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2023 COMMERCIAL HVAC MARKET OUTLOOK

ALSO IN THIS ISSUE:

- **Thermal Storage and Ice Banking Systems**
- **How to Create Custom Air Upgrades**
- **2022 Contractor Spotlight Retrospective: Lessons Learned**

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TECHNICAL:

Thermal Storage and Ice Banking Systems

Historically, these commercial systems work well until buildings undergo redesigns. Then bad things can happen.



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Happy New Year: Here are Seven Trends to Expect in 2023



Mike Weil is editor-in-chief and director of communications and publications at National Comfort Institute, Inc. Contact him at ncilink.com/ContactMe.

So much has happened in the past year that impacted the HVAC Industry. As 2023 begins, I wonder which trends will continue, what others are coming down the pike, and what those of you in the High-Performance Contracting segment of the industry should be on the lookout for.

Here are seven trends, not necessarily in order, that I see impacting the trades this year.

ATTRACTING AND RETAINING TECHS

We live in a time that is seeing a vast exodus of people retiring from the industry. There is concern over young people's lack of interest in the trades as a career. This remains a key issue.

It is incumbent on individual companies to develop and work recruitment strategies and find ways to attract young people in the HVAC trades. It is also an industry issue that requires the teamwork between every channel, the trade associations, and affiliated training organizations.

TECHNOLOGY TRENDS

One thing that can help attract young people to the trades is HVAC technology. From the tools and instruments your HVAC company uses to the Smart Technology built into building and equipment, the HVAC Industry certainly offers the "cool factor" seen in other trades and career paths. Be sure to build a culture of training so incoming talent knows how to use the tools and can present to customers as professional craftsmen. Measuring performance is important. Younger people want to know where they are and how they can advance.

Technology will continue impacting our industry throughout 2023 and the years to come. Watch out for improvements in geothermal heat pumps, smart thermostats, zoning, and test-and-

measurement instruments.

CULTURE MATTERS

The right culture is also crucial for creating attractive, high-paying careers with flexible hours. Incentivizing performance and creating perks are essential to attracting younger techs.

SUPPLY CHAIN ISSUES


The U.S. is still trying to solve shortages from manufacturers, distributors, and contractors. Economists predict that 2023 will be a better year as supply chain issues sort themselves out. Still, in the meantime, as High-Performance Contractors, you need to step up your game when it comes to working with your suppliers and communicating with your customers. Remember that great service matters!

HIGHER CUSTOMER EXPECTATIONS

The pandemic pushed the U.S. workforce into home-based offices. Today many companies are operating *hybridly* with their employees working partially at home and in the office/workplace. A direct result is increased continued demand for better indoor air quality, improved comfort while saving energy, and more throughout the coming year.

ENERGY REDUCTION

The Greening of America is being pushed through government regulations and consumer demand. New refrigerant laws, electrification, lower carbon emissions, and more are high on the agenda, and will continue in 2023.

As High-Performance HVAC contractors, you sit in the catbird's seat. With your training and practices, 2023 should be a great year. Make it even better by attending the [High-Performance Summit](#) in April. I hope to see you there. 

Written by HVAC Professionals for HVAC Professionals

TEC DIGITAL TRUEFLOW SOLUTION

A few months ago, NCI's own David Richardson and I visited The Energy Conservatory (TEC) in Minnesota to closely examine their **Digital TrueFlow Air Handler Flow Meter**. This product is a significant redesign of their original TrueFlow, which was revolutionary for its time. Still, it pales compared to the new model regarding user friendliness and versatility.

After our visit, I am confident that the TrueFlow is *the most accurate* way to measure airflow through a residential air handler or furnace in the field, even in challenging measurement situations.

David and I and the TEC team put the product through its paces in their **NIST-certified "Chamber of Truth."** The TrueFlow performed well within accu-

racy specs when used within its design limits. Remarkably it gave good results even when we pushed those limits.

We don't always have the option to measure within published constraints in the field, and it's comforting that you can still get a reasonable measurement in those situations.

Perhaps more impressive than the accuracy is its ease of use. The TrueFlow uses a mobile app to walk you through the measurement process. Within a few minutes, you get an accurate airflow measurement and a report containing diagnostics based on static pressure measurements — an excellent value-add!

It's clear that TrueFlow is a powerful tool for a service technician or installer to diagnose or verify airflow. What was unexpected is that it's easy and quick



enough to use as a sales tool. The Digital TrueFlow can clearly show customers where the deficiencies are in their current system, providing evidence-based support for system renovations, with or without equipment replacement.

For more information, go to ncilink.com/TECTrueFlow.

— By Ben Lipscomb, P.E., NCI director of engineering and utility services **NCI**

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2022 High-Performance HVAC Contractor Spotlight Retrospective

In 2022 so many things were impacting the world in which we live and work. The major headlines focused on pandemic-caused supply chain issues and crazy high inflation that was out of control. Headlines also focused on how the Federal Reserve increased interest rates to counter it.

Also, in 2022, wages and benefits, according to the U.S. Department of



Labor, rose to a 20-year high, gasoline prices soared after Russia invaded Ukraine, and U.S. mortgage rates climbed as cryptocurrencies crashed.

It was a strange year.

We approached six High-Performance HVAC contracting firms to find out how these events impacted their businesses as part of a series called "Contractor Spotlights." These articles typically focus on contracting companies that work hard in the realm of High-Performance HVAC contracting in terms of measuring, testing, and diagnosing using static pressure and other measurements.

We also address successes and challenges they have addressing custom-

er comfort issues using the high-performance approach of looking at the entire structure as part of the HVAC system. The economic and societal situation of 2022 directly impacted a company's ability to solve these issues, and we wanted to learn how contractors worked to overcome them.

In 2022, we spotlighted the following companies:

- [James A. Wheat and Sons](#), Gaithersburg, MD
- [Hearn Plumbing and Heating](#), Madison, OH
- [SoCal Airflow Pros](#), Orange County, CA
- [Integrity Test and Balance](#), Traverse City, MI
- [Lakeside Service Company](#), Brighton, MI
- [Bailey's Heating and Air](#), Modesto, CA.

