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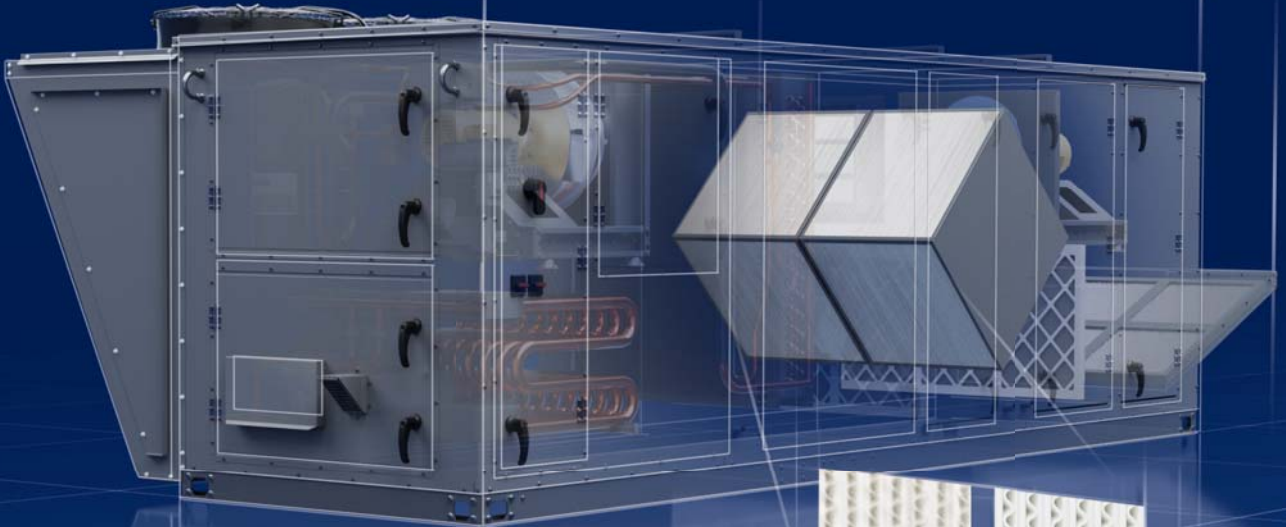
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COVER STORY: Urgent Lead Pipe Replacement Projects Now a Funding Priority

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By Rob McManamy

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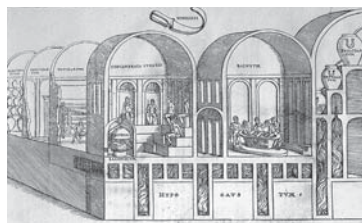
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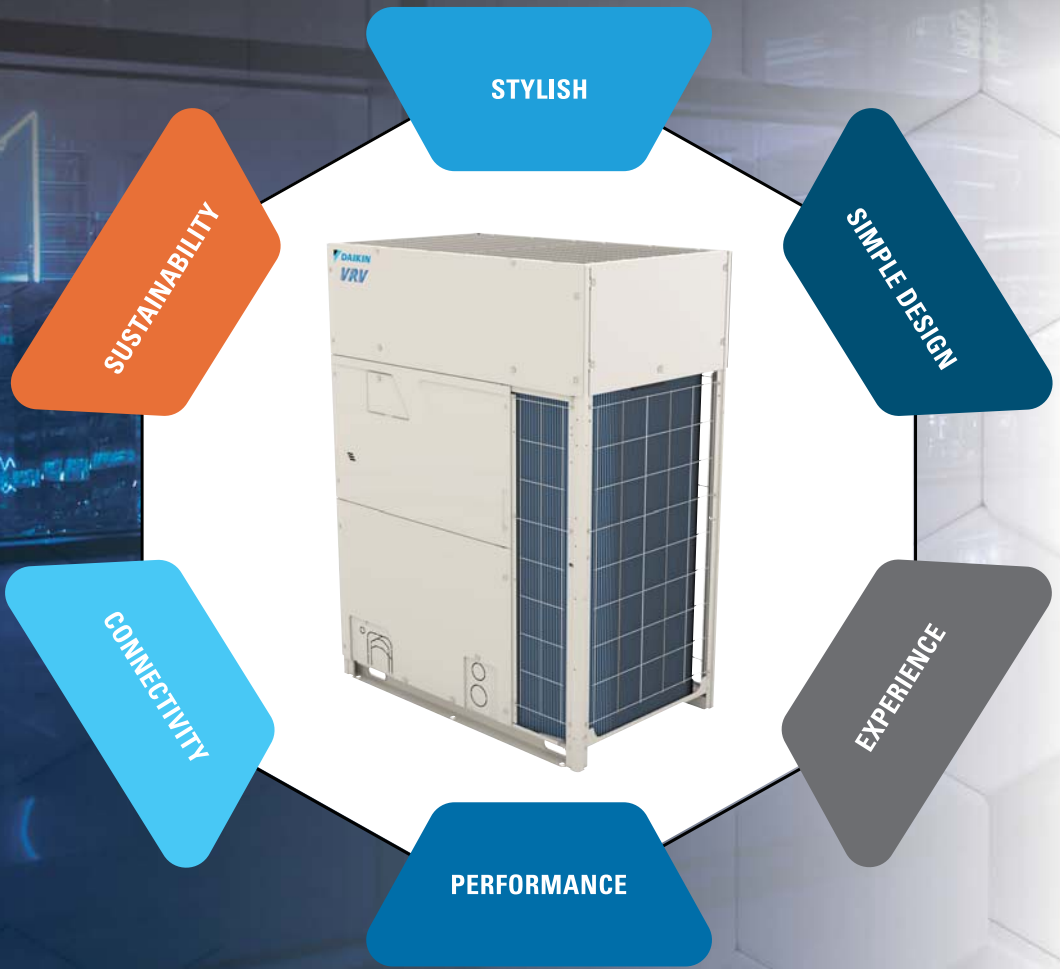
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Time to Exhale, But Still Step Up

As I write this, I am happy to report that on Sept. 14, the director-general of the World Health Organization (WHO), Dr. **Tedros Adhanom Ghebreyesus** said, "Last week, the number of weekly reported deaths from COVID-19 was the lowest since March 2020... We have never been in a better position to end the pandemic. We're not there yet, but the end is in sight." Wow.

Take a moment to think how long we have all yearned to hear those words from someone in authority. Early on, as I recall thinking when I vacated my downtown office, we all wanted to believe that such relief was just two weeks away. Then, that turned into a month or two. And then, well, our lives soon became forever altered.



Rob McManamy
 Editor-in-Chief

Now, four or five vaccinations later, the WHO is reminding us that there actually can be an end to all of this.

"(But) a marathon runner does not stop when the finish line comes into view," added Dr. Ghebreyesus. "She runs harder, with all the energy she has left. So must we. We can see the finish line. We are in a winning position, but now is the worst time to stop running. If we don't take this opportunity now, we run the risk of more variants, more deaths, more disruption, and more uncertainty."

And none of us want that, of course.

Instead, we crave certainty and steadiness. And that goes for our government, as well. Even Wall Street values stability above all else, in our markets and in our institutions. But stability, I think we've learned in recent years, is not quite the lead-pipe cinch we all may have taken for granted for most of our lives.

As the saying goes, "Freedom isn't free." And neither is democracy, it appears.

So, with that in mind, please forgive this bit of a detour here, but I encourage all of

you who read this to participate in your local election processes this fall, regardless of your political persuasion. I know we're all tired and worried about our jobs and our families, but well, this is important, too. If, like me, you grew up swearing the 'Pledge of Allegiance' every day at school, it seems like now is the time to put civic action behind those words.

Toward that end, this November, I will serve as an election judge again in my local community. That's something that I had started doing in 2008, but stepped away from during the pandemic for, well, health concerns.

But now it is the health of our democracy that I am more worried about. And this seems like the least I can do to help. So, I encourage those of you who can to please consider taking such action, as well. Granted, I can't say being an election judge is a totally thankless job, because our local village president always brings doughnuts for the judges, even when he's not on the ballot. But being an election judge is still an underappreciated role, pretty much all over the U.S. And in my experience, it is performed mostly by retirees, just looking to give back a little to their local communities, and to their country. Public service, we used to call it.

In fact, in 2010, I met a fellow volunteer who was then 84 years of age and operating on just one foot, having lost the other to diabetes. Incredibly, he was one of the cheeriest and most upbeat people I had ever met and we chatted throughout the day as midterm voters trickled in and out. As it turned out, my new friend and colleague had been one of the first African-American members of the U.S. Marine Corps, having joined the service right after Pearl Harbor as an underage volunteer with a note from his mother. At the time, African-Americans were segregated and trained separately in Montford Point, NC.

Nearly 70 years later, after *all* the adversity he had faced in an extraordinarily full life, which included turbulent duty as a Chicago police officer in the 1960s, my new friend *still* wanted to give back. In October of 2020, at the age of 95, he passed away.

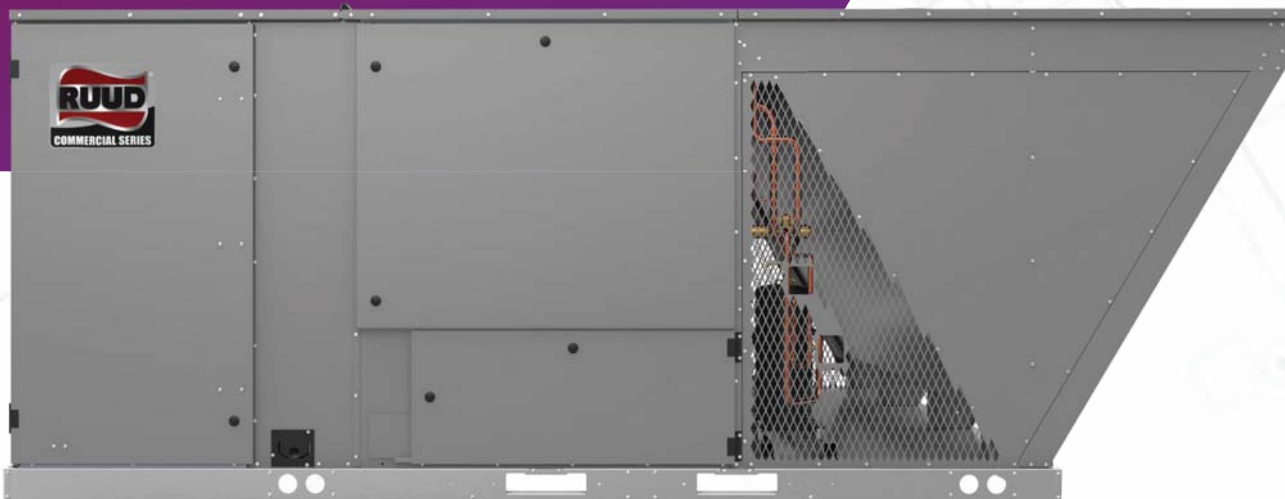
This Election Day, I hope to honor his memory by pinch-hitting for him at the polls. Others can do so simply by voting.

