

THE 2025 TREND REPORT





2025 Trend Report

HVACR is a truly distinctive industry, bringing together professionals from a variety of sectors and disciplines. While we all share common objectives, our daily practices can vary significantly. The Industry Trend Report serves this career diversity, designed to bridge the differences and offer thoughtful connection points regarding the industry's current state ahead of Orlando.

Our endorsing associations provide a comprehensive view of the many roles within the industry, highlighting relevant discussion topics as we prepare to meet in person. We appreciate the contributions of all those who participated in this report, as their input is vital in understanding the industry's challenges and opportunities from multiple perspectives. We realize that despite our varied approaches, aligning our goals is essential for the path of continued growth and success of the HVACR industry—a sentiment that gains importance with each passing year.

You can find more information regarding the show and the industry at ahrexpo.com.



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Summary Takeaways & Common Industry Themes

Regulation updates

- Decarbonization
- Electrification
- New standards with quicker onboarding
- Commissioning
- Energy management

The built environment is evolving

- AI and controls
- Energy efficiency, sustainability and smart technology
- Automation
- IoT and data analytics
- Cybersecurity and BA systems

Supply chain

- A2L transition
- Compliance requirements
- Incentive programs

Workforce and training

- The need for a strong and skilled workforce
- Revitalizing a focus on HVACR career paths
- Promoting the career opportunities within the trades

Product adoption

- Heat pumps
- Hybrid solutions
- Building automation systems
- SaaS platforms

Expansion, growth and meeting demand

- Managing multiple areas of growth within the industry
- Educating first the workforce, and secondly the end user
- Cutting edge technology and environmental responsibility
- Attracting, onboarding and training



Air-Conditioning, Heating, and Refrigeration Institute (AHRI)

AHRI serves its membership of 300-plus HVACR and water heating equipment manufacturers through operations around the world. AHRI members manufacture quality, efficient, and innovative HVACR equipment and components which account for more than 90 percent of the residential and commercial equipment manufactured and sold in North America.

ahrinet.org

Booth #3300

400+ member companies



STEVE YUREK
President & CEO

The Current State of HVACR

“Our industry around the world is strong and innovative. Our member companies manufacture **quality, reliable products and equipment that are essential to the health, wellbeing, and productivity** of customers around the world.”

AN INDUSTRY VISION



Our industry spends considerable time, energy, and resources keeping abreast of changes across the globe, whether they be economic, environmental, cultural or a combination thereof.

Trending Topics



- The transition from HFC refrigerants to their successors that began in 2011 is nearing completion and the industry is now working with regulators and NGOs to explore the feasibility and safety of moving to even lower-GWP refrigerants for some applications in the future. Our industry is also heavily involved in decarbonization efforts, both in the United States and around the world, always focused on economic viability as well as technological feasibility. **Other issues on our radar include increasing state efforts to regulate PFAS chemicals and plastics and packaging, as well as to implement extended producer responsibility programs.**
- Another hot topic is **implementation of the tax credits contained in the Inflation Reduction Act** - we await final guidance from the Treasury Department on that (as of September 2024).
- The one major shift would likely be the **discussion of A3 refrigerants in residential applications.**



MESSAGING IN THE MEDIA

We continue to stress that **HVACR and water heating products are necessities, not luxuries**, and that policies must take into account consumer access and affordability.



ASHRAE

ASHRAE is a diverse organization dedicated to advancing the arts and sciences of heating, ventilation, air conditioning and refrigeration to serve humanity and promote a sustainable world. They have over 53,000 members globally including 5,500 student members in over 400 branches.

ashrae.org

Booth #3201

53,000+ members globally



M. DENNIS KNIGHT
President

The Current State of HVACR

“Rapid advancements in technology and AI, along with a focus on sustainability, energy efficiency, and resilient building systems, are driving innovation in the HVAC&R industry at an unprecedented pace. However, this progress also brings a pressing need for skilled professionals. **By combining technological power with human creativity, both experienced professionals and new talent can work together to shape the future of our industry.**”

SECTOR HIGHLIGHT



The HVAC&R industry is rapidly expanding and plays a crucial role in addressing human health and the climate crisis through sustainable building practices. Despite this, we face a significant challenge in attracting new talent. **Senior engineers and building scientists are aging out of the workforce, taking with them valuable expertise, yet not enough younger individuals are stepping in to fill their shoes.** This disconnect largely stems from a perception problem.

AN INDUSTRY VISION



Our industry’s vision — creating energy-efficient, healthy, and carbon-neutral buildings — must be more effectively communicated. Young people seek meaningful and purpose-driven careers, and the HVAC&R industry has the potential to fulfill these desires. **We need to demonstrate how our work directly impacts indoor environmental quality, climate action, and sustainable development.** By showcasing the real-world impact and future possibilities of our industry, we can inspire the next generation to pursue careers that contribute to a healthier planet and better quality of life for all.

Trending Topics

BUILDING DECARBONIZATION



ASHRAE’s goal to achieving net zero GHG emissions in operation for all new buildings by 2030. We have held global summits on building decarbonization in Washington, DC, Madrid, Spain, Athens, Greece, Delhi, India and have one coming up later this fall focused on high rise buildings in New York City, NY. The CEBC is producing 14 guidelines and a Standard that will allow carbon emissions by buildings to be quantified, accounted for and reported consistently around the world.

ASHRAE continued...

WORKFORCE DEVELOPMENT



ASHRAE members are collaborating on a grassroots campaign to educate others about our industry's role and contributions. We will promote the current work and future opportunities in HVACR that will impact indoor environmental quality, climate change and sustainable development for all humanity. **This work will have an even more significant impact as the world's population grows from 8 billion today to 9.7 billion in 2050.** We are sharing new tools and resources that our members can tailor to include their own personal stories, observations, passions and motivations. These resources are on president's section of [ashrae.org](https://www.ashrae.org).

Other workforce development efforts:

- 1** We have started building relationships with U.S. federal agencies, associate societies, and the United Nations Global Alliance for Building Construction around this topic. As a result, we hosted an industry summit on a global workforce needs assessment tied to our building decarbonization conference in New York City (October 21-23).
- 2** We are creating new endowed scholarship funds to allow practicing professionals to take advantage of our professional development opportunities.
- 3** A focus of this Society year's ASHRAE Decarbonization Challenge and the Presidential Award of Excellence at the chapter level will be on technical talks delivered by local practicing professionals that emphasize upskilling and reskilling, targeting young and mid-career engineers.
- 4** Our Chapters' Regional Conferences will host Industry Roundtables focusing on employee engagement and the workforce of the future.