COMMON GROUND

What do all six of these companies have in common? Five are in the residential-light commercial service and installation markets; one serves mostly commercial customers. All of them, at some point, wanted to find better ways to help their customers by solving comfort and energy efficiency problems and then be able to prove how they did it.

The result was a re-focus on continuous training of their field service and installation teams.

For 45-year-old **James A. Wheat**

and Sons, their focus from day one was on providing the best customer comfort in the Gaithersburg area. In the company's early days, they subbed out any necessary ductwork. It wasn't until Jeff Wheat and his brother attended a balancing certification class taught by National Comfort Institute (NCI) in the late 1990s that they discovered the importance of properly testing and measuring before and after doing the work.

That led to them to do all their own ductwork and changing their business model. Though training was always necessary, Jeff Wheat says it is more important now than ever.

"From my perspective," Wheat says, "if I don't train my people, who will? Frankly, I consider spending time and money on training an investment in our team so they can go out and do the work correctly."



Tom Hearn of **Hearn Plumbing and Heating** agrees. This 76-year-old company slowly began to change from a mostly one-man operation over the decades to a small-but-growing

High-Performance HVAC firm that started training its people in performance-based service and installation.

He says training became an essential cornerstone to the changes in the company. "In addition to business management training, we began enrolling our technicians in technical training from manufacturers, distributors, and National Comfort Institute," Hearn adds."



Training is also the cornerstone of SoCal Airflow Pro's approach to High-Performance Contracting. Owner Cody Novini says he's been able to grow his one-person business in just seven years into a company that employs 36 people and fields 25 service and installation vehicles.

"Airflow is the most important part of a heating and air conditioning system," he says. "That is why our name is Airflow Pros. Early in my service technician career, I understood that static pressure is the key to getting these systems to work right, achieve proper flow, and make every room comfortable per customers' wishes."

John Boylan of Lakeside Service Company adds that it wasn't until 2014 that he and his company got serious about airflow testing, measurements, and diagnosing invisible problems.

"Before that, we participated only in a smattering of NCI air balance and combustion classes. The light bulb went off for me when our dabbling in testing and measuring began bringing

in more jobs and better profits. That is when we decided to get 100% of our team trained and certified.

"But that meant making a lot of changes in how we did our work," he adds. "It also meant investing heavily in our people and tools. The magic is in our commitment and hard work."

From a commercial perspective, Kevin Heikkila's company, Integrity Testing and Balancing, finds that without proper technical training, he and his team cannot stay on the cutting edge and provide the testing and balancing services his customers require.

"I know how important it is to stay ahead of the curve, improve ourselves, and serve our customers better," Heikkila says. "I want to continue to be recognized as a leader in the TAB industry in Western Michigan."

AIR UPGRADES & DUCT RENOS HELP BATTLE PANDEMIC WOES

Interestingly enough, all six of our spotlight contractors say they experienced growth despite the impacts of the COVID-19 pandemic. John Boylan attributes that growth to the company's commitment to training and developing internal processes to sup-



port a high-performance approach. He says that led to closing more air upgrades, especially with rising costs for new HVAC equipment and supply chain shortages.

The air upgrade sale and duct renovations have "added nicely to our overall profits," Tom Hearn adds.

"The air upgrade approach helps us to help take care of issues that can prolong system life and add comfort to the house," Hearn says. "Plus, air upgrades increase the average ticket for a project and our overall gross margin on replacement. The best news is that it helps customers save on energy."

At Bailey's Heating and Air,



owner Mitch Bailey says it's always about the ductwork. "In addition to doing load calculations, we measure the entire existing system to see how it performs before we do anything else."

Bailey also says that his goal is to "stop swapping boxes." Part of that is because "boxes" aren't as readily available due to supply chain issues. Even before he says they pushed back against swap-outs.

"Our industry needs contractors to test in and test out. They should take static pressure readings, measure total system and room-to-room airflow, and do load calculations. Help the customer see how their system operates before you make any changes and then show them what their system is doing after your changes."

Does this add to their bottom line? Bailey says yes, and most of his replacement and renovation jobs save customers around 30% in energy use costs!

DIFFERENCES DO NOT MATTER

The 2022 "class" of contractors we spotlighted are from across the country

and differ in terms of size and backgrounds. Some are multi-generational companies; others are much younger. Some achieve multimillions in annual revenue dollars, while others achieve much less. And as I've said, one is a commercial testing and balancing company, while all the others serve the residential/light commercial marketplace in their areas.

These differences don't matter. Each company has several things in common:

- They all have what I'll call a **servant-leader mindset**. This means they focus on providing the service their customers want and need
- Company owners believe in training and invest heavily in it
- They treat employees as family and work to create career paths and growth opportunities for them. Training is a big part of that growth
- Each company's management believes in equipping their teams with the tools and instruments they need to conduct system performance testing correctly.

How they approach high performance also differs from company to company, but they all say it requires dedication, perseverance, and the ability to learn from mistakes.

Kevin Heikkila of Integrity TAB says, "The key is how our team listens to customers, how they talk with them, and how they ask open-ended questions.

"Knowledge is the secret weapon to help you help your customers. It will bring you more business. It helps create your success. So be tenacious in your efforts, and don't hesitate to call

someone when you have a question. That is how you build relationships and increase your knowledge about your partners, customers, business, and projects. Those relationships help build trust, and we all know how important that is."

LESSONS LEARNED

One of the most challenging lessons most of our contractor spotlight companies say they faced was how to price their work correctly. Tom Hearn says this is true for every contractor



out there. "But when you are operating as a High-Performance Contractor, proper pricing is key to making it work. After all, if we are testing, measuring, and diagnosing problems correctly, we provide customers with great value. That is worth charging the right price."

Hearn adds that another lesson he learned implementing high-performance processes was to "make it part of how we usually run our processes in the company. Testing and measuring are required. They are not negotiable."

Culture is another common factor among these companies. Jeff Wheat says a culture focused on delivering High-Performance HVAC systems

to customers is the mission. "But it's not like we are there yet. It is a changing and evolving process that requires someone to lead it.