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COMMERCIAL



Economy Rolls On As Storm Clouds Roll In

Even as conflicting measures pile up and recession fears mount, the national project pipeline remains full and workers are still in high demand.



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If the pandemic has taught us anything over the last 30-plus months, it is to expect the unexpected. And that appears to be holding true for the U.S. economy this fall, even after it technically fell into recession this summer by recording its second consecutive quarterly dip in the Gross Domestic Product (GDP).

But in this new era of historic curveballs (and wild pitches), that traditional definition of recession may no longer apply, as other economic indicators on inflation and employment have continued to improve. At the same time, global supply chain issues have eased somewhat and massive federal funding of long-delayed infrastructure projects is moving forward.

Add to that the Aug. 16 signing of the unexpected, \$739-million Inflation Reduction Act (IRA), which will significantly boost clean energy jobs nationally, and the economic doom-sayers have repeatedly had to find new causes for temporary alarm.

At press time, even a potentially devastating national railworkers strike appears to have been averted at the 11th hour, avoiding feared chaos.

Remarkably, after slipping 5% in June, total U.S. construction starts rose 48% in July to a seasonally adjusted annual rate of \$1.36 trillion, according to the Dodge Construction Network (DCN). This gain resulted from the start of three multi-billion-dollar manufacturing plants and two LNG export facilities. However, even without these projects, total construction starts would still have increased 7%. Nonresidential building starts rose 79% in July, and nonbuilding starts jumped 120%, even as residential starts decreased 8%.

“Mega-projects aside, construction continues to improve despite the pressure created by higher interest rates and labor scarcity,” said DCN Chief Economist **Richard Branch** in August. “Combined with the strong labor market, this is another indicator that the U.S. is not currently in a recession. However, the Federal Reserve will

continue to aggressively raise interest rates until they feel that inflation is under control. This will create mounting pressure on building activity and potentially lead to a slowdown in construction starts by year-end.”

Through July, however, total construction was still 11% higher in the first seven months of 2022 compared to the same period in 2021. Nonresidential building starts rose 22% over the year, residential starts were 1% higher, and nonbuilding starts were up 16%.

Even so, the monthly Dodge Momentum Index (DMI) for August still ticked downward by 1.2%, thanks to a 5.6% drop in its institutional component. Meanwhile, the commercial component rose 1% in August. According to DCN, the DMI is its monthly measure of initial reports for nonresidential building projects in planning, which have been shown to lead related construction spending by a full year.

“In spite of weak institutional planning activity, DMI remained elevated in August, just a notch below July’s 14-year

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high. This indicates continued confidence from owners and developers that nonresidential building projects will be realized in the coming year,” said DCN Senior Economist **Sarah Martin** on Sept. 8. “Weaker economic conditions and rising interest rates, however, may grind down overall consumer and business confidence as we move into 2023 — translating into fewer nonresidential building projects breaking ground.”

Confidence Up, Backlog Flat

As a measure of the AEC industry’s confidence, Associated Builders and Contractors (ABC) reported Sept. 13 that its monthly Construction Confidence Index (CCI) readings for sales, profit margins and staffing levels all increased in August. The index for profit margins bounced back into positive territory while the sales and staffing level indices remained above 50, which still indicate expectations of growth over the next six months.

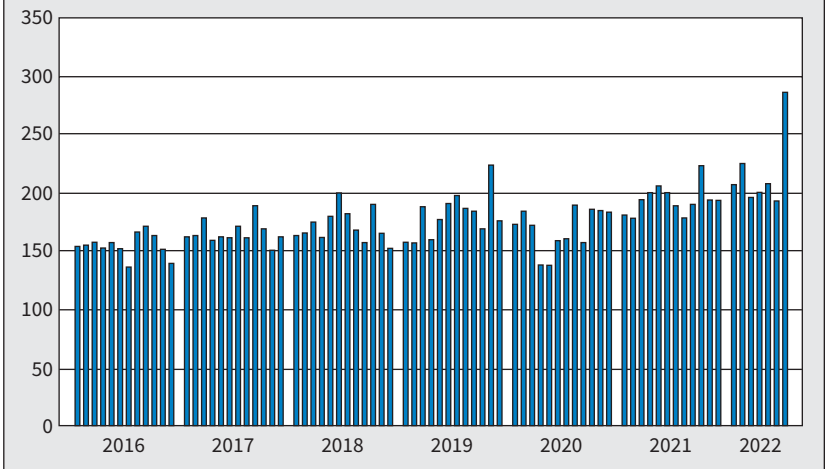
“Despite the high risk of recession, contractors collectively expect sales, employment and profit margins to grow over the next six months,” said ABC Chief Economist **Anirban Basu**. “Backlog is down from the cyclical peak in early 2022 and has been roughly flat in recent months.

“The buoyancy of the nation’s non-residential construction marketplace is really quite remarkable,” he added. “Rising interest rates have already driven the single-family homebuilding market into recession, but brisk nonresidential activity continues. Many nonresidential contractors are operating at capacity, and their principal frustrations relate to supply-side issues like worker shortages, equipment delivery delays and elevated materials prices, as opposed to demand for their services.”

Meanwhile, ABC also reported that its Construction Backlog Indicator (CBI) remained unchanged at 8.7 months in August, according to an ABC member survey conducted Aug.

The Dodge Momentum Index

(2000 = 100, Seasonally Adjusted)



Construction Confidence Index

Response	August 2022	July 2022	August 2021
CCI Reading			
Sales	55.9	55.2	61.3
Profit Margins	51.9	47.5	52.2
Staffing	59.0	57.5	60.1
Sales Expectations			
Up Big	3.8%	8.3%	8.9%
Up Small	47.3%	38.7%	46.6%
No Change	23.7%	23.2%	27.5%
Down Small	19.4%	25.4%	14.8%
Down Big	5.9%	4.4%	2.1%
Profit Margin Expectations			
Up Big	2.7%	1.7%	3.8%
Up Small	34.9%	29.3%	30.5%
No Change	34.9%	32.0%	39.8%
Down Small	22.0%	31.5%	22.5%
Down Big	5.4%	5.5%	3.4%
Staffing Level Expectations			
Up Big	5.9%	4.4%	4.2%
Up Small	39.8%	37.6%	42.4%
No Change	40.3%	43.6%	44.9%
Down Small	12.4%	12.2%	6.4%
Down Big	1.6%	2.2%	2.1%

© Associated Builders and Contractors, Construction Confidence Index

22 to Sept. 7. That result is a full month higher than reported in August 2021.

Overall, backlog is down from the levels of the second quarter of 2022,

but remains higher than at any point from March 2020 to March 2022,

the heart of the pandemic. While the CBI reading fell for contractors in the

South in August, it remains the U.S. region with the lengthiest backlog, Basu noted.

Inflation Peaks, At Least for Fuel

On the inflation front, the price of materials and services used in nonresidential construction fell 1.4% in August, according to the latest Producer Price Index (PPI) data, released Sept. 14 by the U.S. Bureau of Labor Statistics (BLS). Still, those prices remained 16.7% above the August 2021 level. The monthly dip was driven by a steep drop in fuel prices, specifically 13.4% for diesel.

But that also masked increases in the cost of other construction inputs, according to an analysis by the Associated General Contractors of America (AGC) of the BLS data. AGC cautioned that limited price declines cannot undo the harm of clogged supply lines and labor shortages.

“The price report highlights the mixed conditions contractors are experiencing, with many costs still rising sharply while others take a breather,” said AGC Chief Economist **Ken Simonson**. “Meanwhile, an industry survey we recently released found that supply-chain issues and labor availability are delaying many projects.”

That survey, conducted with tech giant Autodesk and released Aug. 31, asked construction firms about the impact of shortages and delivery delays on project completion times, among other topics. Fully 82% of firms reported projects had been delayed due to longer lead times or shortages of materials, while 66% reported delays due to shortages of employees or subcontractors.

The PPI data for inputs to nonresidential construction—the prices charged by goods producers and

service providers such as distributors and transportation firms—decreased 1.4% from July to August but nevertheless rose 16.3% since August 2021.

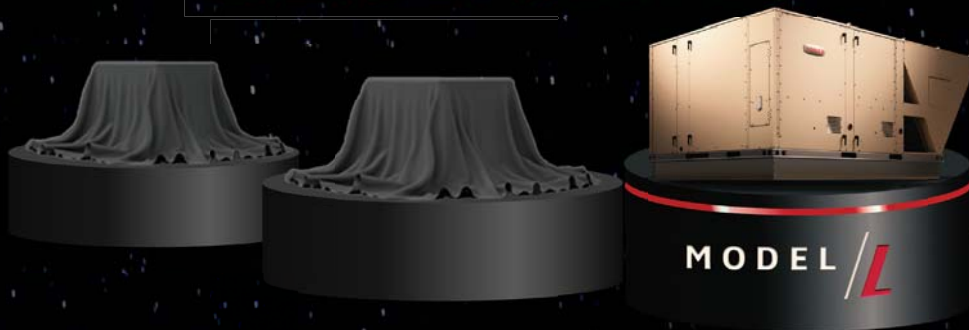
Prices of several widely used goods rose in August, partially offsetting declines for fuel, lumber, and some metal products prices. The price index for gypsum building materials such as wallboard jumped 3.3% for the month. Indices also rose for construction machinery and equipment (2.6%), flat glass (2.4%), copper and brass mill shapes (2.0%), ready-mixed concrete (1.6%), and asphalt paving mixtures and blocks (1.0 percent). Among services, the price index for equipment rental and leasing climbed 3.7%.

“Contractors welcome any relief they can get in the cost of most construction materials,” said AGC CEO **Stephen E. Sandherr**. “But it is still too hard to acquire most materials and

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Producer Price Index: August 2022

	1-Month % Change	12-Month % Change	% Change Since Feb 2020
Inputs to Construction	-1.4%	16.7%	40.5%
Inputs to Residential Construction	-1.4%	16.3%	40.8%
Plumbing Fixtures and Fittings	0.4%	10.9%	15.7%
Fabricated Structural Metal Products	0.0%	17.7%	54.8%
Iron and Steel	-5.1%	-5.7%	78.2%
Steel Mill Products	-5.7%	-4.6%	103.1%
Nonferrous Wire and Cable	0.1%	6.1%	43.3%
Softwood Lumber	-3.1%	14.8%	43.3%
Concrete Products	1.5%	14.3%	22.4%
Prepared Asphalt, Tar Roofing and Siding Products	0.2%	15.2%	35.1%
Crude Petroleum	-5.3%	38.8%	89.6%
Natural Gas	35.3%	118.0%	457.9%
Unprocessed Energy Materials	13.5%	75.0%	185.2%

Source: U.S. Bureau of Labor Statistics

prices remain quite elevated for many key products.”

For his part, ABC’s Basu also urged caution. “(The PPI) report supplies additional evidence that wholesale inflation is edging lower from the highs observed earlier this year. While this may create a sense of relief among contractors, this is no time for complacency.”