ASHRAE Foundation



\$1.4M Total Added

including gifts raised through RP



\$653,581

supporting ASHRAE programs

SCHOLARSHIPS AWARDED



36

Society Scholarships

28

Endowed Chapter Scholarships



Booth #6263

Associated Air Balance Council (AABC)

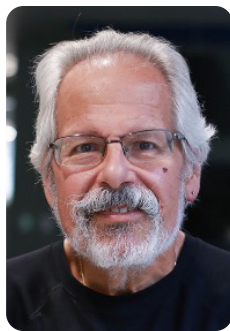
aabc.com

The Associated Air Balance Council is dedicated to the advancement of independent, third-party testing and balancing. The association's mission is to certify highly qualified, independent test and balance agencies.



JEREMY JOHNSON

TBE, CxA, Associated Air Balance Council (AABC) Board Member



AL LAPERA

CxA, EMP, LEED AP, Energy Management Association (EMA) Board Member and AABC Commissioning Group (ACG) Education Committee Member

The Current State of HVACR

“ Today the HVACR industry is strong and prosperous. Advances in technology still continue to be the most exciting and challenging part of the industry. **An overarching trend toward decarbonization and electrification of buildings will mean that commissioning and energy management are even more of a focus.** The ever-changing landscape requires those in the industry to constantly be learning, growing, and adapting while still maintaining the fundamentals of the HVACR industry.”

A Changing Industry

INCREASING COMPLEXITY



With developments in software systems, hardware, and artificial intelligence, the industry is becoming more complex. Long-term changes in the industry will challenge not only those who currently service and maintain systems, but also will require advanced thinking in design and engineering.

Trending Topics

TAB INDUSTRY

- Quality of workmanship
- Challenges in scheduling
- Independence

COMMISSIONING SECTOR

- Remote
- Monitoring-based commissioning
- Ongoing commissioning

ENERGY MANAGEMENT SECTOR

- Energy efficiency
- Decarbonization
- Artificial intelligence

There is also a growing trend toward reducing energy in existing buildings, bringing retro commissioning and energy auditing to the forefront.



Association for Smarter Homes & Buildings (ASHB)

ashb.com

The Association for Smarter Homes & Buildings (ASHB) (formerly the Continental Automated Buildings Association - CABA) supports the intelligent building and connected home technologies market — an industry we've helped grow since 1988. Discover our research and networking opportunities and join with nearly 300 member companies with activities in the smart buildings and homes industry.



GREG WALKER
CEO

The Current State of HVACR

“ The HVACR industry is undergoing significant transformation, with a **strong focus on energy efficiency, sustainability, and smart technology**. Advancements in digitalization and connectivity are enhancing system performance and control, making HVACR a key player in the drive towards smarter, more sustainable buildings and cities.”

AN INDUSTRY VISION



In recent years, the industry has shifted from traditional systems to more integrated, intelligent solutions. This change is driven by the need for greater efficiency, reduced environmental impact, and the growing demand for connected, data-driven building management.

What's happening in Smarter Homes & Buildings?

- 1 Smart Building Integration:** The seamless incorporation of HVACR systems into smart building platforms, enabling more efficient, automated control and monitoring.
- 2 Indoor Air Quality (IAQ):** A heightened focus on IAQ, driven by post-pandemic health concerns, is leading to innovations in ventilation, filtration, and real-time air quality monitoring.
- 3 Energy Efficiency and Sustainability:** The push for net-zero energy buildings is putting pressure on HVACR systems to be more energy-efficient and environmentally friendly, with an emphasis on heat pumps, advanced refrigerants, and renewable energy integration.
- 4 IoT and Data Analytics:** Leveraging IoT and advanced data analytics to optimize HVACR performance, predict maintenance needs, and enhance system longevity.
- 5 Resilience and Adaptability:** As climate change intensifies, there's a growing demand for HVACR systems that can adapt to extreme weather conditions and ensure reliable operation in diverse environments.

Trending Topics

THE ELECTRIC GRID/ELECTRIFICATION



The electrification of HVACR systems is gaining momentum, with increased focus on how these systems interact with the electric grid. **Smart grid integration, demand response, and energy storage solutions** are becoming essential for managing peak loads and enhancing grid stability.

ASHB continued...

Trending Topics

LIVING HEALTHY



Indoor air quality (IAQ) and water quality are increasingly seen as integral to occupant health. **The industry is focusing on advanced filtration, ventilation systems, and smart plumbing solutions** to ensure healthier living environments, especially in light of recent global health concerns.

AI+ CONTROLS



The integration of AI in HVACR systems is transforming how these systems are controlled and maintained. **AI-driven predictive maintenance, energy optimization, and adaptive controls are leading to more efficient and responsive systems.**

WORKFORCE DEVELOPMENT



As the industry evolves, so does the need for a skilled workforce. There's a **growing emphasis on training and education, particularly in new technologies** like AI, IoT, and advanced refrigerants, to ensure the industry can meet future demands.

Most Pressing Issues



The top two pressing issues in the HVACR industry, particularly relevant to ASHB's sector, are **sustainability and decarbonization and integration with smart technologies.**

The drive towards sustainability and decarbonization is a critical challenge as the **industry faces increasing pressure to reduce carbon emissions, adopt low-GWP refrigerants, and enhance energy efficiency.** This shift demands not only technological innovation but also significant investments in research, development, and workforce training to ensure that HVACR systems can meet stringent environmental standards without compromising performance.

- Simultaneously, the integration of HVACR systems with smart technologies presents another pressing issue. **The need for seamless interoperability across different devices and platforms in smart buildings is crucial for maximizing energy efficiency, improving indoor air quality, and enhancing overall building performance.** As more buildings and homes incorporate smart systems, ensuring that HVACR technologies can effectively communicate and function within these environments is essential for the future of the industry.

Opportunities Ahead



The coming year offers significant opportunities for the HVACR and plumbing industries, particularly in the integration of smart technologies and the expansion of sustainable solutions. **As demand for energy-efficient, eco-friendly systems grows, there is a strong market for innovations in heat pumps, low-GWP refrigerants, and water-saving fixtures.** Additionally, advancements in AI and predictive maintenance are set to enhance system performance and reliability, while improving indoor air and water quality to meet the rising demand for healthier living environments.

Industry Shifts



ASHB has been at the forefront of conversations about the integration of HVACR systems into smart building ecosystems, where IoT, AI, and advanced analytics are enhancing system efficiency and adaptability. Additionally, the importance of IAQ has been elevated, with advancements in ventilation, filtration, and real-time monitoring becoming critical in ensuring healthy building environments. The push for electrification of HVACR systems and their interaction with the electric grid is another area of focus, highlighting the role these systems play in supporting grid stability and energy efficiency. **To support these industry changes, ASHB has emphasized the need for workforce development, advocating for ongoing education and training to equip professionals with the skills necessary to manage and leverage emerging technologies.**

ASHB continued...

Challenges Ahead

REGULATIONS & STANDARDS



One area that is being closely monitored is the evolving regulatory landscape, particularly concerning refrigerant regulations and energy efficiency standards. **Staying compliant with these regulations while maintaining system performance and cost-effectiveness is a significant concern for industry stakeholders.** The impact of climate change on HVACR system design and operation, including the need for more resilient and adaptable systems, is also a critical issue on the radar.