"For me, what makes things successful is when our field team understands and believes in it. It's always a matter of training them and keeping them up to date on everything."


Cody Novini at SoCal Airflow Pros agrees. "NCI's high-performance contracting approach is all we do. Testing, measuring, and diagnosing airflow, static pressure, and other readings change you from being a contractor who guesses into a true professional," he says.

Novini sums up the lessons from implementing a performance approach into his business: "No matter where you are in your career – a tech fresh out of school or a grizzled veteran -- you need always to be a student. You should always be willing to learn. You will be learning until the day you die, or the industry will surpass you."

Ultimately, these Contractor Spotlight stories show other contractors that High-Performance HVAC works if you make it part of your daily processes and culture. The companies highlighted here are proof that it is doable and profitable.

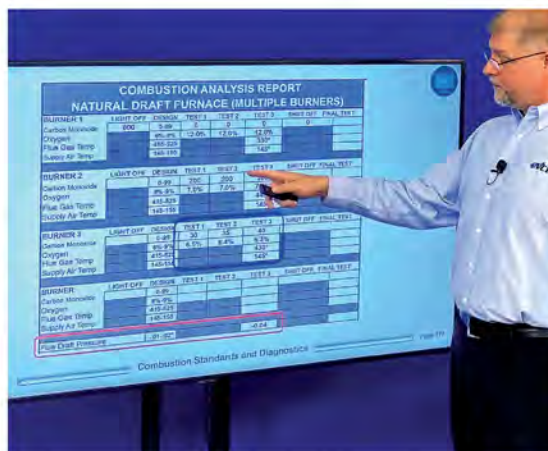
OPPORTUNITY KNOCKS

As you continue working toward implementing this culture and approach into your company, don't be surprised if you receive a phone call or email asking you to share your story.

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Residential HVAC System Performance and Air Balancing Certification Bundle

January 24-26: Henderson, NV
February 7-9: Chesapeake, VA
February 21-23: Wood Dale, IL
February 28 - March 2: Austin, TX

Duct System Optimization and Air Balancing Certification Program

January 31-February 2: Austin, TX
January 31-February 2: Pompano Beach, FL

PUBLIC LIVE TRAINING (continued)

Commercial Air Balancing Training Program

February 28-March 2: Sheffield Lake, OH

PUBLIC ONLINE LIVE TRAINING

Combustion Performance & Carbon Monoxide Safety Recertification Program - **ONLINE LIVE**

January 10-11

Airflow Testing & Diagnostics - **ONLINE LIVE**

January 24-25

Test & Certify Ventilation Systems and Economizers Certification - **ONLINE LIVE**

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January 17-19: Anaheim, CA

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February 14-16: Anaheim, CA

Combustion Performance & Carbon Monoxide Safety Certification Program

February 21-23: Anaheim, CA

* NCI training sponsored/subsidized by Southern California Edison (SCE) for qualified local contractors.



Visit **NCIlink.com/ClassSchedule** to view the latest schedule.

Thermal Storage and *Ice Banking Systems*

There are often questions and doubts regarding thermal banking systems, how they work, the benefits compared to Design/Build costs, as well as maintenance and operating cost changes over the system's life.

For centuries man has capitalized on the benefits of stored hot water systems. One of the first uses of natural hot water for heating was in a monastery in Greenland at the end of the 14th century.

This first example does not use stored thermal energy as we think about it today. It is the first known example of a BALANCED hydronic system as the flow of hot spring water had to be regulated so the spaces were not over heated or turned into steam rooms.

The Romans became masters at the direction and control of stored resources such as water for their cities, agriculture, and more. Central bath houses required fresh and heated water. This required huge wood-fired boilers carefully engineered and controlled (***balanced***).

Even with the early achievements of the monks and the Romans centuries ago, it wasn't until

1829 that America had its first state facility that used stored hydronic heat and flushing toilets. The facility was the Eastern State Penitentiary in Philadelphia. Fun fact: in 1829, even the White House didn't have flushing toilets!

PROBLEMS WITH REDESIGN

The Eastern State Penitentiary operated with no issues until 1935 when additions to the prison included adding a second floor. Sometime later, they discovered the addition of the second floor compromised the entire hydronic design, forcing engineers to redesign the system. It was never right again! The modifications' impact on the original balanced systems never were overcome until its closing.

The advances of the past 100 years have taken the conversation of thermal storage to new heights and temperatures that can achieve considerable returns under the right (engineered) conditions.

The use of thermal storage for satisfying cooling demands has moved into chilled water systems. Although chilled water cooling has been in use for years in the commercial sector, more homes today are designed with a passive energy efficiency intent as the primary goal. These systems try to maintain a typical residential footprint. Chilled water storage requires an array of equipment, from compressor banks to huge district chiller farms serving large cities.

Residential projects using these systems can only achieve efficiency goals if correctly ***designed, installed, and balanced***. Over the



Imagine arriving at a prison to serve your sentence and being greeted by 12-foot-tall gargoyles squatting over the entryway with stored steam jetting from their mouths.

last several years, I have worked on several huge homes plagued by problems in one or more of these areas. The problems compromised completion time and cost, and often led to litigation proceedings and court judgments.

In nearly all the problematic homes, we managed to correct issues or significantly reduce their negative impacts by first seeking to understand the system design, its goals, equipment function and operation, and installation. We compared the results of our testing and measuring that conflicts with the design and its intent. That enabled us to correctly diagnose what was happening and create a scope of work to facilitate repairs.

ICE BANKING

With utility costs and tiered peak usage rates impacting commercial, industrial, institutional, and military facility operating costs, attention is being focused on new approaches to energy savings. HVAC industry manufacturers have put forth great effort in making the equipment we use more efficient, but more must be done.

Many universities and emerging technology labs have been working on various ways to reduce operating costs. One idea was to use lower-cost tier times at night to generate energy that could offset daytime electrical costs. It is more effective to operate the equipment during cooler nighttime temperatures. This is called ***Ice Banking***.

Ice banking can effectively offset space and production cooling costs, especially in hotter climate areas. It is pretty simple in theory. The goal is to divert the chilled water from the cooling coils and equipment to a storage device that will allow you to use that stored cold energy later to help offset the operating costs of large plant systems.

