper-temperature, flexible foam insulation: ArmaFlex UT. It was developed with VRF systems in mind, performing well for operating temperatures up to 300° F, exceeding competitive EPDM insulation limitations of 257° F for continuous operation. The flexible foam is suitable to insulate piping and mechanical equipment for HVAC, chilled water, refrigeration, solar collectors, hot gas, dual temperature, and low-pressure steam lines, and can be used on stainless steel over 125° F. It provides ultraviolet resistance per ASTM G90. The product is a low VOC, non-halogen and PVC-free elastomeric insulation that is manufactured without CFCs, HFCs, HCFCs, PBDEs or formaldehyde.
Armacell

Directional Destratification Fan

Greenheck introduces its model DDF, a directional destratification fan that efficiently mixes air from floor to ceiling for uniform temperature distribution. The high-performance, direct-drive model is available in three sizes and performance levels: a 10-in. diameter for ceilings up to 25 ft., a 12-in. diameter for ceilings up to 45 ft., and a 14-in. diameter for ceilings up to 60 ft. Features an aerodynamically optimized housing for maximum airflow, throw distance and coverage area, and the Vari-Green electronically commutated motor and controls technology for maximum efficiency and controllability. A universal ceiling mount and plug-and-play wiring allow for easy installation. Pair with AMPLIFY HVLS overhead fans in commercial, industrial and institutional applications.
Greenheck Fan Corp.

BE Series Electric Boilers

BE Series electric boilers from Bryan Boilers, in water or steam models, are compact, completely packaged and wired units with automatic controls featuring long-life Incoloy-sheathed elements. Applications include water heating, steam heating, process heating and supplemental heat for heat pumps. The Concert boiler control includes functions designed to save energy, optimize long-term efficiency and integrate seamlessly with all energy management systems. The control also offers Advanced Input Determination for firing rate and water temperature-based algorithms for multiple boilers, and a USB data-sharing port to streamline and simplify commissioning, assist with troubleshooting, and to enhance performance analysis.

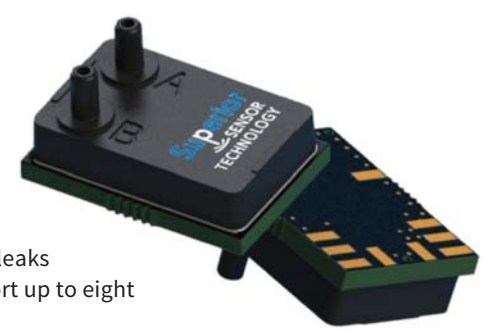
Bryan Boilers

ProAct Alarm Management

Emerson's ProAct Alarm Management offers facility managers customized responses to facility, refrigeration, HVAC, environmental and other alarms. Part of the ProAct monitoring solution. Safeguards food quality with temperature monitoring and extends the life of fresh foods with environmental control. Receives, prioritizes and analyzes equipment and system alarms from connected devices.

Emerson

Industrial Differential Pressure Sensor Technology



Superior Sensor's differential pressure sensor technology — NimbleSense — can improve the detection of ammonia leaks or clogs in HVAC or industrial refrigeration equipment. When used in HVAC and industrial equipment, this precise measurement capability enables the system to accurately monitor the pressure drop of ammonia as it flows through the equipment, alerting operators of possible hazards. Detecting changes in ammonia pressure flow at very low pressure ranges may indicate possible leaks or clogs in the system. The ND Series of differential pressure sensors support up to eight calibrated pressure ranges in one device.

Superior Sensor Technology

Indoor Air Quality Multisensor

Siemens' IAQ multisensor is a 7-in-1 sensor that acquires the value of temperature, relative humidity, carbon dioxide, volatile organic chemicals, particle matter as well as sound pressure and illuminance as complementary info. The sensors are used as a measuring sensor for building automation and control systems or display units. Multisensors are designed for wall-mounting. They are suitable for use with most commercially available recessed conduit boxes. Compliant with WELL, LEED building certification in terms of people's well-being. Output signal supporting BACnet (IP and MSTP) and LoRaWAN. RESET-certified.

Siemens

Outset HVAC Lineset Insulation Jackets

RectorSeal releases new code-compliant HVAC lineset jackets offering protection from wind, code-compliant UV rays and abrasion. The Outset jackets — durable, UV-resistant PVC foam insulation — include a hook-and-loop fastening system that is bonded and sewn for extra adherence. It allows the lineset insulation jackets to be both removable and reusable for easy installation and maintenance. Available in three wall sizes, they are designed to fit residential and commercial ducted and ductless HVAC systems. The insulation provides a secure, breathable, tight fit, covering multiple lineset diameters, and do not fray when cut to size.