INNOVATION IMPACT



The integration of AI and predictive analytics into HVACR systems has the potential to make the biggest impact in the industry. These innovations can revolutionize how systems are monitored, managed, and maintained by enabling real-time data analysis, predictive maintenance, and optimized energy usage. AI-driven systems can anticipate failures before they occur, adjust performance to maximize efficiency, and even learn from operational data to continuously improve functionality. This not only enhances system reliability and extends equipment lifespan but also significantly reduces energy consumption and operational costs. **As buildings become smarter and more interconnected, AI and predictive analytics will play a crucial role in driving the industry toward greater sustainability, efficiency, and innovation.**

Member Discussions



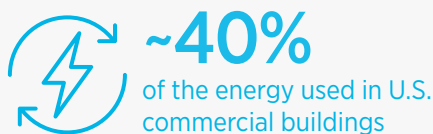
Members will be on the **lookout for innovative technologies and partnerships that offer seamless integration into smart building ecosystems, as well as tools that provide actionable data to optimize energy use and system reliability.** Additionally, there will be a strong focus on building awareness around the latest advancements in AI, IoT, and energy-efficient HVACR systems, ensuring that they are equipped to lead in an increasingly complex and interconnected industry landscape.

The opportunity to see cutting-edge AI and IoT-driven solutions in action [at AHR Expo], particularly those that enhance system efficiency, predictive maintenance, and indoor air quality, is exciting.

Facts and Figures

ENERGY CONSUMPTION

HVACR systems account for



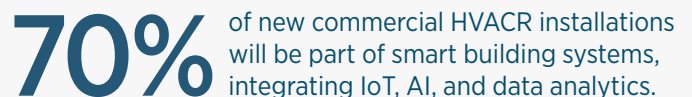
This significant energy demand highlights the importance of:

- improving efficiency
- integrating renewable energy sources to reduce operational costs and carbon footprints

(Supported by data from the U.S. Department of Energy (DOE) and the Environmental Protection Agency (EPA))

SMART TECHNOLOGY ADOPTION

By 2025, it is estimated that over



This integration will allow for:

- more efficient energy management
- predictive maintenance
- enhanced indoor air quality, driving both cost savings and improved occupant comfort.

(Gartner and Statista)



BSRIA Inc. is a subsidiary of BSRIA Ltd, a global strategic market intelligence company. With over 30 years' experience of researching within the HVAC industry, specializing in global studies on heating, air conditioning, renewables, IT cabling and associated technologies and building controls markets. BSRIA has undertaken research in over 94 countries and employs 30 permanent multi lingual staff; with over 17 languages being spoken.



KRYSTYNA DAWSON
Commercial Director

The Current State of HVACR

“ The HVAC & Refrigeration industry is undergoing a green transformation. A **heightened focus on sustainability, driven by environmental concerns and rising energy costs, is propelling the adoption of renewable energy sources and energy-efficient solutions.**

Heat pumps that can deliver heating, cooling and hot water are gaining traction, becoming the preferred choice for new homes, while the industry explores innovative solutions to decarbonize existing buildings. Advanced building automation and digital control solutions are helping to unlock the change.

Smart and connected HVAC systems are revolutionizing buildings' management tactics and increase their performance potential; by harnessing AI and machine learning, building operators can optimize systems performance, enhance indoor air quality, and deliver unparalleled comfort while reducing energy consumption.”

A Changing Industry

NAVIGATING DISRUPTIONS



Navigating supply chain disruptions is a top priority. **Pre-fabricated systems offer potential solutions, while nearshoring gains traction.** The industry shifts, adapting to upcoming refrigerant regulations, balancing environmental responsibility with market realities.

THE EVOLUTION OF HVACR



The HVAC & R market is evolving. While traditional HVAC products remain relevant, there is a **clear trend to steer away from fossil fuels; decarbonisation of electricity generation is ongoing, driving demand for heat pumps** in new build and for hybrid solutions in existing dwellings. Skilled labour still poses a challenge amid heat pump installations growing in volume.

BSRIA continued...

A Changing Industry

HEAT PUMP ACCESSIBILITY



Heating as a Service (HaaS) presents an opportunity to **accelerate the adoption of heat pumps, making them more accessible to a wider range of customers**; with an add-on of maintenance and support services, ensuring optimal performance and reducing the burden on customers, this trend supports the raise of new type of providers, delivering thermal comfort service, rather than selling products.

HIU EVOLUTION



Heat Interface Units (HIUs) are evolving into Hydraulic Interface Units (HIUs), expanding their capabilities to include both heating and cooling. This versatility makes **HIUs a valuable component in district heating and cooling networks**, enabling efficient and flexible energy distribution.

REGULATORY CHANGES



The HVACR industry is facing a **complex interplay of factors, including protectionism, regulatory changes, economic conditions, and technological advancements**. The Inflation Reduction Act (IRA) in the United States and the Net Zero Industry Act (NZIA) in Europe are aimed at boosting local production and strengthening the HVACR economy while addressing climate change. However, the revision of the F-Gas Regulation to allow the installation of R410a systems in replacement cases could potentially slow down the adoption of low-GWP refrigerants.

FOCUS ON SERVICE & MAINTENANCE



The slowdown in new construction has shifted the focus towards service and maintenance (S&M) activities. In the United States, BACS refurbishment and retrofit rates have remained consistently high over the past three years. **The emergence of new Building Operational Platform (BOP) software offerings is facilitating the integration of various products and systems into a unified platform, enhancing operational efficiency**. The shortage of skilled labor is driving the demand for remote monitoring solutions, while the growing demand for air conditioning in data centers is creating new opportunities for the HVAC & R industry.

Trending Topics

CHALLENGES & OPPORTUNITIES



The HVACR industry faces significant challenges, including **regulatory uncertainty, labor shortages, and the declining boiler market**. However, opportunities abound in **water treatment, digital solutions, and heating technologies** like heat pumps and HIUs.

MAINTENANCE FOCUS



Focus on **maintenance of HVAC systems grows to deliver efficiency and longer HVACR equipment life cycle** as well as an enhanced indoor air quality responding to customers' increased awareness of health and well-being issues.

HYBRID SOLUTIONS



While traditional heating systems still have a robust replacement market, the **trend towards lower installation and running costs for alternatives like heat pumps is driving competition**. Hybrid solutions are gaining traction in existing homes that aren't suitable for a complete transition to renewable heating.

BSRIA continued...