Global Factors, Active Fed

Though the pandemic has ebbed, its influence on the global economy and related ripple effects are far from over. And the war in Ukraine continues to threaten Europe in multiple ways.

“With COVID-19 lockdowns persisting in China, the world’s leading manufacturer, and Europe facing severe energy crises, supply chain disruptions will persist,” said Basu. “That suggests that construction materials and equipment prices are likely to remain elevated even if year-over-year price increases moderate. Public construction workers remain in short supply, including in the category of public construction. The upshot is that inflation is poised to remain stubbornly high even as some begin to declare victory. Estimators and others in the construction industry should be on guard for

occasional surges in inflation during the months ahead.”

Of course, the Federal Reserve has been determined since spring to lessen those surges. And the Fed was expected to raise its benchmark interest rate yet again this September, even if it brings on the recession that many fear.

“Exacerbating the current situation is the torrid pace at which the Fed is attempting to compensate for delaying the onset of initiating monetary tightening,” wrote ITR Economics CEO **Brian Beaulieu** in his Sept. 16 blog. “It is reminiscent of what (former Fed Chair) **Paul Volcker** did in the early 1980s, when the Fed intentionally set out to squelch inflation regardless of the near-term impact upon the general economy... The Fed’s goal seems to be pushing the federal funds rate to around 4%. We will be at 3% to 3.25% after Sept. 21. This means we may be nearing a break in the Fed’s push to deter economic growth.”

Construction employment, meanwhile, has continued to grow. In August, firms added 16,000 jobs, according to the latest data from the Bureau of Labor Statistics (BLS).

“Nonresidential construction activity is growing, but contractors universally report difficulty hiring as many workers as they need,” added

AGC’s Simonson. “With the industry unemployment rate hovering below 4%, finding qualified applicants is sure to remain a major challenge.”

Total construction employment climbed to 7,708,000 in August as both residential and nonresidential construction firms added jobs for the month. Nonresidential firms added 4,300 employees, as gains of 700 jobs at general building contractors and 5,600 at nonresidential specialty trade contractors offset a loss of 2,000 at heavy and civil engineering construction firms. Employment in residential construction—homebuilders, multifamily general contractors, and residential specialty trade contractors—increased by 10,900 in August.

Compared to August 2021, the construction industry has added 311,000 jobs, an increase of 4.2%. The nonresidential sector added 191,600 of those yearly job gains, an increase of 4.4%. Meanwhile, residential construction firms added 118,700 jobs between August 2021 and August 2022, an increase of 4%.

The unemployment rate among jobseekers with construction experience fell from 4.6% in August 2021 to 3.9% in August 2022 month, Simonson noted. He said the low unemployment



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rate is consistent with the association’s recent Autodesk survey, which found that 93% of responding firms had open positions. Of those firms, 91% report having a hard time filling hourly craft positions, Simonson added.

Into the Crystal Ball

Looking ahead, the American Institute of Architects (AIA) this summer released the midyear update of its annual Consensus Construction Forecast, which combines the views of nine industry economists and forecasting agencies. Released July 18, the consensus outlook predicted 6% growth for nonresidential work in 2023.

“New project work coming into architecture firms, as well as inquiries for future projects, have been very strong, indicating design revenue at architecture firms will continue to grow,” said AIA Chief Economist

Consensus	Estimated \$	Forecast % Change		
		2021	2022	2023
Dodge Construction Network	Nonresidential Total	—	5.4	6.1
IHS Markit	Commercial Total	—	4.7	5.3
Moody’s Analytics	Office	—	0.8	3.6
	Retail & Other Commercial	—	7.5	4.9
FMI	Hotel	—	-0.4	13.5
	Industrial Total	—	9.4	8.4
ConstructConnect	Institutional Total	—	4.4	6.0
	Health	—	6.2	6.1
Associated Builders & Contractors	Education	—	3.5	1.2
	Religious	—	-1.1	5.6
Wells Fargo Securities	Public Safety	—	-1.3	5.6
Markstein Advisors	Amusement & Recreation	—	7.7	6.0

AIA Consensus Forecast, July 2022

Kermit Baker upon release of the forecast. He added, “Growing workloads have pushed up backlogs at architecture firms, now averaging seven months and near their highest level since before the Great Recession (of 2008-09).”

Challenges to the economy and the construction industry notwithstanding, Baker concluded, “The outlook for the nonresidential building market appears promising for both this year and next.” [HPAC](#)

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Our Smaller World, with ASHRAE's New Chief

Meet mechanical engineer Farooq Mehboob, the hopeful soul now channeling a half century of professional experience into one year of potentially pivotal leadership.



Joining us this summer from his home in Dubai, was the newly elected 2022-2023 President of ASHRAE, Mr. **Farooq Mehboob**, the international society's first-ever Asian-born president.

An accomplished mechanical engineer with more than 50 years of industry experience, Mr. Mehboob is the founder and owner of his own engineering firm, S. Mehboob & Co., based in Karachi, Pakistan. There, he is also a founding member and current chair of the Pakistan HVACR Society.

Over his career, he has been involved with more than 600 landmark projects across Pakistan and the Middle East. All along the way, Mehboob has been extraordinarily active in the growth and development of professional engineering support systems within his region and across ASHRAE internationally, during his decades of service.

This century, he has been a particular advocate of ASHRAE's ongoing globalization efforts, which perhaps are best exemplified by his own presidency. Here, he spoke with us about

the theme of his presidential year, "Securing Our Future," and the urgent necessity of global cooperation and collaboration among engineers that can help to solve our planet's most pressing problems.

What follows is an edited transcript of our recent podcast:

HPAC: Mr. Mehboob, thank you for joining us. And congratulations on assuming the top spot at ASHRAE this year. I listened to your inaugural address and feel inspired by your remarkable life story. Can you please briefly recap your career path for us, which now spans over half a century?

Farooq Mehboob: Yes, thank you, sir. It's a pleasure being with you. As you say, my career does go back a long ways. After graduating as a mechanical engineer in 1965, I went to work for the local Trane distributor in Dakar as an applications engineer. We not only sold equipment, but offered design, as well. But back then, we were in the "slide rule era." Calculators and fax

machines had not yet been invented. So, we communicated then with snail mail, phone calls, and telegrams.

A couple of years later, I joined Intercontinental Hotels, a subsidiary of Pan Am World Airways, and became chief engineer of the Intercontinental Hotel in Dakar. I went on to become the chain's regional chief engineer, looking after the operations and maintenance for hotels in Sri Lanka, Pakistan, Afghanistan, and the Middle East. It was a tremendous learning experience and I got to see the high and mighty close up and travel a great part of the world... After the breakup of Pakistan in 1971, I moved to Karachi in West Pakistan and worked with Intercontinental there.

In 1980, I went to work for myself. For an engineer with limited resources, consulting is a good option. I started in the garage of my home in Karachi with a couple of part-time staff, and my wife as the manager and accountant. We grew from a five-person staff to a firm of about 30 people by the late 1990s. By then, two of my sons had graduated as engineers and had joined the business. We grew rapidly and opened our office in Dubai in 2000.

HPAC: And that was a very significant move for you in many ways.

FM: Yes. Dubai was a stepping stone for us to the Middle East, North Africa and Central Asia. Across the region, I've been involved in MEP systems for airports, high-rises, hospitals and hotels. And we now have offices in Islamabad and in Lahore, as well... My business is now mostly run by my sons and my daughter-in-law who is also a mechanical engineer. All are active in ASHRAE. Today, I live mostly in Dubai, and this helps me to devote a lot more of my time to my ASHRAE family.

HPAC: Tell us a bit more about that extended family. You are now ASHRAE's first Asian-based president. That is a significant milestone, even for an organization with such a large international footprint. So, you personally have witnessed much of that global growth within the organization, which now has members in more than 130 countries. When did you first become involved with the organization and could you ever have foreseen that you would one day be its president?

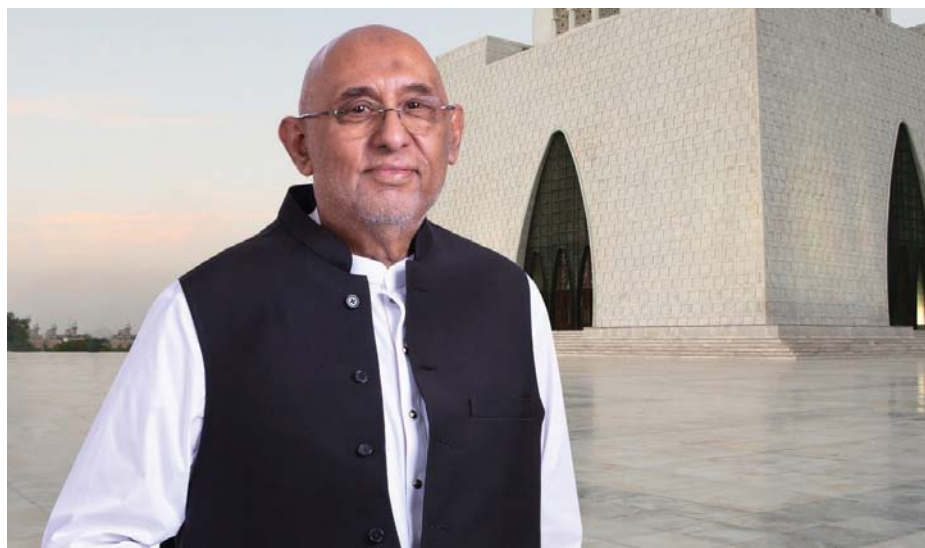
FM: My interest in ASHRAE started about the time I had set up my consulting practice in 1980. I needed to understand HVAC design and have access to reference material. The one-stop shop for my needs then was the *ASHRAE Handbook*, so I became a member. As a consultant, one needs to engage with industry, so my network of professional contacts grew. And the same realization that gave birth to ASHRAE came to Pakistan HVACR professionals a century later. We needed a platform to engage with each other. So, I, along with about 20 other professional engineers founded the Pakistan HVACR Society in 1994.

We were inspired by the ASHRAE model and applied for membership in the ASHRAE Associates Societies Alliance. By then, I had traveled to an ASHRAE winter meeting, so when ASHRAE created a Region-at-Large in 2001, I felt the time had come to form a chapter. So I carried a petition to the Region-at-Large Conference in Reading, UK. At that time, the region had three or four chapters. Today, it has 30 chapters in 16 countries. Back then, Europe was also part of it before it was spun off as a separate region.

So I have been involved with ASHRAE international activities across three continents. And I have received its John F. James Award for International Service. ASHRAE has been a passion for me for the last 40-plus years. At Society, I have served on CTTC (Chapter Technology Transfer Committee) now

for seven years and its my ninth year on the board. Frankly, I did not foresee that I would one day be the president of ASHRAE. That possibility only occurred to me when I became Vice President, because that's the big step in the ladder to top leadership.

And I have never felt constrained on account of my ethnicity or Pakistani origin because ASHRAE is a truly global community where race, religion, color, etc., do not count. What counts is our pursuit of our vision for a healthy and sustainable built environment for all. **I wish the world were more like ASHRAE.**



Mehboob has much to do before he can retire to pursue his other passion: history.