This technology has an unlimited number of sizes, configurations, and applications. It comes with more complex scopes and can be even more reliant on the installed job being correctly balanced to achieve the design goals and return on investment. These systems can range in size from small five-ton packaged unit systems to extremely large district-type built-up systems rated for up to thousands of tons of cooling.

ICE BANKING APPLICATIONS

Simple ice banks have been used for years in soda and beer dispensing systems due to

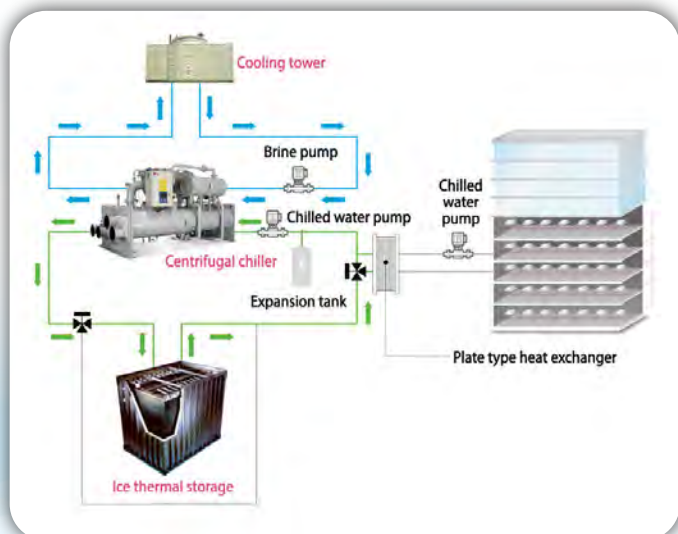


their exceptional ability to recover to high-demand flow periods. They are relatively cheap to purchase and operate. They build up a bank of ice at night or during slow periods, and as the high-demand period starts, the ice bank begins to melt, maintaining product temperature. The system rebuilds ice during slow or nighttime periods.

Ice Bank systems used in the commercial and industrial sectors are vastly larger and more complex, using equipment from cold plates, storage tanks, and silos to large farms of ice storage tanks and devices.

Some Ice Bank systems are so well engineered and balanced that the mechanical cooling systems may never operate during daylight hours except for high-demand periods. Some use balls filled with water that freezes in a brine or glycol solution pumped through the system.

Others use frozen eutectic salt and complex ice solutions that remove heat from whatever it serves. In this way, ice banks save wear and tear on chiller systems and shift power consumption to non-peak hours. Oh, and



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there is a bonus in that ice banks act as effective redundancy to the facility.

CALIFORNIA'S ICE BANK SUBSIDIES

With California's thirst for energy efficiency, state utilities have significantly subsidized thousands of ice banking projects using incentive programs.

Many of these projects were on new buildings, but most were part of facility retrofits, expansions, and upgrades. Hospitals, universities, and many other sectors rushed to the opportunity of the possible savings and benefits.

Unfortunately, benefits were not achieved due, in large part, to the assumption that ice banks will magically work right once installed. If they don't, the finger-pointing begins: contractors blame the manufacturer or engineers, so they wipe their hands and rush off to screw up the next job.

Sadly, many projects go through the balancing process, and the system still doesn't operate as intended.

A QUICK CASE STUDY

In one such case, I was asked to test two ice banking systems with one of our NCI-trained contractors. The site engineer could not understand why

they were having issues operating the plant's systems effectively and had been going after the manufacturers to solve the problems. Sadly, we could not reproduce any measurement recorded in the certified balancing report.

Why? After our initial pass through the systems, it was apparent the hydronic loop flow rates, controls, and the chiller were not set to design — many settings remained at factory defaults which confounded the facility team. The installing contractor guaranteed that the balancing was correct and to design.

It took more than three years for the facility to get the attention guaranteed by the agency. Since then, the facility has enjoyed a significant benefit from

the ice bank systems and reduced daylight chiller operations from 31% to less than 5% over the next three-month period.

With the more advanced embedded technologies in these systems and countless configurations, it is imperative to honestly inform yourself about their operations within your contract.

PROPER FOCUS IS ESSENTIAL

One thing became apparent: when contractors hurriedly completed and submitted projects for incentives, then moved to the next project, the cost of **NOT** correctly doing something greatly dwarfed the cost of doing it right the first time. Often the contractor ends up paying for someone else to return to fix the project using

proper commissioning and balancing, or worse, replacing damaged chillers and storage systems due to incorrect operation.

Under the microscope of energy efficiency, it is more important than ever to focus on these potentially efficient systems properly. If we don't, we tarnish our industry. **NCI**



Jeff Sturgeon is the Southern California Training Center Manager/Instructor for **National Comfort Institute**. He has more than 30 years of residential and commercial HVAC and refrigeration field experience. Jeff works with hundreds of contractors and their field personnel to help insure successful implementation of Southern California Edison's Workforce Education & Training programs. He can be reached at ncilink.com/ContactMe.

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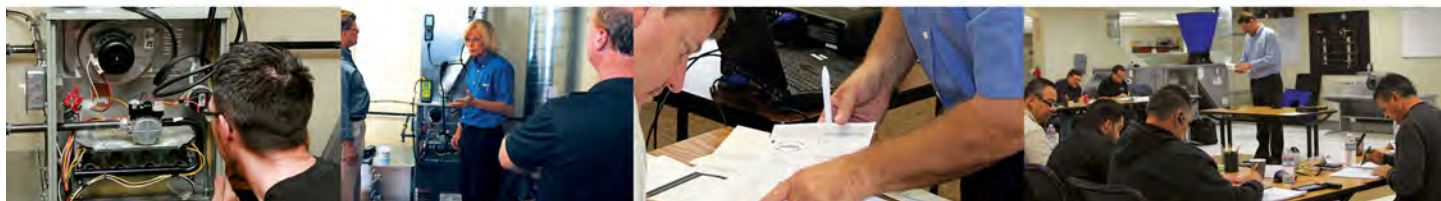
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Welcome to 2023: A Commercial HVAC Market Outlook

Welcome to 2023. There is so much happening in the not-so-post-COVID world that it might be good to pause and look at what's happening and what it could mean to commercial HVAC contracting firms.