Trending Topics

DEPLOYING BACS



District heating and cooling are increasing their penetration, particularly in apartment blocks in densely populated areas. The threat to energy security has spurred building owners to invest in systems that improve building performance, including BACS. However, the high inflation and associated interest rates have hindered the newbuild market in some countries. Governments have been implementing legislation to encourage greater energy efficiency, but the effects of these policies take time to materialize. As a result, the **same trends are driving the deployment of BACS in smaller buildings and a greater focus on the refurbishment market.**

SaaS PLATFORMS



In the United States, the percentage of BACS software delivered as SaaS has risen rapidly. **Predictive maintenance, often linked to SaaS platforms, is becoming a key value proposition for building owners, enabling remote asset management and proactive maintenance.**

CONNECTIVITY



The trend towards more easily connectable products continues, with a **shift towards IP-based systems and a demand for faster data transfer** to support cloud analytics.

REFRIGERANTS

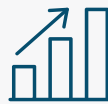


Turning to the specific refrigerants used in HVACR systems, **we see a mix of established and emerging options.** In the residential AC market, R410a continues to dominate globally, with notable exceptions in Europe and Southeast Asia. Suppliers have introduced new lines, such as Daikin's R32 and R454B and offerings from other Asian manufacturers. However, discussions surrounding relaxing regulations on HFCs (like R410a) for retrofit applications may hinder the adoption of low-GWP refrigerants in North America.

Facts & Figures

Residential and commercial AC markets account for the biggest share of the global HVAC market, at a value of

• **\$131B** in 2023 (USD)
They post steady growth year on year.



Sales of hydronic heat pumps and solar thermal systems created a global market at:



\$31B in 2023 (USD)

The market for renewable solutions is posting growth at a global scale.

Global heating market (including space and water heating) represents a value close to: **\$39B** (USD)



This market proves to be relatively stable on a global scale, with slow decline in sales of domestic boilers offset by regional increases in the water heating business.

Building automation market, which focuses mostly on the commercial buildings, represented some:

\$22B in 2023 (USD) and is growing well year on year.

BSRIA continued...

Positive Highlights

DEMAND FOR ENERGY EFFICIENCY



Even though energy prices have fallen in most parts of the world, **consumers have become acutely aware of the benefits that energy efficiency brings to their energy cost.** The understanding of the **impact of air quality on health and well-being has become a lasting legacy** from Covid time. These two factors, together with growing environmental awareness among end-users, are driving a significant shift in the HVAC & R industry, as **both policy and consumers raise their demands towards low carbon, efficient and effective, health supportive solutions.**

- This trend is particularly evident in the replacement market, where minimizing operating costs is a key motivator for upgrading existing HVAC & R systems. **The combination of environmental concerns and the need for cost savings is accelerating the adoption of energy-efficient technologies,** such as heat pumps and high-efficiency boilers, and driving a demand for connected HVAC solutions.

Challenges Ahead

FACTORING IN COST



Despite growing environmental awareness, **price remains a significant factor for many end-users when making HVAC & R system installations.** The high electricity-to-gas price ratio can influence the choice of heating systems, while poor construction quality can impact the efficiency and performance of HVAC equipment.

POLITICAL UNCERTAINTY



The regulatory framework in many markets is insufficient to meet national green targets, and **political uncertainty regarding future targets and subsidies can create challenges for the industry.** The inability of retrofit, construction, and investment activities to keep pace with regulatory requirements is another obstacle.



esco institute

Booth #167

ESCO Group

escogroup.org

ESCO is your gateway to the dynamic world of HVACR and building science, where innovation and knowledge shape the industry's future. We are committed to setting industry standards, providing validation tools, and delivering tailored training resources to help professionals thrive. Join us in advancing the industry and building a brighter, more sustainable future. Whether you are a student, technician, contractor, manufacturer, wholesaler, or instructor, the ESCO Institute offers resources to help advance your career.



CLIFTON BECK
Manager of
Digital Media

The Current State of HVACR

“ Technology and regulations are ever-changing. **Those who embrace change are often the first to benefit and first to succeed**, setting new standards and leading the industry forward.”

AN INDUSTRY VISION



We are witnessing the rise of unprecedented change in our industry through technological innovations that improve system efficiency, and environmental sustainability. **There's a strong shift towards innovative and energy-efficient solutions aimed at combating global warming and embracing alternative energy sources.** Traditional heating methods using fossil fuels like oil and gas are being replaced by heat pumps and hybrid solutions. Simultaneously, the importance of air conditioning is growing globally. As a result of the technological explosion in our industry, the days of single-stage equipment — both fossil fuel systems and air conditioning — are coming to an end. **Variable capacity fossil fuels and inverter-driven heat pumps have become the new kings and queens of the HVACR industry, leading the charge toward a more efficient and adaptive future.**

Trending Topics



Low-GWP refrigerants have introduced **new educational opportunities**, not only regarding the refrigerants themselves but also for next-generation refrigerant leak detection systems aimed at effective leak mitigation. As A2L equipment enters the market, the demand for training and certification has reached an all-time high. **Consumers are increasingly expecting higher levels of professionalism from their technicians, especially as the price of goods rises and the need for skilled professionals grows.** The industry is buzzing with discussions on required commissioning reports and nationally recognized training certifications. This may be the era that ushers in a wave of change and elevated professionalism, pushing HVACR technicians to meet national standards of training and certification, similar to other professional fields.

Opportunities Ahead



Our recent travels across the country allowed us to engage with educational partners and equipment manufacturers, providing us with invaluable insights into the latest advancements and the educational needs of the workforce. **Properly trained HVACR and plumbing professionals will have a unique opportunity to work on hybrid water heating solutions**, such as heat pump water heaters, across residential, commercial, and industrial applications.

ESCO Group continued...

In the News



The U.S. Department of Energy has developed a program to recognize professionals who have acquired training and certification in the clean energy transition. HVACR professionals looking to enhance their skills in best practices for sales, installation, commissioning, and servicing of products like heat pump water heaters and cold-climate heat pumps are encouraged to pursue Energy Skilled recognition through the Building Science Education initiatives. Learn more at bsesc.energy.gov/recognition/energy-skilled.

Challenges Ahead



The move to low-GWP refrigerants, such as A2Ls, is preparing us for the next generation of HVACR products, which will feature even lower-GWP refrigerants like R290, R600a, and even CO2 — all within the residential HVACR industry. **As we progress through the HFC phasedown, with an 85% reduction target over the next decade, we must stay mindful of the changes ahead.** It is inevitable that we will encounter air-to-water solutions using ultra-low-GWP refrigerants in the coming years.

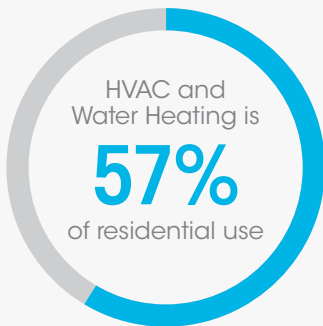


Big Impact Innovations

In my opinion, **residential air-to-water inverter heat pumps with ultra-low-GWP refrigerants will be the most significant innovation in our industry over the next decade.** As the demand for precious metals like copper and aluminum continues to grow, it makes sense to transition to water and other heat transfer media distributed through low-cost tubing, such as PVC and recycled plastics.