HPAC: To that point, has the fact that today we are ALL facing shared global challenges, like the pandemic and the climate crisis, made the world smaller, would you say? At least across the engineering community?

FM: Rob, the pandemic has brought about the realization that no one is immune. No matter where we live, we are all in it together, for better or for worse. The challenges we face today will impact everyone. It doesn't matter where the molecules of carbon dioxide and methane are coming from to get into the atmosphere. Their impact is global. And there is

an interconnectivity now in the world on a scale we have never seen before, whether it's on complex supply chains or distributed manufacturing. Instant communications have made the world smaller in many aspects and more interdependent.

It has impacted the way we work and collaborate with each other. Not so long ago, 'work from home' was not something that organizations seriously thought about. But technology has spawned an evolution. I have engineers in my company working and collaborating in real time in half a dozen different countries. I believe this

is great for the world, actually. It brings people together, unleashing the power of collaboration. And the engineering community is certainly a beneficiary of this. In fact, I don't think we will ever revert to our old patterns of work. We've passed into a new digital age, which will define the way we work. And the virtual experience is evolving in a manner that is more akin to the face-to-face environment. This will take more time. Because the workforce needs to learn the new technology and the way it will work. So I believe workforce training is an area that we will really need to concentrate on.

Bottom line: The world is smaller and engineers are now closer.

HPAC: *The theme for your presidential year is “Securing Our Future.” Could you please speak about that a bit and what those words are meant to convey in these insecure times in which we now live?*

FM: Well, ASHRAE has now experienced 60 years of unparalleled success. We grew from 72 chapters in North America in 1956 to 200 chapters worldwide today. But we’re now at a critical point in our evolution. Our past success could lead us to believe that we are invincible. But without change, we’ll become stagnant.

“Securing Our Future” speaks to the need to adapt and be ready and able to overcome the challenges we face. Whether these are from the pandemic, from climate change, the need to develop new technologies, and so on. To “secure our future,” we must equip our members with new tools, new skills, and new resources, so that they remain on the cutting edge of their profession.

I have drawn from my personal experience on how this can be achieved. I believe it is important for us to have strong and trusted relationships across our industry, as well as accurate and insightful information about the state of our profession and the needs of our members. And if we use these relationships and knowledge together, along with a willingness to adapt, then we will be able to secure our future. But to do all this, we will need to espouse diversity in its true meaning. Diversity of thinking, in a welcoming environment. Not simply ticking boxes for race, color, gender, etc.

To be more truly diverse in our thinking, there are two prerequisites: transparency and participation.

As an organization, we need to be fully transparent to our members and encourage participation to develop the strengths that we need to secure our future. So, we have a number of initiatives and actions planned for the year to build strong partnerships with our associate societies and industry. We’re

going to be having a *Global HVACR Summit* in Istanbul this October, along with ASHRAE’s second international board meeting, and the region-at-large’s chapters regional conference. The critical issues of the day which impact our industry will be discussed and an action plan developed. Moving forward, we hope to have these summits every couple of years.

To interact and understand the needs of our industry, we are also planning in the coming year to have three industry roundtables where we will sit down with industry leaders in manufacturing, distribution, etc., and discuss how ASHRAE can fulfill the market and industry needs and serve our members better. To make ourselves more transparent, we’re going to distribute agendas and “livestream” our key meetings of the board and councils. And we’ll continue to streamline our processes, so that ASHRAE is more ready to react and provide the technical services needed. That’s how we intend to secure our future.

HPAC: *Finally, like a number of senior leaders at ASHRAE, you are now an accomplished engineer in your seventies. And you have seen a lifetime of global steps both forward and back, successes and continuing challenges, more so in international relations than in engineering. In our February podcast, we recently asked your colleagues, former presidents Don Collier and Tom Phoenix, co-chairs of the new Decarbonization Task Force: Why not retire? How would you answer that same question?*

FM: Rob, I’m going to confess something. I’m of the view that as long as a person can contribute, or give back something that he or she has learned or gained over their career, then they still have to be in the game. I have learned almost everything I know about my profession from ASHRAE. I have trusted friends across the world in ASHRAE now, so it is like family for

me. So retirement would mean that I am ready to give up my family, and I am not ready to do that.

But I have reduced my work commitments, and my sons practically run the business now. I simply advise them on key points if they ask for advice. So, that has been wound down and you might call me semi-retired from my company. And after my presidential year at ASHRAE is over, I will have much more time to do the other things that I want to do. I’m always reminded of this quote from **Winston Churchill** when he eventually retired, after winning the war and being prime minister and everything else in his great life.

He then took up painting, and sat by a brook and did landscapes. And he was a lousy painter. So, someone asked him why he did that. Churchill said, “I had always wanted to be a painter, but I just never had the time because I had more important things to do. But now I do have the time, and this is what I love.”

Me? I love history. I love to travel and go places and interact with people of different cultures, see how people live and so on. So I hope that I will have the time to do that and that I may even write a bit about my experiences over my lifetime. Because I really think that one of things you need to do when you go is to leave some thoughts behind. That’s important, I believe.

HPAC: *That’s a good goal, it would seem. Hopefully we can connect with you here another year or two down the road to hear what new insights you have gained. In the meantime, thank you again for your time here and we wish you the best of luck with all that you have ahead of you in your presidential year and beyond.*

FM: Thank you for having me, Rob. It’s been a pleasure. And thanks also to *HPAC Engineering* for all that you do, as well. [HPAC](#)

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Urgent Lead Pipe Replacement Projects Now a Funding Priority

Recent crises in Jackson, MS, and Flint, MI, highlight a much broader national infrastructure emergency that finally seems set for significant federal resources.

EPA



By ROB MCMANAMY
HPAC Editor-in-Chief

Mississippi's state capital entered its second month of an emergency boil order for unsafe drinking water this September, as a bitter battle between its governor and the city mayor intensified over federal infrastructure funding that the state had previously turned down.

Meanwhile, local residents, schools, businesses, and municipal services all scrambled to adjust their fall planning to prioritize short-term survival, in addition to longer-term solutions.

But as stark as the City of Jackson's fate had become, seemingly overnight,

it was ultimately not all that different from recent drinking water crises that had previously struck and continue to concern the aging cities of Flint (MI), Milwaukee, Chicago, New York, Boston, and others. In fact, Mississippi's latest Infrastructure Report Card from the American Society of Civil Engineers (ASCE) gave its drinking water systems a grade of 'D' in 2020 and warned then that the state needed to increase related investments drastically:

In 2015, the U.S. Environmental Protection Agency (EPA) estimated that Mississippi needs \$4.8 billion over the next 20 years to fund safe drinking water infrastructure for the people of Mississippi. Much of the state's current drinking water infrastructure is beyond or nearing the end of its design

life, with older systems losing as much as 30-50% of their treated water to leaks and breaks...

According to the Mississippi Department of Health's (MSDH) Bureau of Public Water Supply, the state has 1,170 public water systems that must comply with the Federal Safe Drinking Water Act (SDWA). The condition and capacity of Mississippi's drinking water infrastructure influences the systems' ability to treat, store, and deliver potable drinking water at adequate pressure to the state's population. In Mississippi, the percent difference of billable water to treated water (non-revenue water or water losses) averages approximately 15%; older systems lose as much as 50% of the water treated. The high leakage rates and water main breaks are mostly

due to the aging pipes of legacy water systems in the state. Some pipes were laid as early as the 1920s, while other water systems consist of pipes that were laid from the 1940s to 1980s. Many of these networks have aged past their useful life span.

On Sept. 7, national ASCE President **Dennis Truax**, himself a Mississippi resident, said, “My heart goes out to all of those impacted in Jackson. No one should be without safe drinking water in the 21st Century.”

He added, “All of the utilities in Mississippi are doing what they can to protect the citizens they serve. However, with very limited resources, these systems have become increasingly susceptible to water main breaks, treatment facility problems, and other infrastructure failures. Funding from the bipartisan Infrastructure Investment and Jobs Act (IIJA) is providing significant resources to the state’s drinking water systems—\$429 million over five years.”

“While this figure is not enough to completely reverse the decline of the state’s systems, improved planning, data, and financial assistance is a crucial step to help utilities tackle deferred maintenance projects, and better withstand extreme precipitation, wind, and other natural hazards,” said Truax.

Nationally, of course, ASCE has been sounding the alarm for decades, ever since launching its overall U.S. **Infrastructure Report Card** in 1998 and re-issuing grades every four years in 16 categories, ranging from transportation and energy to water systems and waste management. Ironically, the most recent report card in 2021 actually raised the national grade for drinking water systems from ‘D’ to ‘C-.’ But that assessment was made well before the latest disastrous failures in Jackson.

Even so, the 2021 ASCE Infrastructure Report Card pulled no punches in reiterating its dire warnings for the U.S. drinking water sector:

“Our nation’s drinking water systems face staggering public investment



needs over the next several decades. ASCE’s 2020 economic study, *The Economic Benefits of Investing in Water Infrastructure: How a Failure to Act Would Affect the U.S. Economic Recovery*, found that the annual drinking water and wastewater investment gap will grow to \$434 billion by 2029.

“Additionally, the cost to comply with the EPA’s 2019 *Lead and Copper Rule* is estimated at between \$130 million and \$286 million. Drinking water utilities also face increasing workforce challenges. Much of the current drinking water workforce is expected to retire in the coming decade, taking their institutional knowledge along with them. Between 2016 and 2026, an estimated 10.6% of water sector workers will retire or transfer each year,

with some utilities expecting as much as half of their staff to retire in the next five to 10 years.”

That said, the positive turn taken last November in the enactment of the new Bipartisan Infrastructure Law (IIJA) finally promises actual progress. As a result, the federal government is providing some \$55 billion to support capitalization projects through the Clean Water and Drinking Water State Revolving Fund (SRF) programs, including \$15 billion specifically for lead service line replacement projects. EPA estimates there are 6 to 10 million lead service lines still in the ground across the country

In May, EPA announced that it is making available \$7.28 billion in new federal grant funding for the Drinking Water State Revolving Fund (DWSRF). This funding can be used for loans that help drinking water systems install treatment for contaminants, improve distribution systems by removing those lead service lines and improve system resiliency to natural disasters such as floods.

“I have visited with and heard from communities in Chicago, Flint, Jackson, and many other areas that are impacted by lead in drinking water,” said EPA Administrator **Michael S. Regan** last



ASCE Gov't Relations @ASCEGovRel · Sep 2

Jackson, Mississippi's water crisis is sadly emblematic of a nationwide issue regarding water infrastructure.



wsj.com

Jackson Water Crisis Forces Cities to Confront Their Own Aging Infras... Utilities across the U.S. say the situation in Mississippi's capital is a wake-up call to problems with the nation's aging pipes and pumps.

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December. “These conversations have underscored the need to proactively remove lead service lines, especially in low-income communities. The science on lead is settled—there is no safe level of exposure and it is time to remove this risk to support thriving people and vibrant communities.”