RectorSeal

Tronic 4000 C Electric Tankless Water Heater

The Tronic 4000 C electric tankless water heater from Bosch is designed for residential and light commercial point-of-use, under-sink installations. It delivers 100% electric, high-efficiency on-demand hot water with a compact design for significant energy and space savings. At only 8.5 in. x 13 in., and only 4.4 lb., it can be wall-mounted directly under the sink. Because it runs on electricity and doesn't hold water, there is no venting and virtually no maintenance required. Comes in four models: 3.5 kW, 6.5 kW, 8.5 kW and 10.5 kW, delivering up to 96 Uniform Energy Factor ratings. Ideal for use in office buildings/break rooms, apartments, warehouses and stadiums.

Bosch Thermotechnology

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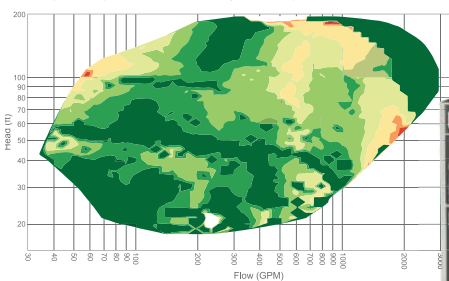

Climate Change, Pirates, and a Milestone

"Teach a man to fish, and you feed him for a lifetime." But what happens when global warming takes away the fish?

Larry Clark
A regular contributor to HPAC Engineering and a member of its editorial advisory board since 2012, the author is a principal at Sustainable Performance Solutions LLC, a south Florida-based engineering firm focusing on energy and sustainability. Email him at larry@sustainflorida.com.

This June marks the 10th anniversary of *Clark's Remarks*. So, for a decade now, I have been writing about the effects of climate change on our Earth and on our industry. Some of those effects, like sea level rise and increasing ocean temperatures, are obvious. Others, however, are not.

My most recent column looked at air pollution 60 years after passage of the first Clean Air Act in 1963. I noted the irony of the American Lung Association's latest conclusion in its annual *State of the Air* report: "Climate change is making the job of cleaning up the air more difficult."

Now, a recent paper published in the American Meteorological Society's *Weather, Climate and Society* journal even links higher ocean temperatures to an increase in the incidence of maritime piracy. Yes, piracy.

Pirates, of course, have been around since the beginning of maritime shipping and they have long been a favorite adventure theme for Hollywood movies, from **Errol Flynn**'s *Captain Blood* to **Johnny Depp**'s Capt. Jack Sparrow in the popular *Pirates of the Caribbean* series. But a decade ago, **Tom Hanks** also brought *Captain Phillips* to the big screen, depicting that title character's harrowing, real-life ordeal when his merchant ship, the *Maersk Alabama*, was hijacked by Somali pirates in 2009.

That story reminded us that piracy at sea has not gone away. In fact, it is still such a significant threat to maritime shipping that it has given rise to armed escorts on ships and private maritime security companies around the world.

According to experts, the most active areas globally for maritime piracy today are:

1. Northwest Africa, the Gulf of Guinea and the Niger River delta;
2. Red Sea, Somalia, Horn of Africa, Gulf of Aden, Indian Ocean;
3. Indian subcontinent and Southeast Asia (Indonesia, Bangladesh, Malaysia, Malay Strait, South China Sea, Singapore Strait);
4. South and Central America, the Caribbean;
5. The coast of the Gulf of Mexico.

The paper's authors, **Bo Jiang**, of the University of Macau, and **Gary LaFree**, from the University of Maryland, studied recent acts of piracy off East Africa and the South China Sea. They analyzed more than 2,000 incidents over a 20-year period, and concluded that warmer ocean surface temps had severely depleted local fisheries. And, as fishing became less viable, they found, many fishermen turned to piracy. Conversely, the paper's authors also noted a correlation in the opposite direction. When there was an increase in fish production, there was a corresponding decrease in pirate activity.

Jiang and LaFree added a *Significance Statement*. In part, it reads: "There is little evidence on the effect of climate change on criminal behavior. This study seeks to quantify the impact of a specific type of climate change—rising sea temperature—on maritime piracy, a type of crime that is linked exclusively to the ocean."

So, now we know that climate change affects all of us, even pirates. *Aargh!* HPAC

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