I also envision **mono-block outdoor units becoming a new market model** with simple leasing options due to their modular construction and ease of replacement.

DID YOU KNOW?



Energy Usage

31%	Space Heating	3%	Lighting
29%	Other Uses	1%	Computing
14%	Water Heating	1%	Cooking
11%	Space Cooling	1%	Lighting
5%	Refrigeration	1%	Ventilation
3%	Electronics	1%	Wet Cleaning

Highlight the Positive



We must **invest in education and industry-recognized certifications to prove our competence and stay up-to-date with ongoing advancements** as the industry continues to evolve. Today's consumers, and those of the future, will seek trusted professionals who are current and credentialed for working on modern HVACR equipment.

hardinet.org

HARDI (Heating Air-conditioning Refrigeration Distributors International) is a trade association with the mission of making wholesale distributors the channel of choice for HVACR manufacturers and contractors. We provide our members with the tools and resources needed to advance your businesses. We have a team of market researchers, data analyzers, trainers, lobbyists, marketers and account managers all working to support you. When you become a HARDI member, you get more than just a membership, you get access to an entire community.



TALBOT GEE
CEO

The Current State of HVACR

“ 2025 should bring more opportunities for growth than 2024, however the complexities around the **A2L transition, various incentive programs and incentives qualifications, and the hard deadline for the expiration of expensive inventory at the end of the year will present plenty of challenges.** Distributors and contractors, in particular, who are unprepared or unaware of these complexities are likely to be exposed to their detriment and at HARDI we take very seriously our responsibility in not letting that happen to our members.”

AN INDUSTRY VISION



The industry in 2024 looked a lot like 2023, as **residential end-market demand remained weak relative to recent years, and nonresidential end-markets continued their strong performance.** Residential demand in both '23 and '24 has been suppressed by a difficult mix of inflated prices and high interest rates, driving increases in service/repair demand and declines in replacement activity. Conversely, nonresidential market participants continue to benefit from the outsized performance of data centers and new investments in manufacturing facilities. Taken together, the HVAC/R addressable market has grown by more than 10% across 2023 and 2024.

Trending Topics

STATE REGULATORY ISSUES



As state-level regulations around environmental and energy standards evolve, there's an **increasing need for distributors to stay ahead of diverse compliance requirements** across the U.S. Staying informed and adaptive to these changes is crucial for long-term success.

With non-residential and residential markets taken together, the HVAC/R addressable market has grown by

>10% across 2023 and 2024

WORKFORCE DEVELOPMENT



Excelling in workforce development means attracting, onboarding, and training individuals without backgrounds in HVACR or wholesale distribution and helping them thrive within the industry. Onboarding sets the tone for tenure and longevity. **Competitive companies must be prepared to offer robust training and a clear value proposition** when it comes to culture.

HARDI continued...

Trending Topics

SUPPLY CHAIN FORECASTING



The A2L refrigerant transition continues to add complexity to market forecasts and product availability. Companies with the financial strength and capacity to adapt are poised to weather these uncertainties more successfully.

REFRIGERATION AND REGULATION



The A2L transition brings particular challenges for HVACR distributors. Our focus is on **condensing the overwhelming flow of regulatory updates into straightforward, practical steps our members can take** to ensure compliance and efficiency.

Critical Issues



The transition to A2L products will stress HVAC/R businesses throughout the industry value chain, and new regulations intended to lessen the industry's impact on the environment will continue to materialize on the state and local level.

Upcoming Opportunities



2025 brings plenty of reasons for optimism. Fortunately, **economic circumstances appear to be tilting in the industry's favor at just the right time and may help to offset the added costs that can be attributed to regulatory burdens.** Inflation has slowed and interest rates are coming down, which will help to improve a housing market which has been a drag on industry growth. Nonresidential markets, while slowing, will continue to see upside from demand driven by manufacturing and data center growth. Additionally, IRA funds will also become more widely accessible, which will help reduce the higher costs associated with new A2L systems.

Messaging in the Media



Professionals can champion the HVACR industry by positioning themselves as trusted experts who navigate today's challenges with insight and resilience. Distributors play a critical role in ensuring that energy-efficient, high-performing products reach the market, which benefits both the environment and the economy. By staying informed on regulations, rebates, and emerging technologies, they can guide customers toward maximizing incentives and making informed choices. **Investing in technology, talent, and financing options not only strengthens individual businesses but also reinforces the industry's reputation as a vital contributor to sustainability, innovation, and growth.** This kind of leadership and expertise is essential in advocating for HVACR's impact on a larger scale.



Big Impact Innovations

AI advancements hold immense potential to reshape industries. In HVACR, **AI can drive predictive maintenance, optimize energy use, and streamline supply chains**—and as we navigate the refrigerant transition, AI will be crucial for analyzing compliance needs, predicting demand shifts, and ensuring seamless adaptation to new standards.

Member Discussions



Our members are intensely focused on **strategies to maintain profitability amid tightening markets.** Key discussions center around finding specific solutions, products, and partnerships that can strengthen their competitive edge. The innovations, partnerships, and insights available on the show floor will be essential in supporting these goals and equipping our members to tackle current and future market challenges effectively.

Challenges Ahead



As state-level regulations around environmental and energy standards evolve, there's an **increasing need for distributors to stay ahead of diverse compliance requirements** across the U.S. Staying informed and adaptive to these changes is crucial for long-term success.



Booth #2175

The International Association of Plumbing and Mechanical Officials (IAPMO)

iapmo.org

IAPMO is a global team of experts engaging industry and government for a safer built environment. Our deep expertise in codes and standards is applied to our rigorous product testing, certification and inspection services, professional development offerings, industry research, policy and advocacy work.



JOHN MULLEN
Director of Technical Services and Research

The Current State of HVACR

“ The plumbing and mechanical industry is on the cusp of unprecedented transformation as we approach 2025. **Innovations in sustainable technologies, AI integration, and enhanced workforce development are driving the industry forward.** We are seeing a strong push towards decarbonization and energy efficiency, which is reshaping how we approach mechanical solutions. As I often say, ‘Water is energy,’ and harnessing this natural resource through advanced hydronic systems can lead to remarkable sustainability and efficiency gains. **This is a time of collaboration and creativity, with a shared vision for a greener, smarter future.** Furthermore, the emphasis on attracting and training the next generation of highly skilled tradespeople is pivotal in ensuring the industry’s continued growth and evolution - It’s an exciting time to be in the skilled trades!”

AN INDUSTRY VISION



Short Term

We have witnessed an accelerated adoption of **smart technologies and AI-driven solutions.** **These advancements are not only improving system efficiency and reliability but also enabling predictive maintenance and real-time monitoring.** The integration of these technologies is helping us optimize energy usage and reduce operational costs, providing a competitive edge to businesses that embrace them.