At that time, the Biden Administration announced a new “whole of government *Lead Pipe and Paint Action Plan*,” which followed an EPA review of the latest revisions to the original 1991 *Lead and Copper Rule*. Announced in December, the new *Lead and Copper Rule Revisions* (LCCR) were subsequently delayed twice, but took effect in June. Their goal is “to advance critical lead service line inventories that are necessary to achieve 100% removal of lead service lines.”

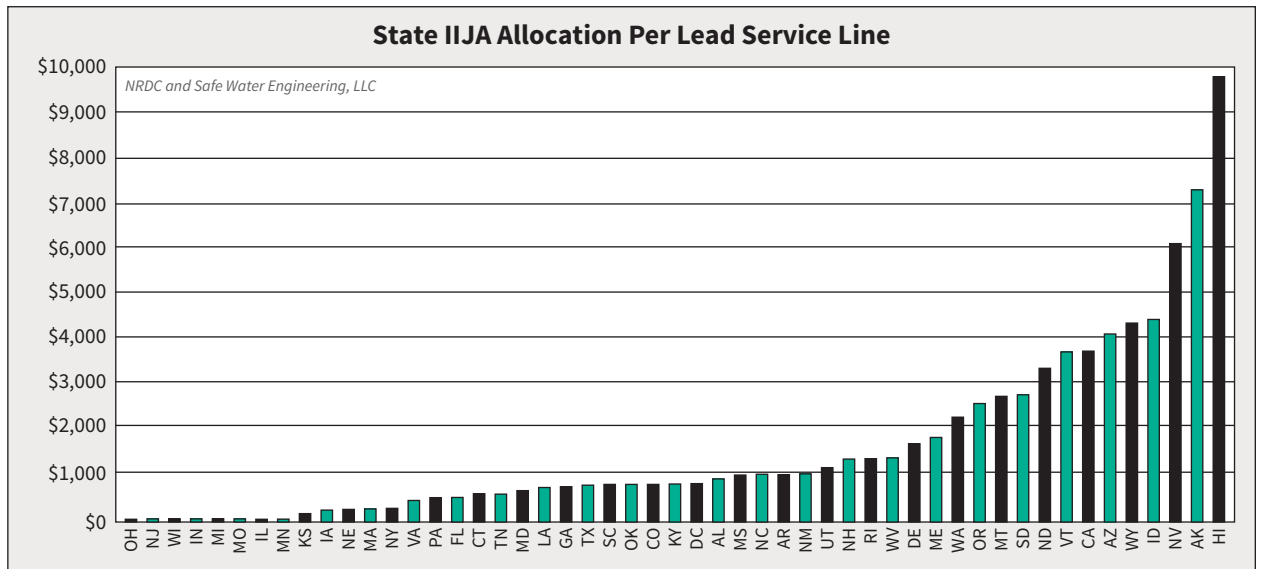
EPA said it would also develop a new proposed rule, the *Lead and Copper Rule Improvements*, to help to implement and complete the replacement projects “as quickly as is feasible.” EPA also intends to consider opportunities to strengthen tap sampling requirements and explore options to reduce the complexity and confusion associated with the action level and trigger level, with a focus on reducing health risks in more communities.

At a June visit to the Pittsburgh offices of the AFL-CIO, EPA Administrator Regan joined Vice President **Kamala Harris** in announcing the LCR improvements and to cite tangible evidence of projects already underway. So far this year, they noted:

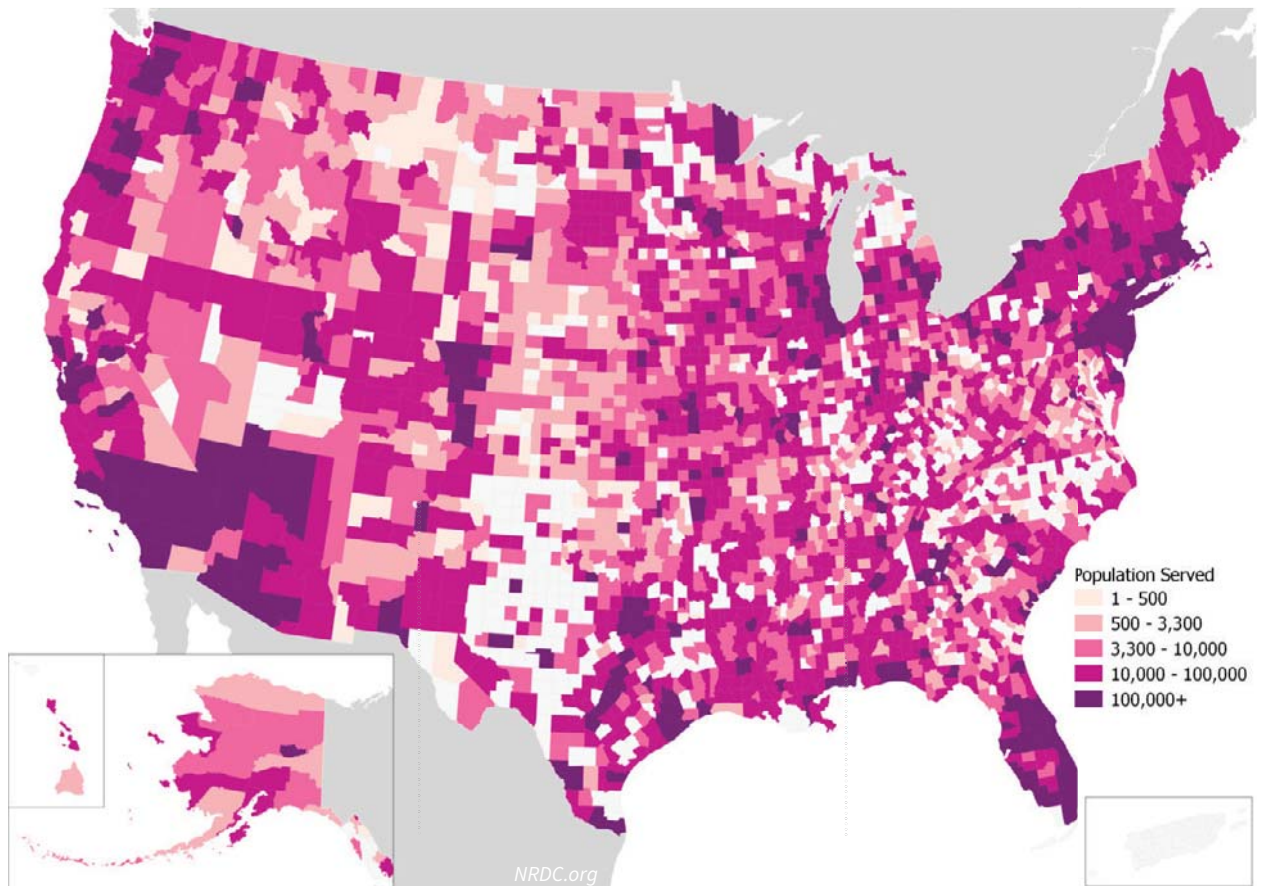
- The **City of Pittsburgh, PA**, has budgeted \$17.5 million to partner with the Pittsburgh Water and Sewer Authority to complete projects to remediate lead in drinking water;
- The **City of Toledo, OH**, plans to replace all private lead service lines in the city (approximately 3,000 lines) at no cost to homeowners. Additionally, the City will replace many public lead service lines co-located with private lines;
- The **City of Buffalo, NY**, has budgeted \$10 million for an expansion of its ROLL program so that at least an additional 1,000 homes can have their lead water service lines replaced. The City has already successfully replaced the lines in 500 homes and this expanded capacity will more than double its impact;
- The **Village of Elberta, MI**, has received \$3.4 million in grant and low-interest loans from the U.S. Dept. of Agriculture (USDA), leveraging an additional \$2 million in state assistance, to improve their water system and remediate lead. Approximately, 79

percent of the service laterals in the water distribution system are known or suspected to contain lead. USDA has an additional \$23.8 million in projects containing lead remediation that are nearing approval and other applications in development;

- The **City of Linwood, KS**, has been awarded \$350,000 award by the USDA for its Water System Improvements Project. Leveraging \$499,586 in U.S. Housing and Urban Development (HUD) Community Development and Block Grant funds and \$150,000 in applicant contribution, this project will enable Linwood to replace approximately 75 cast iron service lines that may contain lead joints and to make other necessary improvements;
- The **Anson Madison Water District** in Maine has received a \$6-million low-interest loan and \$3.5-million grant to mitigate lead exposure for 3,700 residents. The work will replace lead lines and remediate lead plumbing, pipes, and paint in two area high schools and local child care facilities;
- **Columbus County, NC**, has been awarded a \$9.5 million rural development grant from USDA to cover the construction and cost overrun of a new replacement school housing Pre-K through 8th grade. This new facility replaces two schools ranging from



NRDC is concerned that states with the most lead service lines may receive less funding per line.



Populations served by drinking water systems with 90th percentile lead samples above 1 part per billion. (NRDC)

60-94 years old with asbestos in most flooring and lead paint throughout.

Appearing with HUD Secretary **Marcia Fudge**, Vice President Harris and Administrator Regan also announced an additional \$500 million for states and local governments to reduce lead exposure and build healthier homes via the new **Justice40 Initiative**. That program allows states and municipalities to apply for the funds, targeting disadvantaged businesses and communities.

Of course, even as the federal government now moves more aggressively, some environmental advocates worry the size of the investment will not be enough and that the initial targets may not be the most needy.

“While there is much to like about this landmark federal investment in replacing lead service lines, key improvements are needed to equitably

distribute funding and align this assistance with need,” said **Cyndi Roper**, a senior policy advocate in Michigan for the nonprofit National Resources Defense Council (NRDC). “This is because the current state-by-state funding distribution formula is based on past drinking water infrastructure needs assessments that did not include the cost of replacing lead service lines.”

Writing in July on NRDC’s blog, Roper explained, “Every state has lead service lines, but some have significantly more than others. The highest concentration of lead service lines delivering water to homes are in the upper Midwest and Northeast states, as well as Texas. The states with the most lead service lines—like Illinois, Michigan, Missouri, New Jersey, New York, and Ohio—will receive far less per lead line than states with fewer lead service lines. For example, the states of Michigan and Missouri will

receive an estimated \$151 per lead service line, while some states with fewer lines will receive an estimated \$7,441 and \$10,098 per line, respectively.”

On the opposite page, NRDC projects the allocation for all 50 states. (See *NRDC.org* for the full data set.)

Roper says the fix for this problem is for EPA to quickly complete its *Drinking Water Infrastructure Needs Survey and Assessment* (DWINSA) and to redistribute the \$15 billion for lead service lines based only on the number of lead service lines in each state or territory.

Of course, if and when those funding allocation revisions happen remains to be seen. But for now, as noted earlier, the number of lead pipe replacement projects moving forward is only accelerating. And the hope, both nationally and locally, is that this long-delayed work will now move quickly enough to prevent the next Flint or Jackson. [HPAC](#)

VRF Zoning Delivers Results to San Antonio Offices

To maximize sustainability in its new headquarters complex, Credit Human embraced an holistic design utilizing a water-source VRF system.