From an economic standpoint, most market research groups are saying the economy is still going strong, and with just a few bumps in the road, 2023 should be a great year.

For example, market research firm [Technavio](#), in a December 2022 press release, estimates the U.S. HVAC systems market will surge by \$22.1 billion from 2021 to 2026 at an accelerating compounded annual growth rate (CAGR) of 4.2%.

The release says one factor driving growth is the increased construction of data centers. That makes sense with the influx of smart building tech over the last five years. Commercial HVAC systems are indispensable for data centers to maintain temperature, humidity, airflow, and cleanliness so these sensitive electronic components continue to function correctly.

For those contractors involved with smart building technologies that focus on controlling energy consumption, the good news is that more building owners and managers are turning to

these systems so they can better manage their HVAC systems.

Technavio also cites the growing importance of air monitoring systems in HVAC equipment. The reasons start with indoor air quality, but also the impact of proper air control in the life of commercial HVAC systems.

Tom Winstel, president of Cincinnati-based [Enervise, LLC](#) – a commercial HVAC contractor – says, “During the pandemic, building owners suddenly understood the difference between good and poor filtration. We also saw increased demand for air purification, either through ultraviolet germicidal irradiation or bipolar ionization devices. Sales of those types of air handler renovations increased significantly. And as the pandemic grew, IAQ demand by building occupants increased.”

He adds that the key for his company was to ensure his team was talking with building owners and listening to their needs so they could provide the best service possible. He wrote about this in an article entitled, “*Changes Caused by the Pandemic in Commercial HVAC Service*,” which you can read here: [ncilink.com/Winstel](#).

According to the [American Institute of Architects \(AIA\)](#), 2023 looks good with spending

Market Segment Consensus Growth Forecasts <small>Source AIA</small>	2022	2023
Overall nonresidential building	9.1%	6.0%
Commercial total	6.7%	4.5%
Office space	2.6%	3.5%
Retail & other commercial	11.5%	3.2%
Hotels	-5.4%	13.8%
Industrial total	31.0%	9.9%
Institutional total	2.6%	5.5%
Healthcare facilities	5.0%	5.7%
Education	2.0%	5.2%
Religious	-8.7%	-1.1%
Public safety	-10%	5.5%
Amusement/recreation	7.5%	5.8%

Source: Technavio 2022

in 2022 up 9% and spending for 2023 forecasted to be up another 6%. In their **Consensus Construction Forecast** they say “This outlook is somewhat more optimistic than what was projected at the beginning of the year, largely due to the extremely strong gains in the manufacturing category, as well as surprising strength in retail facilities.”

SOME CHALLENGES ON THE HORIZON

Several factors will have an impact on the commercial HVAC marketplace. In a study by **Market Research Future**, these factors include:

- The high price of installation and maintenance of commercial HVAC equipment. A lot of this has to do with supply chain issues, workforce shortages, and, subsequently, component shortages
- Energy consumption concerns and a more proactive push toward green energy initiatives
- Increased competition from non-traditional HVAC actors
- Supply chain issues caused by COVID-19 shutdowns are still impacting the commercial marketplace.

Another challenge is inflation. Media outlets like **CNBC** say the Federal Reserve’s raising interest rates is working, and inflation is slowing down. Greg McBride, the chief analyst at **Bankrate**, says, “with the year-over-year rate of inflation still above 7%, we have to check our expectations at the door” when it comes to rate increases, and therefore inflation, ending anytime soon.”

In the CNBC report, McBride adds that it might take all of 2023 be-

fore inflation returns to the Federal Reserve’s target 2% rate.

CONTINUED PUSH FOR ENERGY REGULATIONS

It’s no secret that as of this month (January 2023), new **Department of Energy (DOE)** regulations are in effect, increasing the minimum efficiencies of commercial packaged air conditioning and heat pump equipment by 15%. This is the second efficiency increase on commercial equipment in the last five years. This means that current equipment needs to be retested or re-rated. These changes are all part of DOE’s ongoing push to reduce overall U.S. energy consumption.

The new DOE regulations will first impact equipment manufacturers who have been hard at work changing their testing procedures and designing products that will comply. The changes will increase their costs, which means they will increase your costs, and ultimately the price commercial building owners and managers have to pay to upgrade their systems.

There has been plenty written about these regulations over the last year. Many manufacturers have published information on how they are complying and what this means to their customers. Suffice it to say these changes will require continued training for HVAC contractors as field testing and measuring will change.

The good news is that High-Performance HVAC contractors are in the catbird’s seat because they are already in a position to help building owners and managers reduce their energy consumption. How? By testing, measuring, and then diagnosing issues and creating solutions that can decrease

energy consumption while increasing comfort and indoor air quality.

NET ZERO AND OTHER SUSTAINABLE GOALS

What I’m talking about here is the Net-Zero Building initiative. On the **energy.gov** website, they describe zero-energy buildings as those that are “designed and built to consume as little energy as possible. When a renewable source of energy is added to these buildings, they are capable of producing enough energy to meet or exceed their requirements to run.”

Alongside net-zero are the provisions of the **Paris Climate Agreement**, which the Biden Administration rejoined by executive order on February 19th, 2021. This international agreement has greenhouse gas emission, decarbonization, electrification, and low GWP (global warming potential) refrigerant requirements to be achieved by 2030.

The DOE and other government agencies have really increased their initiative to achieve these goals (thus the new energy standards), as a result of climate change. To achieve these goals requires using building materials, designs, and construction practices that increase initial costs and lead times of projects – not only in the construction world, but in the commercial HVAC world as well.

Net-Zero is a goal that faces many obstacles – at least in terms of the current economy and state of technology. Many solutions involve the use of highly efficient products and materials and up until now, didn’t consider the impact of airflow on the efficiency of mechanical systems.