Long Term

The industry is poised for a major shift towards sustainability and decarbonization. The emphasis on renewable energy sources, such as geothermal and Thermal Energy Networks (TENs), is becoming more pronounced, driven by regulatory changes and the need to combat climate change. **We are also seeing a cultural shift towards embracing new methodologies and training programs that equip the workforce with the skills needed for this evolving landscape.**

Crucially, there is a renewed focus on workforce development, particularly in attracting the next generation to the trades. **By leveraging modern educational technologies and hands-on training, we are preparing young professionals to become the future leaders and innovators of our industry.** We must recognize water as a tool of thermal energy transfer, utilizing its unique properties to create efficient and sustainable building systems. This focus ensures that our craft evolves, staying relevant and resilient in the face of future challenges.

IAPMO continued...

Trending Topics

THERMAL ENERGY NETWORKS (TENS)



These networks are gaining traction due to their efficiency and the financial incentives provided by the Inflation Reduction Act (IRA). **TENS are becoming a cornerstone of sustainable building practices, offering significant energy savings and environmental benefits.**

AI AND SMART CONTROLS



The integration of AI into HVAC and Plumbing systems is revolutionizing how we manage and maintain these systems. Predictive analytics, machine learning, and smart controls are making it possible to preempt issues, optimize performance, and enhance energy efficiency.

WORKFORCE DEVELOPMENT AND JOBS IN THE TRADES



With the industry facing an aging workforce, there is a strong focus on attracting and training the next generation of professionals. Online learning platforms, EduTech, and hands-on training programs are critical in ensuring that we have a skilled workforce ready to tackle future challenges. **We are actively encouraging young people to pursue careers in the trades, highlighting the opportunities for growth, innovation, and stability that these jobs offer.** By fostering a new generation of builders and craftsmen, we are ensuring the craft continues to evolve and thrive.

DECARBONIZATION AND SUSTAINABILITY



Building owners and operators are increasingly focused on decarbonizing their operations. The use of tools like the Building Efficiency System Tool™ (BEST) to model and measure progress is essential in making informed decisions about energy usage and sustainability.

RENEWABLE ENERGY INTEGRATION



The push towards integrating renewable energy sources into heating and cooling systems is stronger than ever. **Geothermal, TENS, and other modern renewable technologies are being adopted to reduce reliance on fossil fuels and promote a cleaner, more sustainable environment.** Utilizing water for thermal energy transfer is a ripe opportunity for new communities to embrace sustainable practices, making waste heat an asset and aligning our living spaces with natural temperature regulation.

These topics reflect a dynamic industry that is constantly evolving to meet the demands of a changing world. **The focus is on creating systems that are not only efficient and reliable but also sustainable and forward-thinking.** By prioritizing workforce development and engaging the next generation, we are ensuring the future of the mechanical trades is bright and resilient.

Changes Ahead



Since the last AHR Expo, The Radiant Professionals Alliance has been passionately advocating for a major cultural shift towards de-siloing within the industry. **A core belief of “The Alliance” is that the future of our field hinges on breaking down traditional barriers and fostering unprecedented levels of collaboration across various sectors.** By organizing forums, workshops, and collaborative projects, we aim to create platforms where professionals can come together to share knowledge and best practices. These initiatives not only build stronger networks but also drive collective progress towards common goals.

One of the most exciting and relevant emerging topics within the plumbing and mechanical industry is the development and implementation of Thermal Energy Networks (TENS). These networks are **rapidly gaining attention due to their potential to revolutionize energy management in buildings and communities.**

IAPMO continued...

Critical Issues



The industry is currently facing just a couple of pressing issues, one of the most significant being the **tendency towards developing proprietary products rather than embracing open-source solutions**. This trend is creating silos and hindering the potential for innovation and efficiency that comes from collaborative efforts. **The heating and cooling industry plays a crucial role in reducing carbon emissions and improving our nations energy efficiency. However, achieving these goals requires collaborative efforts and the adoption of innovative technologies**, such as AI-driven energy management systems and integrated renewable energy solutions. Proprietary systems that do not integrate well with other technologies can often times hinder these efforts.

Upcoming Opportunities



The coming year presents a wealth of opportunities for the plumbing and mechanical industry, particularly in the realms of **sustainability, technology integration, and workforce development**. By joining the Radiant Professionals Alliance (RPA), professionals can leverage these opportunities and work together to drive the industry forward. **The RPA provides a platform for professionals to share knowledge, exchange ideas, and collaborate on innovative solutions**. This collective approach can lead to breakthroughs that individual efforts might not achieve, driving the industry towards greater efficiency and sustainability.

Challenges Ahead



One of the most significant challenges facing the industry in the near future is the **increasing demand for efficient and sustainable cooling solutions for data centers**. As data centers continue to support the growing needs of high-energy computing and emerging technologies like quantum computing, the industry must address the immense energy consumption and heat generation associated with these facilities. Water-based cooling systems are emerging as a highly effective solution for data center cooling. By leveraging the superior thermal properties of water, these systems can dissipate heat more efficiently than air-based cooling methods. Water's ability to absorb and transfer heat makes it an ideal medium for cooling high-energy computing environments.



Big Impact Innovations

In my opinion, the **most impactful innovation in the pipe trades is the use of water to achieve significant energy cost reductions**. By leveraging water's unique properties for thermal energy transfer, we have an incredible opportunity to use less grid energy and share it with neighboring buildings, ultimately lowering energy delivery costs for everyone involved. The concept of energy sharing through these networks is revolutionary. Buildings that generate excess heat during certain periods can transfer that energy to neighboring buildings that require heating, and vice versa for cooling needs.

Member Discussions



One of the most important topics of discussion amongst our membership **revolves around policy and participation in the codes and standards development process**. These topics are critical for ensuring that our industry continues to advance in a safe, efficient, and sustainable manner.



Booth #420

National Comfort Institute (NCI)

nationalcomfortinstitute.com

NCI is an organization that provides heating, air conditioning, plumbing and electrical contractors with a focused offering of services and tools to help them improve their businesses, differentiate themselves, grow, and become more profitable. NCI accomplishes this through membership groups and by providing unique business management, sales, marketing and technical tools, training, support and coaching - all designed with the goal of helping HVAC professionals to differentiate their companies through measured performance, quality and value.



DOMINICK GUARINO
President & CEO

The Current State of HVACR

“ The HVAC industry is facing unique challenges with the transition to A2L refrigerants along with the focus on electrification and inverter technology. Much training is needed.”

AN INDUSTRY VISION



We can no longer rely on rules of thumb and cheap testing instruments to set up or service systems. **We have to step up and technicians need to get the right training and tools to do the job right.**

Trending Topics

TESTING & VERIFICATION



Greater focus on testing and verification of newer systems, especially with inverter technology. Much training and instrument upgrades are needed.

ADVANCED TRAINING



With all of the challenges we're facing **we must focus more on industry training.** Not just through trade schools, but advanced training for the existing workforce.

Transition to A2L refrigerants is upon us. Also inverter technology is becoming prevalent as we move into 2025.