Case Study by Mitsubishi Electric Trane.

San Antonio's revitalized Pearl development, just two miles from the city's popular Riverwalk and the famed Alamo, offers some of the Lone Star State's most desirable real estate. Locally owned shops and boutiques, chef-led restaurants, more than 600 residences, a twice-weekly farmers market, and the 5-Diamond Hotel *Emma* all can be found at Pearl, which operated as the Pearl Brewery for over a century before its closure in 2001.

Pearl was the ideal place for **Steve Hennigan**, CEO of Credit Human, to bring his vision for a sustainable new headquarters building to life.

Established in 1935 during the Great Depression, then under a different name, Credit Human was one of San Antonio's first credit unions. Its customer base has since expanded far beyond the city limits and now serves approximately 250,000 members in 43 states. Over the years, the business had clearly outgrown its 100,000-sq-ft office space.

In keeping with the credit union's core values, Hennigan, with the aid of design engineer Glumac, wanted the new HQ to demonstrate how good stewardship of both financial and environmental resources go hand in hand.

The resulting project has set a new standard for sustainable building design, encompassing ambitious but achievable goals for reduced energy consumption, water conservation and lowered carbon emissions. Glumac's design featured CITY MULTI® water-source Variable Refrigerant



The owner was determined to demonstrate good stewardship of both financial and environmental resources.

Flow (VRF) systems from Mitsubishi Electric Trane HVAC US (METUS), which proved to be essential in meeting these goals.

While one set of goals related to extremely high performance of the building, another set related to community responsibility. The latter fell well within the experience and expertise of **Bill Shown**, CEO of Pearl BUILD, LLC, the newly created real estate development subsidiary of Silver Ventures, which is the team that developed Pearl. The combination of essential and complementary skill sets made it possible to bring the vision of Credit Human's new HQ building to fruition.

Credit Human and Silver Ventures entered into a partnership in 2017, each settling quickly into their

designated areas of expertise. Hennigan would coordinate the environmental aspects while Shown handled the aesthetics of the building's planning, design and construction.

"This project is an example of a powerful partnership, where two parties with differing interests come together and learn from one another," explained Shown. "Together, I think we created something that's really unique."

Their creation, a 12-story, 200,000-sq-ft office space, opened in January 2021 as a showcase of their vision. A second structure, the Oxbow Tower, is an eight-story, 100,000-sq-ft office space adjacent to Credit Human. It was constructed as part of the project and uses the same systems and components as Credit Human.

ARRAY SE

HIGH EFFICIENCY CONDENSING BOILER



EASE OF
COMMISSIONING
& MAINTENANCE



DEDICATED
BOILER PUMPS



CASCADE UP TO 8 BOILERS
WITH A TURNDOWN RATIO
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INSTALLATION
AND RETROFIT
PROJECTS



BUILT IN
REDUNDANCY

THE ULTIMATE IN HIGH EFFICIENCY, HIGH PERFORMANCE & UNQUESTIONABLE RELIABILITY

The Riello Array SE is a stainless steel condensing, fan-induced, fully-modulating floor standing boiler. It is the newest addition to Riello's innovative Array boiler lineup. With a single heat exchanger inside, the Array SE is a single platform designed for easy installation and simple commissioning. It is the perfect solution for stand alone installation, or in cascade of up to 8 boilers for larger input applications.

The Arrays SE has a compact design full of innovative features including an onboard circulating pump, vortex analog flow meter, 7" color graphic touchscreen display, separate dedicated service/ commissioning display, universal vent adapters (fits most common venting materials), Modbus RS485 communication and proprietary plug & play cascade software. It is a true example of high performance in a compact design.

The Array SE utilizes a low emission pre-mix burner with high turndown (10:1 per boiler or up to 80:1 system turndown in cascade). Combined with Riello's patented heat exchanger design (legendary for its reliability & ultra-high efficiency), the Array SE sets the new standard for high efficiency, performance and reliability.

Combining Heritage with Sustainability

Shown envisioned a timeless aesthetic for the headquarters, paying homage to San Antonio's heritage. He wanted to incorporate modern design elements while using local artisan craftsmanship.

Once inside, employees and visitors are greeted by an open concept lobby before making their way to the work areas, conference rooms and communal spaces on the upper floors. The workspaces are designed for a maximum of 1,200 employees with desks housed in central areas rather than defined offices or cubicles, encouraging an open and collaborative office environment. In all, 80 meeting rooms of various types and sizes are available for employee use. The building also features a rooftop patio, cafeteria and community spaces.

The facility's aesthetic appeal and human-centered functionality would come with improved sustainability and energy efficiency.

Hennigan's goal was to reduce his utility bill by 96% on a square footage basis compared to the former Credit Human building. He also set high standards for carbon emissions and water usage.

"When you make long-term decisions, as you should with buildings, you should apply long-term thinking to all elements of the building," said Hennigan. "Where would you like your utility bills to be 20 to 30 years from now?"

Hennigan's ambitious goals turned out to be achievable through strategic planning and thoughtful design. Contributing sustainable features include window shades programmed to automatically raise and lower depending on the sun's positioning; water-reclamation tanks that capture approximately 97% of the property's rainwater; a one-megawatt rooftop solar array to provide power while shading the roof and reducing heat load on the building; and elevators programmed for optimized and efficient travel.

These features combine to help create a finely controlled, ultra-efficient building. In the first seven months of

its occupancy, Credit Human saw a 91% reduction in utilities and carbon emissions and an 85% reduction in water usage.

"The goal of this design was to reduce the demand on the building, so everything that was put into it had that thought process in mind," said **Matt Dunn**, MEP coordinator, Joeris General Contractors. "All of the elements combined to create the synergy that got the building to not only reduce demand, but ultimately allow it to run as efficiently as it does."

large quantities of air in a ductwork system," explained Dunn.

In a VRF system, outdoor units are connected to up to 50 indoor units via refrigerant lines. An inverter-driven compressor enables energy-efficient operation by modulating the flow so the system uses only the precise amount of energy needed. Instead of burning fossil fuels, all-electric VRF technology extracts ambient heat from the air or nearby water source, then uses refrigerant to deliver heating and cooling to designated comfort zones.



In a VRF system, outdoor units are connected to up to 50 indoor units via refrigerant lines.

VRF Made All the Difference

All-electric VRF zoning technology has earned the attention of environmental stewards and business leaders such as Hennigan by delivering value and helping to improve operating costs while maximizing sustainability and occupant comfort. VRF heat pump and heat recovery systems provide energy-efficient, high-performance heating and air conditioning to commercial spaces of all sizes and functions.

"From an efficiency standpoint, it's obvious why VRF technology does so much better, because you're working with refrigerant, a much more energy-dense medium as opposed to moving

Hennigan worked with the METUS team to design a water-source VRF heat recovery system with approximately 900 tons of capacity, supported by 152 ground-linked wells, to condition the new Credit Human HQ.

"It's basic physical and environmental stewardship," said Hennigan about his decision to go with a ground-linked water-source VRF system. "One of the things that most people don't understand about this area of the country is that water is a big deal. Cooling towers use lots of water, so by going with a ground-source system, we went from the design possibility of having six cooling towers to only two. That



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All of the equipment in a ground-linked water-source VRF system is designed to be installed indoors.

decision alone reduced our water consumption by more than one million gallons of potable water per year.”

Ground-linked systems supply a relatively constant water temperature, allowing the mechanical system to operate with optimized efficiency. These systems are especially advantageous in locales like San Antonio, where average outdoor air temperatures fluctuate by almost 90° F between summer and winter months. While winters tend to be mild, the region’s hot and humid summers force air-source mechanical systems to work harder to reach a building’s indoor temperature set point. By comparison, ground-water temperatures fluctuate by a much narrower range of 10-20° F. Ultimately, water-source systems used in these climates are able to deliver efficiencies three or four times higher than air-source VRF systems.

The HVAC system serving the Credit Human building achieves the highest level of energy efficiency and sustainability,” remarked **Steve Straus**, president of Glumac. “The ground-source geothermal system consisting of 300-ft-deep wells supports the

Mitsubishi Electric water-source VRF system. In the winter, the system is able to utilize the abundant heat in the ground that’s been stored through the summer months. In the summer, heat is reclaimed from air conditioning for domestic hot water.

“The water-source VRF system is probably the most efficient system you can design for this building,” said **Henry Delgado**, mechanical engineer for the southwest business unit, METUS, who

“ Cooling towers use lots of water, so by going with a ground-source system, we went from the design possibility of having six cooling towers to only two. ”

—Steve Hennigan, CEO, Credit Human

played an integral role in the system’s design. “It takes advantage of multiple levels of heat recovery and allows you to design your system independently of ambient outside air conditions. The building itself is 56% more efficient than a typical building utilizing the code

minimum equipment. It’s estimated to save 1.45 million kilowatts of electricity per year because of its highly efficient design and systems.”

Delgado went on to discuss additional benefits of water-source VRF technology, including its unique installation opportunities. All of the equipment in a ground-linked water-source VRF system is designed to be installed indoors. The water-source units at Credit Human are housed in mechanical rooms on each floor, stacked on top of one another. Indoor installation protects units from the elements and maximizes usable outdoor space.

Naturally, Hennigan found a way to utilize his freed-up rooftop real estate for added sustainability. The design team had ambitious plans for the building’s rooftop in the form of a 3,000-panel photovoltaic array. Combined, the panels provide one megawatt of capacity to supply roughly 40% of the building’s annual electricity demand. Credit Human believes it has the largest solar array of any mid-rise or higher building in North America, currently.

Driving Corporate Wellness

While Hennigan’s efficiency and sustainability goals were paramount, he also prioritized the health and wellness of the employees. Many of the design elements, including the CITY MULTI water-source VRF system,

played a direct role in making the new Credit Human building better for the environment, employees and the local community.

The commitment to wellness began with the selection of the build site. Walking and bike trails along the San

Antonio River sit a stone's throw from Credit Human's entrance. The building's interior encourages movement via a large, central staircase.

Keeping employees healthy involved more than just physical activity, however. Hennigan spared no detail when it came to maximizing employee wellness throughout the building.

"At complete capacity, around 1,200 employees can be in the building at any one time, and it should be really comfortable for them," said Hennigan. "It was designed to be open architecture. We made sure that the air flows freely and there are no offices that face any piece of glass."

One of the most critical elements to help meet wellness goals, however, was a reliable, high-performing mechanical system to maintain thermal comfort and indoor air quality (IAQ). The VRF zoning system was up to the task.

The fan systems are equipped with MERV 13 filters to maximize IAQ," explained Straus. "This, in combination with a dedicated outside air system (DOAS), provides excellent IAQ and mitigates the spread of airborne particles or illnesses."

"We always have to remember that we build buildings for people," said **Kimberly Llewellyn**, senior project manager, METUS. "Our ultimate goal is to ensure a healthy and comfortable living or workspace. That's where our systems really excel. Higher levels of IAQ are linked to higher productivity, better work attendance and even better moods and motivation."