Technology plays a part in all of

this as well. Studies by companies like Johnson Controls and others show that commercial organizations are planning to increase investments in higher energy efficient products, smart building control technologies (including those that use artificial intelligence to help with monitoring and controlling energy use), and more.

For the first time the new DOE regulations include airflow considerations. That falls right into the wheelhouse of most High-Performance HVAC contractors who measure airflow (or lack of it), then determine how that impacts everything from overall building efficiency to comfort, Indoor Air Quality (IAQ), and even productivity.

IAQ AND HEALTHY ENVIRONMENTS

Speaking of IAQ, thanks to nearly three years' worth of pandemic, the world has laser-focused on building IAQ as it pertains to public health. Joseph G. Allen, associate professor of exposure assessment science at the [Harvard T.H. Chan School of Public Health](#) founded something called the Healthy Buildings program that "synthesized 30 years of public health science" into a report that identifies what makes a building healthy. In his [9 Foundations of a Healthy Building](#) report, he cites wellness, ventilation, indoor air quality, thermal health, and humidity among his key foundations.

That, along with the Biden Administration's launch of the [Clean Air in Buildings Challenge](#) on March 17, 2022, in collaboration with the U.S. Environmental Protection Agency (EPA), make HVAC system performance and healthy indoor environments more im-

portant than ever before.

The key phrase here is 'HVAC performance.' Trained professional HVAC contractors focus on making sure the commercial HVAC equipment is optimized to deliver the correct airflow, while maintaining the right temperature and humidity levels in tenant-occupied buildings. By properly maintaining that equipment as well as air filtration systems, contractors help building owners and managers control mold and mildew as well as viruses be-

"Good quality service and maintenance do not go out of vogue. It's as essential as ever."

ing spread throughout the structure.

Trained HVAC pros are the key to helping commercial customers meet clean air requirements of the Biden challenge.

FILLING IN THE GAPS

Today there is a severe shortage of techs. As wave after wave of Baby Boomers retire, in what many call the "Silver Tsunami," the shortage will only get worse. It is said that an average of 10,000 baby boomers reach retirement age every day! Add to that the rising cost for labor, especially since the pandemic, squeezing margins which, according to Alan Beaulieu of ITR Economics in an October 2022 blog post, will continue to accelerate higher in the coming year.

How does the industry fill in the manpower gaps? HVAC equipment manufacturers and distributors play an important role in providing re-

sources to help train the next generation. Training organizations like National Comfort Institute (NCI), that provide hands-on and virtual training resources, also play a huge role.

Many commercial HVAC contractors also take fate into their own hands by establishing training centers for their field service and installation technicians and are proactive in recruiting technicians into their companies.


Still, 2023 and beyond will continue posing challenges when it comes to recruiting, training, and retaining commercial field service and installation technicians. The only thing contractors can do is create a training plan, execute that plan, and revisit it to make sure it is working.

FINAL THOUGHTS ...

Overall, the commercial market outlook for the HVAC Industry is ratcheting upwards in 2023. Opportunities abound, but as pointed out, there are a number of landmines to avoid.

One last thought: in addition to everything discussed here, it's more important than ever to vigilantly focus on providing customers best-in-class service. As Tom Winstel wrote, "We cannot hide behind the supply chain or tolerate mediocre quality service as an industry. In responsive service, we need to enhance communications with customers to explain supply chain issues and how proper maintenance benefits them.

"Good quality service and maintenance do not go out of vogue. It's as essential as ever."

Yes there are challenges to 2023, but there are also many opportunities, especially if you focus on system performance and training. 



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How to Create *Custom Air Upgrades*

It's well-recognized that duct systems play an essential part in HVAC equipment efficiency and performance. From National Comfort Institute (NCI) studies, average airflow from the typical installed system is much lower than manufacturer specifications.

With proper airflow gaining more attention than ever before, why not capitalize on this growing opportunity?

In the October 2022 issue of **High-Performance HVAC Today**, we looked at [how to use an air balancing hood to generate interest in Air Upgrades](#). This test instrument helps your customers understand the connection between airflow and their desired solutions. Let's now look further into [Air Upgrades](#) and how you can customize them to address your

customer's issues and fit into your company operations.

WHAT IS AN AIR UPGRADE, ANYWAY?

An Air Upgrade is a customized airside solution you offer customers to help resolve their unique comfort and efficiency problems. It requires you to have the proper training, making air upgrades exclusive to you. Why? Because you're the only one who can

discover the invisible problems they solve. Without that training and knowing how to use the proper test instruments, Air Upgrade opportunities will remain hidden.

The foundation for an Air Upgrade is precisely repairing defects discovered when testing an existing system. You find hidden airside issues and then offer modifications to improve airflow and lower static pressure. These enhancements are usually at the equipment and usually solve uncomfortable rooms.

One of the worst assumptions about an Air Upgrade is that you must completely demolish the existing duct system and then rebuild it. This assumption simply isn't valid. Instead, Air Upgrades provide a starting point to improve equipment performance, energy efficiency, and customer comfort.

You can easily add Air Upgrades to most equipment replacement projects since they don't require additional days on-site. Air Upgrades won't make a system perfect, but they will correct the most frequent issues your customers have.

WHY AIR UPGRADES ARE IMPORTANT

Air Upgrades are all about making your customers happy. It eases their minds when they have comfort problems that are fixed right the first time. They are assured they'll get what they paid for, because you prove the results through testing and measurements.

One of the most challenging things about Air Upgrades is ensuring you choose applicable repairs. When your choices are based on test results and not guesses, you can be sure you have the right corrections and aren't creating any new problems. These measurements also give you more confidence.



Typical nameplate data found on air handling equipment used for Air Upgrades.

Once the work is complete, your customers will notice the improvement in upgraded system performance. Lower static pressure and improved fan airflow lead to lower operating costs, increased system efficiency, and overall comfort once the work is complete.

Ultimately, Air Upgrades change the game. Instead of only focusing on equipment replacement, you look at the entire HVAC system, including the ductwork to which it is connected. This new viewpoint helps you look for issues others are unaware of. As you begin to provide unique solutions to problems often deemed *unsolvable*, you focus on your craftsmanship and increase your profits and referrals.