In a Nutshell

- We have a **shrinking workforce** and not enough support for contractor training by manufacturers and distributors.
- Contractors **who embrace new technologies** and increase tech training and invest in better tools will win.
- A challenge is the next **transition to zero GWP refrigerants** and everything that comes with that.
- **Better testing software and instruments** will help move our industry forward.
- We are **discussing tools and software** to help service and install systems better, faster and more accurately.

HVAC systems still perform at less than an average of



60% delivery of capacity to the conditioned space



How can we champion the industry?

Increase awareness of careers in HVACR and as a great alternative to typical college education.



Booth #2793

NEBB

nebb.org

Established in 1971, NEBB is the premier international certification association for firms that deliver high performance building systems. NEBB's function is to establish, promote and maintain high quality standards through certification of Firms, Professionals and Technicians. NEBB delivers through Certifications, Procedural Standards, Specifications, Seminars, Publications and through the NEBB Quality Assurance Program.

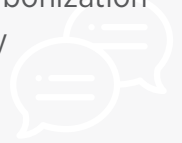


JEFF SCHOOLS
Technical Director

“ The industry needs to stay ahead of the times with the fast-moving world that we live in.”

Discussions to Highlight the Positive

- Promoting Decarbonization
- Energy Efficiency
- Sustainability



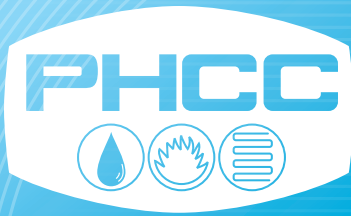
Changes Ahead

AI is starting to creep in and change the way we do business.



On Our Radar

- Artificial Intelligence
- Indoor Air Quality



Plumbing-Heating-Cooling Contractors — National Association (PHCC)

phccweb.org

The premiere organization for the p-h-c professional, PHCC provides legislative advocacy, education and training to approximately 3,300 plumbing and HVACR open shop and union businesses and 65,000 technicians. Our members work in the residential, commercial, new construction, industrial and service and repair segments of the construction industry.



CINDY SHERIDAN
CEO

The Current State of HVACR

“ The HVACR industry is starting into a period of change that can offer significant opportunities for both consumers and contractors. **Energy efficiency will be key to the future** with numerous federal and state programs emerging to help fund these transitions.”

AN INDUSTRY VISION



In the near term, getting technicians comfortable with new products will be important. However, the long-term plan should be to **develop a consistent, consensus-driven and realistic vision of regulatory requirements ensuring products and installations can meet consumer needs** in a practical and economically viable form without eliminating certain consumers from the market.

Trending Topics

Our nation's energy portfolio must remain diverse as we transition to less carbon-intensive solutions. **Regulatory changes to consumer water heaters, furnaces, and boilers are concerning to our members**, who cite increased costs to convert to these new products particularly when retrofits are necessary to accommodate those products.

DECARBONIZATION



Certain states, specifically New York, California, and Massachusetts continue to take a **more aggressive posture toward energy decarbonization policies**. PHCC continues to work with industry stakeholders to identify ideal solutions and understand consumer impacts of federal and state decarbonization policies.

HEAT PUMPS



PHCC is working to position its members as the primary professional resource in their markets for heat pump technology. **As the heat pump market matures, PHCC remains optimistic that heat pump technologies will remain accessible to all consumers.**

SHIFTS IN THE INDUSTRY

The **acquisition and consolidation of plumbing and HVAC contracting businesses** by private equity groups continues to be a notable trend.

PHCC continued...

Trending Topics

REFRIGERANT AND REGULATION UPDATES



The AIM Act instructed EPA to ensure competent personnel are doing this work. **PHCC strongly supports stronger enforcement of licensing and certification requirements** to ensure safe and optimal performance of advanced heating and cooling systems.

WORKFORCE DEVELOPMENT



PHCC continues to advocate for a robust federal workforce funding framework that provides avenues for younger workers to seek careers in the skilled trades such as plumbing and HVAC. **Workforce Innovation and Opportunities Act (WIOA) grants provide sufficient funds for employers to educate the next generation of plumbing and HVAC professionals.** Perkins Career and Technical Education (Perkins CTE) provides funding for secondary schools to introduce students to skilled trades. PHCC supports funneling Pell Grants to short-term in-demand job training that will be particularly beneficial to those seeking work in HVAC.

Pressing Issues



There are many “unknowns” in implementation of HOMES and HEARS rebate programs, in addition to 179D tax incentives. As a national association, **it requires a lot of bandwidth to keep track of each state’s program developments, and communicate those developments to our state chapters and members.** Contractors are **particularly concerned about how rebates will work** and whether they will be fully compensated by the time work starts, how long they will have to wait to receive compensation, how long a homeowner will have to wait to have work performed, and whether the rebate will be sufficient to offset costs.

DID YOU KNOW?

PHCC continues to expand its association offerings and benefits to support HVAC contractors and grow that segment of our membership.

Opportunities Ahead



Demand of high-efficiency products being driven in part by federal and state government incentive programs has the potential to expand product offerings and services, modernize inventories, and provides an opportunity for contractors to get their technicians trained on new products and technologies.



MESSAGING IN THE MEDIA

Professionals can **champion the industry by promoting a wide variety of products for every consumer’s building comfort needs and budget.** Professionals can best improve the visibility of the industry by participating in industry functions, such as attending this AHR Show or membership in allied associations such as PHCC.

Big Impact Innovations



The PHCC Academy® was recently established and offers a **wide variety of online training for employees, which in turn will reinforce the HVAC workforce’s skillsets** while helping employers retain skilled employees by providing pathways to growth.

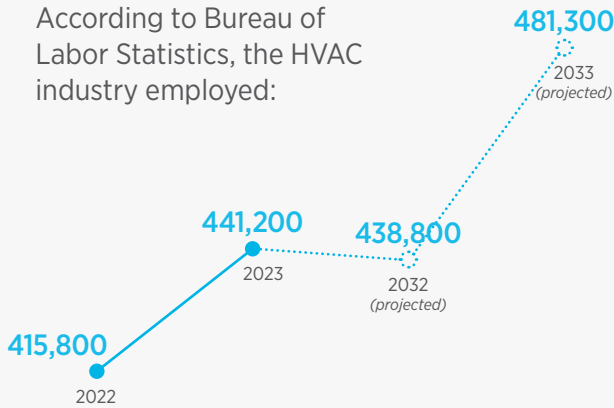
Important Discussions



As plumbing and HVAC products become more complex, **contractors will depend on manufacturers and distributors to provide training and technical support specific to their products to facilitate professional installations, operations, and maintenance.** In turn, that promotes the consumer/contractor relationship allowing for continued service of a system throughout the lifecycle of that product.

PHCC continued...