VRF systems are the ideal solution for offering customizable comfort control, thanks to their zoning capabilities. With a traditional system, multiple rooms are controlled by one thermostat. VRF technology allows for each zone to have its own set point based on occupancy, usage or personal preference. In the Credit Human office spaces, the system is controlled through a singular interface, but thermostats can be found approximately every 20 feet, giving employees some autonomy over their comfort.

"What it really comes down to is giving more people control of their climate so they can be more productive, happier and want to come to work," said **Jamie Armstrong**, area sales manager for the southwest business unit, METUS. "This office is set up as an open office concept, but each person has their own level of control. You won't see half of the staff in coats and the other in tank tops. Everyone's comfortable."

High standards for efficiency, sustainability and wellness made the Credit Human building a complex and multi-faceted undertaking for the project team. But the facility has already delivered a significant return on investment.

"Every new construction building we bring into existence is going to be operating and probably not renovated for another 30, 40, or 50 years," said Llewellyn. "Think about what we need from our next generation of buildings. If a building is energy-efficient, comfortable and healthy, then a natural byproduct will be resiliency. That's the best insurance policy any building owner can have against unforeseen weather events, changes in energy prices or water supply issues. If you have this kind of resilient building, you're in a really great place to be able to manage whatever comes at you in the future."

Despite all of the unknowns about the decades to come, Hennigan is confident the systems he chose for Credit Human will continue to offer resiliency.

"We built a project that should last 100 years or more," he said. "When you have a 100-year horizon, the possibilities actually open up far greater than if you're just talking about 10-to-15-year horizons, where you're building something interesting and special, but not necessarily enduring."

As an increasing number of builders and building owners realize the benefits of all-electric VRF technology, including sustainability, durability, efficiency, comfort control, improved IAQ and reduced lifecycle costs, the market may

ENERGY STATS

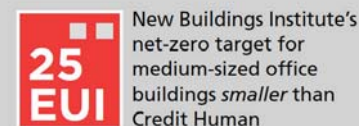
ENERGY USE INTENSITY (EUI) = Energy used per square foot per year



IN COMPARISON



63 EUI = Median for similarly sized buildings
(Source: [Building Performance Database](#))



soon be filled with construction following Credit Human's lead.

"This building is the future of building technology. It serves as a positive example for what developers can really achieve when they put energy first," advised Delgado. "My message to any developers out there would be, utility rates are only increasing. Now is the time for a sustainable building. So, why not your building?"

"I just thought this was an amazing project," said Hennigan in closing. "This team was amazing, the vision was amazing, as were all of the people coming together to work on this... the results of what we've created are amazing, and we get to live here." **HPAC**

Steps to Safety: Restarting Boilers After Summer Shutdown

Entire system must be carefully checked and procedures reviewed before any boiler can be safely placed back into operation for fall.



By ROBERT FERRELL
Senior Staff Engineer,
National Board of Boiler and Pressure
Vessel Inspectors (NBBI)

It's that time of year when heating boilers should be prepared for the heating season.

Before moving the boiler power switch to the 'ON' position, *survey the scene*. I've taken that command from my First Aid training. It means, "Before rushing in to help a victim, make sure you're not the second victim!" So, survey for potential

hazards created by an improperly operating boiler or improperly stored material in the boiler room.

Your survey should ask the following questions: "What is the condition of the boiler system?" and "Has any work been performed on or near the boiler during the summer shutdown?"

If work has been done on or near the boiler, perform a system inspection tracing fuel lines, feed lines, steam and blow-off piping, stack, and regulator vent lines. Check controls and control panels for evidence of damage and changes or loose connections. Inspect mechanical

assemblies such as burner linkage and safety valve springs for paint, dirt, and rust accumulation which wouldn't allow easy movement. Also, check that all ventilation and combustion air openings are clean and free from debris.

Review the *Manufacturer's Operation, Maintenance, and Instruction Manual* for operation instructions. Become familiar with the timing sequence of the automatic controls. Then do a start-up check:

- Verify water level in the boiler, and test the low-water fuel cutoff;
- Verify proper positioning of the fuel train valve;
- Clean the flame scanner;
- Verify that peep sights on the burner and boiler are clean;
- For steam boilers, verify operation of the feed/condensate system;
- For water boilers, verify that there is air in the expansion tank and that make-up water is available;

- Verify electrical power is available to both the blower (power burners and induced draft) and control circuit.

Start the boiler by moving the power switch to 'ON'. Reset all manual reset switches, low-water fuel cutoff (LWFC), fuel pressure switches, and pressure or temperature limits switches. Observe the start-up sequence. It may be necessary to isolate the boiler from the system in order to warm it up slowly.

Verify the flame conditions in the combustion chamber.

Based in Columbus OH, the author has more than 35 years of industry experience and a degree in mechanical engineering technology. He joined the National Board of Boiler and Pressure Vessel Inspectors (NBBI) in 1999, where he serves as a senior staff engineer in its training department. This article was first published by NBBI and has been updated as needed.

On gas-fired, non-condensing boilers, a cold start may produce condensate leaking from the gas-pass covers and casing. Once the boiler water temperature exceeds 150° F, the condensate should stop.

When the unit has warmed, turn power switch to 'OFF'. Verify the shut down cycle. Then restart. Let it come up to full firing rate and open isolation/stop valves to put it into the system. Monitor it throughout the day, looking at the flame, stack outlet, controls, and linkage. Verify gasket tightness for both water side and fire side.

If any abnormal condition occurs during start-up, then turn the power switch to 'OFF', and investigate the cause before restarting the boiler. **HPAC**



ABMA Maps Out Future Strategy

Building on recent members surveys, the next 18 months promise to be full of relevant and compelling content that will prove essential for navigating the challenges ahead.



Strategic Planning

This summer, ABMA engaged McKinley Advisors to partner with our staff and volunteer leaders to build on our recent successes. McKinley has a deep knowledge of the issues associations face and it is skilled at collaborating with executives and volunteers to craft effective and practical strategies.

During the last few months, ABMA engaged our members with a comprehensive survey to obtain key insights on how the industry continues to evolve and how ABMA can enhance our programs and services to meet the needs of our members and boiler supply chain. Almost 100 member contacts completed the survey and the results are rich with valuable data. The McKinley team followed the survey results with one-on-one targeted interviews with a cross section of members and supply chain partners.

By SHAUNICA JAYSON, ABMA

Since our founding in 1888, ABMA's mission has been to lead and unite the boiler industry through advocacy, education, awareness, and

a commitment to provide solutions to our members. ABMA is on the move now and driving that mission forward. Our schedule of upcoming events will enable us to meet the needs of our members, end-users, and the entire boiler supply chain.

With survey results and interview insights, the ABMA-McKinley team will come together to create a framework for an upcoming strategy session that will take place in Dallas, TX. We expect our revised strategy will build on new programs such as BOILER 2022, while taking the association in a few new directions, as well.

2023 ABMA Annual Meeting

Next year, the boiler industry will convene and connect on January 13-16 at the Park Hyatt Aviara Resort in Carlsbad, CA, for our 2023 Annual Meeting. Twice a year, ABMA hosts bi-annual meetings for industry leaders from across the country to come together to learn about current and emerging industry trends and to network to enhance and grow business relationships.

Confirmed keynotes include **Robert Sher**, Founder & CEO of Mastering Midsized, who will discuss how to successfully retain your employees, and **Connor Lokar**, economist with ITR Economics. He will present a 2023 economic forecast to prepare our members for the year ahead.

Every other year, the annual meeting includes elections for the leadership of our Product & Market Groups. The next elections will take place at this annual meeting, so

ABMA is excited to welcome new Product & Market Group Leadership in 2023.

More details on this event will be posted online in the coming months and registration will open by October. Visit [ABMA.com/annual-meeting](https://www.abma.com/annual-meeting) for more details.

ABMA 2023 Manufacturers Conference

ABMA is also excited to bring back the Manufacturers Conference in April 2023 at the Hyatt Lodge in Oak Brook, IL. MC 2023 is a unique event for the boiler industry focused on middle managers and those entering leadership at their companies. Many of the participants are the future leaders of this industry and ABMA is offering them an opportunity to expand their network and build their leadership capabilities.

The conference is known for leading-edge content, broadening the attendees' knowledge of the boiler industry and hands-on manufacturing tours. We are pleased to share that ABMA members SCC, Inc. and Vapor Power International have agreed to host tours of their facilities.

MC 2023 brings will offer a new emphasis on markets, worker recruitment, potential new environmental regulations, industry challenges, marketing tools, etc.

Registration opens later this year, so stay tuned for more details and visit [ABMA.com/manufacturers-conference](https://www.abma.com/manufacturers-conference).

BOILER 2024

BOILER 2022 forever changed ABMA and this industry, expanding our impact beyond manufacturers to focus on the entire supply chain. And now we have already transitioned to build on that foundation set forth earlier this year.

BOILER 2024 – ABMA Technology Conference & Expo will take place May 1-3, 2024 at the Gaylord Rockies in the Denver suburb of Aurora, CO! Once again, the event will be only a two-day trade show focused exclusively on the boiler supply chain, bringing together boiler manufacturers, influencers, and end-users of our products.

If the product is in the boiler room, it will be there. BOILER 2024 directly engages those in the purchasing, operation, and maintenance of boilers! What's in store?

- 2 Action-Packed Days;
- 10 Dedicated Expo Hours;
- 100+ Exhibiting Companies;
- Boiler Room Tours;
- Speakers & Educational Sessions;
- 1000+ Attendees.

ABMA is planning to open exhibit sales in early 2023 and general registration will start in the fall of 2023. Visit [BOILER2024.com](https://www.boiler2024.com) for more information. [HPAC](https://www.hpac.com)

To obtain more information on ABMA and stay up to date on BOILER 2024, please sign up to receive ABMA's Boiler Weekly E-Newsletter by visiting [ABMA.com/news](https://www.abma.com/news).

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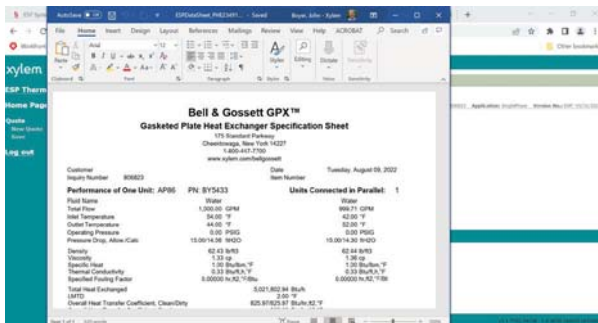
Carrier's 40MBAB ductless heat pump air handler features inverter-controlled, variable-speed technology for extra efficient heating and cooling. It adjusts motor speeds and comfort capacity as conditions change, delivering smooth, consistent temperatures and quiet operation, all while saving on utility bills. Also features patented welded-aluminum coils, wired and wireless remote-control capability, third-party thermostat compatibility, five operating modes and quiet indoor operation. It includes four-way installation, easy maintenance and new, easier-to-install electric heater options. The unit has expanded multizone compatibility, with sizes 18,000 through 36,000 now being multizone-compatible.