Understanding this unique product's importance is essential to your company. However, it's also vital to know how to assemble these customized solutions based on the installation conditions you encounter. You'll need to equip your team with the right resources to ensure success.

TOOLS AND RESOURCES TO COMPLETE AIR UPGRADES

Most duct system repairs fail because of inadequate testing and an overabundance of guessing. The first step to creating a custom Air Upgrade is ensuring you have the right test results. Your findings hinge on measurements to reveal system and equipment defects. You'll need a variety of measurements that include:

- Total external static pressure (TESP)
- Pressure drops (coil and filter)
- Duct pressures (supply and return)
- Plotted/Measured fan airflow
- Temperatures (both equipment and system).

You begin to see airflow defects hid-



David Richardson demonstrates doing a static pressure test

den from others from these measurements. Depending on the problems you discover from the above tests, you can also add other measurements.

The measurements are only one piece of the puzzle. You also need equipment paperwork and system documentation to make sense of your readings.

Without the equipment specifications, proper reporting, customer survey results, photos, and a floor plan, it's hard to create a detailed scope of work to share with your installation team. Documentation is your best friend to prevent any unforeseen problems.

While you may customize each Air Upgrade, there are many common elements. Your measurements show the areas to focus on with the most significant issues. Never assume any part of the system works well until you test and prove it.

Most Air Upgrades start near the air handling equipment and then continue outward to the trunk ducts, duct fittings, and branch ducts. Remember, you're trying to relieve excessive static pressure and improve fan airflow. So, start with the equipment and then work outwards. It's incredible

what you can do simply by increasing the return duct capacity, sizing the air filter correctly, and installing low total equivalent length (TEL) duct fittings.

Besides the duct system, look at the supply registers and return grilles. Make sure they deliver and return conditioned air in a way that helps it mix without creating drafts. Common duct installation materials and hand tools take on new meaning once paired with test results and the correct information to develop solutions your customers desire.

ESSENTIAL SKILLS TO ASSEMBLE AIR UPGRADES

Once you have the tools and resources, you'll need to evaluate your team's skills. Otherwise, there's no way to ensure the Air Upgrade is right.

Armed with the necessary measurements, you can now interpret the test results. Unless you know what these readings mean, it's impossible to confidently create a scope of work that addresses the system issues you found. Instead, you're guessing. Common diagnostic skills to master are:

- Static pressure diagnostics
- Fan airflow diagnostics
- Temperature diagnostics
- Customer diagnostics.

Don't forget to evaluate installation conditions. For example, you can only make modifications if you have enough room. First, look at the equipment and duct system location. Make sure you don't prescribe equipment, repairs, or ducts that won't fit in the space. Accessibility limitations are



one of the toughest obstacles to overcome. You can design the perfect Air Upgrade for a customer, but it won't work unless it fits. You'll need to come up with an alternative solution.

Communicate to your team any promises you made to the customer. Make sure you have a process to share the work scope. Most Air Upgrades fail when there's a break in the communication chain between technicians, salespeople, installers, and the customer.

Keep the chain intact by assuring you document any discussions or promises made. The small promise a salesperson makes to the customer but forgets to share with the installation team might derail a project and undermine trust in your company.

Once you have the proper diagnosis, the scope of work, and clear communication between all parties, it's time to complete the job. Most customers have never seen anything like this, so put on a show and keep the work area clean and organized.

Be prepared to adjust when unexpected issues pop up. That means don't price the project so tightly you don't have room for changes.

Once your Air Upgrade work is complete, it's time to verify the project's success. Measure static pressures, airflow, temperature, refrigerant charge, and combustion. Any work should have the same test procedures done during a test-out once the work is complete.

Compare test-out results to test-in measurements to prove your work did the job, or uncover the need for adjustments. Provide a report of the job details with photos as an assurance policy that the customer got what they paid

for. It's a nice touch to finish the job.

FOLLOW A SMART(R) APPROACH

Many people use the **SMART** method to achieve goals. It's an acronym that describes difficulty and priority levels when working towards implementing a process or product.

It first appeared in a 1981 magazine article written by consultant George T. Doran, and it's gained popularity ever since.

I changed Doran's model to fit the needs of High-Performance HVAC professionals looking to succeed with Air Upgrades. The **SMART(R)** approach includes six questions to ask as you work to implement Air Upgrades in your company. These questions act as a guide to help you gain momentum and often reveal unseen obstacles before you encounter them.

- 1. Simple** – How easy can we make the Air Upgrade process?
- 2. Measurable** – What measurements are necessary for what we want to achieve?
- 3. Appropriate** – Will an Air Upgrade solve the problem, or are

more advanced repairs needed?

- 4. Realistic** – Can we achieve what we promised the customer?
- 5. Time frame** – How long will the Air Upgrade take?
- 6. Results** – Can we realistically meet the customer's expectations?

Considering the benefits of Air Upgrades to your company and customers, consider these two additional questions.

- What skills do I need to sharpen to ensure successful Air Upgrades?
- How can I make SMART(R) adjustments to our installations and service calls? Are we missing opportunities to serve customers better?

These challenging questions require you to be honest and do some soul-searching. It takes courage to move beyond the traditional pattern of "box-swapping" and become High-Performance HVAC Craftsmen.

As you think, you'll likely find your company has many of the pieces it needs to offer this premium product to your customers.

Why not commit to elevating your company's level of service? **NCI**

Based on David Richardson's NCI Summit 2022 Presentation



This article is based on a presentation given by David Richardson at National Comfort Institute's **2022 High-Performance HVAC Summit** in Scottsdale, AZ. The session was titled, "How to Create Customer Air Upgrades."

If you didn't attend the 2022 Summit, you should plan to join us in Branson, MO for the **2023 High-Performance**

HVAC Summit (April 16-20).

You can learn more about upcoming sessions, special events, registration savings for members and more at www.gotosummit.com. You can also register and book your hotel rooms now.

David Richardson is NCI's director of training. You can reach him at ncilink.com/ContactMe with any questions.





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NCI PARTNERS WITH TRUTECH TOOLS

National Comfort Institute (NCI) and [TruTech Tools, Ltd.](#) are partnering to provide tools and instruments to the HVAC and building performance industries. As a result, TruTech joins the ranks of partners in the NCI Member Rewards Program and will join the NCI team in Branson, MO, as part of the [High-Performance HVAC Summit 2023](#).

As part of this partnership, effective immediately, NCI will no longer directly sell tools and instruments through its own website. Instead, they will link to an NCI-branded page on the TruTech website at [ncilink.com/trutech](#). Through this NCI-branded store, NCI members can purchase NCI specialty products, tools, and instrument packages at a special member discount.

NCI will continue selling resale products and proprietary support materials, including CO Monitors, Duct Saddles, clipboards, labels and tags, and brochures through its website. They will also continue to sell hats, shirts, mugs, and other NCI branded products through their [Swag Store](#).

This partnership will also benefit students attending NCI training classes. Students will receive special discount codes for their TruTech purchases.

In addition, TruTech, which recognizes NCI as an industry leader in advanced high-performance training, will promote its advanced technical training on their

TruTech website. TruTech will be featured on NCI's website as an industry partner.

"We look forward to a long-term relationship with the team at TruTech as we work together to help industry professionals become advanced craftsmen in their trade," says NCI CEO **Dominick Guarino**.



"TruTech is a great supporter of our training. They see it as instrumental to raising the bar in the HVAC industry. We both see the high-performance

approach as a tremendous value to the industry and want to support its advancement."



approach as a tremendous value to the industry and want to support its advancement."

Bill Spohn, president, CEO, and co-owner of TruTech Tools, says, "Since I first met Dominick Guarino and Rob Falke in the mid-1990s, I've been impressed with their technical approach to training. I believe that NCI has a terrific mission to help HVAC contractors and their technicians and installers become professional craftsmen. TruTech has a parallel mission to help provide the tools, access to education, and training to help contractors do better work. What a perfect harmonization for TruTech to focus on the tools while NCI focuses on education and training.

"Our mission and purpose is to help technicians create better environments for people by using our niche to provide HVAC and building performance tools and best practices. We look forward to this relationship blossoming as we move forward."

WHY YOU SHOULD ATTEND SUMMIT 2023

National Comfort Institute's (NCI) 20th Annual Summit is just a few months away, and it's time to start planning to join your fellow High-Performance HVAC contractor peers in Branson, MO, from April 16th to 20th, 2023. You can find all the details here: [gotosummit.com](#).

There are so many reasons why this year's event is so important, but don't just take our word for it – here are some comments from past contractor attendees:



Bill Kennihan of Kennihan Plumbing, Heating, and Air Conditioning in Valencia, PA, said, "More contractors need to come to Summit to see what they are missing in their work, how they can make their customers happier, more comfortable, and safe."

Greg Vickers of GV's Heating and Cooling, Glenview, IL, said, "We learn so much during Summit and always go home fired up and ready to implement everything we learned."

Scott Getzschman, Getzschman Heating, LLC, Fremont, NE, adds, "When you attend, you learn something new that you can use. It just helps your company. The more you can implement, the better you will be and the more you can set yourself apart in your marketplace."


These are just a few of the attendees' many comments during the High-Performance HVAC Summit each year.

So what are you waiting for? You can register for the 2023 Summit in Branson, MO, here: [ncilink.com/23SummitReg](#).

Don't forget to book your rooms too. We are looking forward to seeing all of you in April. NCI

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Dominick Guarino
is publisher of
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[ncilink.com/
ContactMe](http://ncilink.com/ContactMe).

2023 will be filled with many challenges including the new energy efficiency rules. Customers will be faced with soaring prices, not just due to spiraling inflation, but increased costs from SEER2-rated equipment.

Contractors will be faced with tough [AHRI](#) matches, and in some cases, installing huge coils to get systems to work properly.

As I wrote in December, because higher-rated equipment is less forgiving, when static pressures exceed 0.5-in., performance can drop like a rock. Unless systems are tested and fixed, you'll have many unhappy customers and callbacks.

So, what does this have to do with NCI's [High-Performance Summit](#)? Everything!

HIGHLY-PERFORMING SYSTEMS FROM SERVICE TO INSTALLATION

Whether you are an NCI member, get trained and certified by NCI, or are a contractor looking for answers to the new normal, you can't miss this year's High-Performance HVAC Summit Week — April 16-20 in Branson, MO.

This year's conference focuses on how to service, sell, and deliver systems that perform as they are supposed to.

While it's important to make sure new SEER2 systems deliver the promised comfort and energy savings, it's equally important to educate customers about how these changes impact them.

LASER-FOCUSED EVENT

Each of this year's sessions will help you achieve these goals and build a stronger service agreement base with performance testing on every maintenance and service call.

This information-packed event isn't like other events with generic seminars by industry consultants touting their latest theories on how to

generate leads or close HVAC sales. Summit 2023 is laser-focused on helping you deliver the highest quality at the profits you deserve.

If you have never been to a Summit before, fasten your seat belt, it's unlike any HVAC industry event you've attended before. We aren't very flashy and we don't do rah-rah rallies. We are focused on solid content without the fanfare typical with many other events.

While Summit has many unique features — including the way we do our general sessions, our game show, idea meetings, breakouts, and social events — one of the most standout differences about Summit is **YOU**, the attendee.

THE SPIRIT OF SUMMIT


I've been involved in HVAC industry events for more than 35 years, and to this day I've never witnessed the type of sharing and relationships that occur at Summit.

The only way to truly grasp the openness and caring of this group is to witness it yourself. While many love to rekindle old relationships, it is amazing how this group welcomes newcomers.

This conference, now in its 20th year, was created to give High-Performance HVAC contractors their own unique place to gather with fellow like-minded professionals, learn from each other and NCI instructors and coaches.

When we ask attendees what they like the most about Summit, the most common response is the sense of community, even family, and the open and honest sharing that goes on.

So don't delay, if you haven't registered for Summit yet, register today at GoToSummit.com and take advantage of early-bird rates.

I wish you a prosperous and healthy 2023, and can't wait to be together this April. See you in Branson! 

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