Carrier

ABD-Z2 Automatic Balancing Damper

Greenheck introduces ABD-Z2 is an integrated automatic balancing damper with an adjustable set point controlled by an electric actuator (24V or 120V). The unit can toggle between two pressure-independent CFM setpoints; the low-flow setpoint maintains a constant minimum ventilation rate, while the high-flow setpoint provides boosted on-demand ventilation. It is ideal for use in apartments and condominiums, education buildings and dormitories, hospitals and clinics, hotels and motels, and nursing homes and assisted-living facilities.

Greenheck Fan Corp.



ESP-Thermal Heat Exchanger Selection Program

The ESP-Thermal online plate/shell/tube heat exchanger selection program from Bell & Gossett is now integrated into its ESP-Systemwise selection tool. It offers the option to design gasketed plate units to the requirements of the AHRI LLHE certification program and ASHRAE 90.1 compliance. It provides double wall designs for potable water selections, and single and dual-circuit refrigeration evaporators and condensers. It includes the design capability and physical properties for more than 100 different fluids, including today's most popular fluids in the HVAC industry. Mechanical design options for materials of construction, connection types, and accessories such as insulation kits.

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RD-2000 Round Control Damper

Johnson Controls' RD-2000 round control damper for use in HVAC systems is available with seals for low-leakage and easily installed in round ducts. It is available with or without a factory-installed actuator. Dampers without actuators must be rated to operate over a temperature range of -20° F to 200° F (-29° C to 93° C). Features include formed shroud and one-piece construction, which increases rigidity and strength..

Johnson Controls



Hercules Grrip

Hercules Grrip from Oatey is an all-purpose, nonpetroleum, hydrocarbon-based pipe joint and gasket seal for all metals and PVC, ABS and CPVC plastics. It is non-separating and will not harden or shrink when used. It can perform over a temperature range of -90° F to 450° F (on steel pipe), 12,000 psi (hydraulic), and 2600 psi (gas). The seal is safe for drinking water lines and is brushable, as it comes with an applicator in the lid. It comes in four sizes, ranging from 4 oz. to 16 oz.

Oatey

TESCOM Anderson Greenwood Instrumentation H2 Valve Series

Emerson launches the TESCOM Anderson Greenwood Instrumentation H2 Valve Series for hydrogen applications up to 15,000 pounds/sq. in. The solution isolates process pressure in high-pressure gas applications such as hydrogen fueling stations and tube trailers, reducing fugitive emissions and improving safety. Each valve has a convenient QR code, allowing operators to quickly access the valve's specs during maintenance and installation. The product also ensures that no high-pressure liquid or gas is released during maintenance. The valves are compliant to the ISO 19880-3 hydrogen fueling standard.

Emerson



10-100 Series ASME Hot Water Safety Relief Valve

The 10-100 Series ASME hot water safety relief valve from Apollo protect ASME Section IV water heating boilers and hydronic heating systems for commercial applications. The high-capacity design features corrosion-resistant construction, standard stainless-steel springs, and male or female NPT inlet connections. With 5-60 psig (1.4 – 4.1 bar) set pressure at 250° F (121° C) max. Brass, satin or polished chrome finishes are available.

Apollo Valves

EME620DD Double-Drainable Louver

Ruskin's newly designed EME620DD 6-inch-deep, horizontally bladed, stationary double-drainable louver protects air intake and exhaust openings in exterior walls against wind-driven rain under severe weather conditions. It features 48% free area and corrosion-resistant, extruded aluminum construction. To suit each application, the unit ranges in size from 8 in. by 8 in. to 120 in. by 90 in. It is available with a wide range of options, such as extended sill, front or rear security bars, filter racks and a variety of finishes.

Ruskin



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conducted June 4–6, 2019.

COMMERCIAL



ThermaPANEL Hydronic Radiant Heating/Cooling System

The thermaPANEL hydronic radiant heating/cooling system from Therma-HEXX is a modular solution for new and refurbished residential, commercial and industrial applications. Evenly distributed heating/cooling is achieved through low-profile panels located in the ceiling, or in the floor when used for heating-only applications. Coupled with a high-efficiency electric heat pump, hydronic fluid is evenly distributed throughout the individual panels in integrated, thermoformed micro-channels that enable even cooling and heating. The patented aluminum ThermaPANEL-TRAK system offers an easy, snap-together installation and provides for the direct attachment of drywall or other surfaces.

Therma-HEXX



P-Series Ductless Wall-Mounted Indoor Unit

Mitsubishi Electric Trane HVAC's P-Series ductless wall-mounted indoor unit is designed to meet the needs of light commercial and residential applications, such as mechanical/electrical areas where critical cooling is needed. Two new PKA models, 12,000 Btu/hr. and 18,000 Btu/hr., are available in selectable high sensible or high latent modes. Additional features include reduced sound levels, down to 34 dB(A); a SEER rating of up to 21; controller options for easier operation; and kumo touch wall-mounted wireless controller.

Mitsubishi Electric Trane HVAC US

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Duck Pro By Shurtape Professional-Grade Tapes

Duck Pro By Shurtape professional-grade tapes by Shurtape Technologies feature 13 tape types divided among four tape grades: utility, general purpose, professional and premium. Many tapes in the new line feature Shurtape's CO-EX Technology. During the co-extrusion process, the tape's components meld together under high temperatures in one step, resulting in a permanent, airtight bond. This seamless construction gives the tape additional strength and ensures that it will not delaminate. They unwind and tear easily, and are designed for a wide variety of applications.

Shurtape Technologies



Microlite White PSK Duct Wrap

Johns Manville offers its Microlite White PSK formaldehyde-free duct wrap offers good thermal performance (R-value, 4.2) and condensation control in a lightweight, blanket-type insulation with a white PSK facing. It is recommended for HVAC system exteriors or surfaces where design parameters prohibit the use of liner or board. Features include improved handling, easier cutting and less dust. Manufacturing process ensures consistency. Matching White PSK seaming tape is available.

Johns Manville

0026E ECM High-Efficiency Circulator

The 0026E ECM high-efficiency circulator from Taco offers up to 85% energy savings over a conventional circulator, with a maximum of 26 ft. of head and 44 gal. per minute. Available with cast iron or NSF/ANSI 61 and 372-certified stainless-steel volutes, it is ideal for either closed-loop heating systems or domestic hot water systems. The unit offers a convenient, rotatable control box for a professional look, no matter the orientation of the installed circulator. Has five settings; low, medium, high, activeADAPT self-adjusting proportional pressure, and 0-10v control. Features include SureStart automatic unblocking and air purging, BIO Barrier black iron oxide protection, dual electrical knockouts, 6-in. stranded leads and recessed flange nut-grabbers for easier fit up.

Taco Comfort Solutions



Zero Degree Air-Source Heat Pump

AAON introduces its zero-degree cold-climate, air-source heat pump packaged rooftop unit, now available from 2 tons to 30 tons. It is optimized with variable-speed compressors, variable-speed outdoor fans and advanced AAON controls. It enhances compressorized heat pump heating application into a wide range of climate zones, down to 0° F. It has an AHRI-certified heating COP of up to 3.7 and cooling IEER up to 21.5. The selection of a gas heater with the heat pump provides supplemental heat. Up to 100% airflow economizer dampers provide energy-saving free conditioning when conditions meet setpoint values.

AAON

Fieldpiece

BUILT TOUGH FOR ANY HEATING JOB

COMBUSTION ANALYZER HC CAT85

Accurate measurement of O₂, CO, CO₂, live draft pressure

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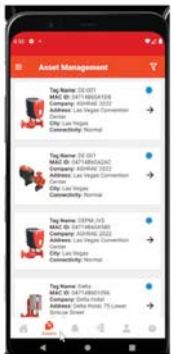
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Armstrong Fluid Technology has announced a mobile app that brings all of the value and benefits of the Pump Manager subscription service to users of Android and iOS mobile devices. Pump Manager is a cloud-based service that provides pump analytics and performance insights along with alerts and notifications. The service supports Active Performance Management in HVAC systems. The app is available for download in the Google Play Store and Apple Store; search for Armstrong Pump Manager.

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Researching Urban Heat Islands For Key Climate Clues

As cities become denser, new strategies will be needed to keep them liveable.



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.

Those of us involved in green building certifications (LEED, Green Globes, etc.) are intimately familiar with urban heat islands (UHI), both roof and non-roof, since they detract from a project's overall sustainability.

And all of us, green building practitioners or not, know that our cities have been hotter than usual this year.

So now, more than ever, we need to better understand and improve our climate models. Toward that end, last year, a team of scientists at the U.S. Dept. of Energy's Brookhaven National Laboratory — led by **Katia Lamer**, director of operations for the Lab's Center for Multiscale Applied Sensing (CMAS) — built a mobile laboratory to survey climate characteristics in cities. The research objective was to better understand how the effects of UHI might influence weather patterns like rain, and to collect higher resolution data on them in order to understand possible climate inequities between neighborhoods in the same city.

UHI's are metropolitan areas which are significantly warmer than their surroundings. According to the EPA, many U.S. cities have air temperatures up to 10°F (5.6°C) warmer than the surrounding natural land cover. Structures such as buildings, roads, sidewalks, parking lots, and other infrastructure absorb and re-emit the sun's heat more than natural landscapes such as forests and water bodies. Urban areas, where these structures are highly concentrated and greenery is limited, thus become "islands" of higher temperatures relative to outlying areas.

The research team's mobile lab is completely off-grid and employs a suite of instruments to measure parameters, including air temperature, relative humidity, wind patterns, and air flow (using LIDAR — laser imaging, detection, and ranging — also known as 3-D laser scanning). In addition to such high-tech measurements, the mobile lab is also equipped with helium-filled, "party" balloons outfitted with instruments known as radiosondes to collect and transmit data back to the mobile

lab. Of note, since the mobile lab is intended for use in dense urban areas, it cannot use the traditional larger weather balloons.

The first deployment of the mobile lab was in NYC, where the scientists measured surface temperatures and wind patterns around Manhattan skyscrapers in order to determine the effect of solar heating on air flow. The air flow is dependent on many factors, including the height and orientation of the building and the temperature differential between the sun side and shade side of a given building.

The mobile lab then embarked on a 1,700-mile journey from Upton, NY, to Houston, TX, collecting street-level climate data along the way.



Katia Lamer is director of operations for the Brookhaven Lab's Center for Multiscale Applied Sensing.

According to Lamer, the plan is to build another mobile lab and deploy both to NYC to collect data that could be used to determine the optimum location for a permanent weather station.

Knowing which urban areas and neighborhoods are most vulnerable to climate change will help develop effective mitigation strategies. One such strategy is increasing urban tree canopy. In fact, a study authored by Dr. **Brian Stone Jr.**, Professor in the School of City and Regional Planning at Georgia Tech, suggests that tree canopy may be twice as effective in reducing UHI effects as other strategies.

*For more on tree canopy, read my companion article at www.hpac.com. **HPAC***



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