According to Bureau of Labor Statistics, the HVAC industry employed:



A net gain of **40,100** over ten years

- almost double 22,200 over 2022-2032 projection



Average of **57,300** vacancies/yr

- up from 37,700 vacancies/yr for 2022-2032 projection

We are seeing an increase in HVAC workers but not nearly enough to keep up with vacancies over the next decade.

Average of **4,010** net gain in HVAC workers/yr

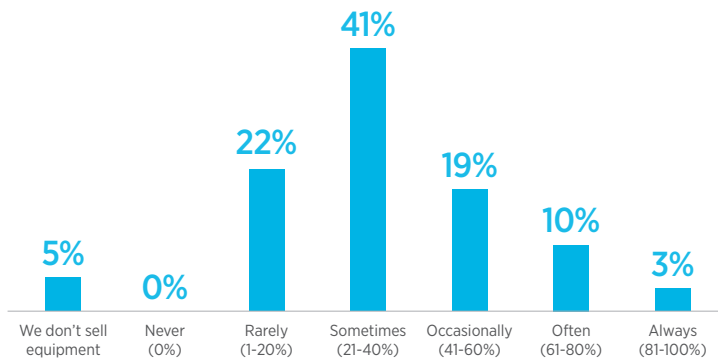
- even though there are 57,300 openings/year



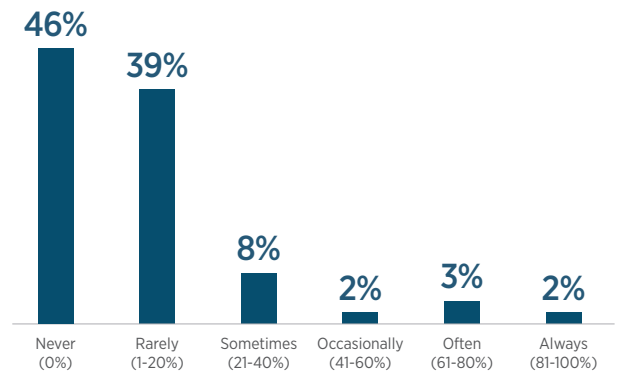
Survey Results: Equipment Efficiencies & Electrification



How Often Do Customers Want The Most Efficient Equipment?



How Often Do Customers Mention Rebates?



Refrigeration Service Engineers Society (RSES)

[rses.org](https://www.rses.org)

Since 1933, Refrigeration Service Engineers Society (RSES) has been a leader in training and education for professional HVACR technicians and contractors. RSES is a membership organization with members in chapters in the U.S. and Canada, with additional technicians routinely using its training material in 50 countries across six continents.



LORI SCHIAVO
Senior Director
of Operations

The Current State of HVACR

“ While I am hopeful that industry professionals are properly preparing for the new refrigerants and the continued transition of the HFC phasedown, I am not always certain that this is occurring as preparation, but rather as it is encountered in the field. While this is an effective approach from a cost efficiency standpoint – why train on something that has yet to be seen – for the safety of field professionals, **it is imperative to independently seek out training of the new refrigerants and technology. AHR will provide a fantastic platform to do this, however, the equipment is already out there.**”

AN INDUSTRY VISION



Preparation is the key to success in our industry, and RSES would love to see more of the newer professionals and their employers taking more initiative in helping to shape their career paths. I feel like we are rounding a corner on this, as **continuous training is becoming more of a staple in our industry, but we still face more people leaving the industry than entering it, so this will become more crucial as the year unfolds.**

Trending Topics

GREEN TECHNOLOGY



Many of the hot topics bubbling in the industry relate to incentivizing greener technology via rebates and cost benefits for the end-user to switch, but this is not necessarily a new trend. Many of **the younger industry professionals and end users were born with the idea that we need to help the environment, so it is definitely becoming more commonplace.**

FOCUS ON SAFETY



Safety is always a relevant discussion at RSES because of the variety of “exposure” technicians, contractors and facility managers regularly see. Be it the physical dangers that accompany this work or the liability dangers that are increasingly becoming more relevant with new technology being rolled out.

TRENDS FOR REFRIGERATION ENGINEERS

Refrigerants, heat pumps, sustainability and partnerships--the latter of which relating to government to unions to manufacturers to educational institutions.

RSES continued...

Trending Topics

ARTIFICIAL INTELLIGENCE



The topic of AI and controls is interesting because, while helpful, it **adds some complexity to liability issues because so many of the products are using Bluetooth and cloud-based applications for support reasons.** This certainly lends to closing up any access points from a cybersecurity stance and introduces a market the light commercial and residential industry has not been as privy to as say data centers or building automation systems.

WORKFORCE DEVELOPMENT



It also appears that workforce development has caught the attention of the masses. We are **starting to see more vo-tech courses coming back to middle and junior high schools**, but we still have a long way to go. This is an initiative RSES has been and will continue to support throughout 2025 and beyond.

Pressing Issues

GOVERNMENT REGULATIONS



Despite the changes made to refrigerants and equipment for a better environment, there appear to only be a handful of people at the table that work with these things daily providing insights that are needed at the table. Government regulations and standards are important and necessary much of the time, but not all areas are being represented from the swath of individuals commenting. **More involvement from a technician level needs to be considered by the powers that be.**

EARLY EDUCATION



Another pressing issue is carving out career paths for individuals not interested in attending a traditional four-year college. **Earlier exposure in school to the trades is an important part of providing options for students who may not excel academically, but are brilliant in the trades.**

Big Impact Innovations

PROGRAMS ARE KEY



Academically: Updating training programs based on the shortcomings of current graduates

Technologically: More and better access to programs, apps and procedures to help techs troubleshoot and repair quicker in the field.

Important Discussions



We still have some **issues of bad information online being as accessible as good information.** Addressing discernment of where to look for answers may assist with this. Of course, training for what techs need NOW. Safety issues, regulation issues, code issues...there are so many boxes techs need to work in or check that oftentimes system repair is last on the list.

Upcoming Challenges

Definitely keep an eye on incorrect installs. **Although we laugh at them in the form of memes, they are a lack-of training or management “tell.”** Consistent industry fails reveal a larger problem that needs addressing.



HVACR in the Spotlight

Continue to **reveal the necessity of our industry so an end-user can understand it.** For example, comfort (imagine no heating in winter or cooling in summer as each of these continue to become more extreme), food chain (how food is preserved from production to their homes), environmental (how our equipment decisions shape protection), etc.

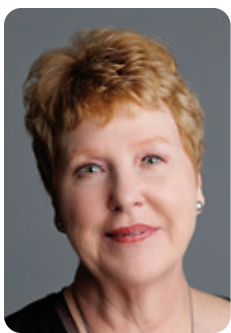


Booth #2273

Women in HVACR

womeninhvacr.org

Women in HVACR is a female-led nonprofit organization that champions the advancement of women in the HVACR space and is dedicated to improving the lives of our members. Our purpose and mission is to help increase the number of women in the HVACR space. Whether it's through networking events or our mentorship program, we want to help women grow their careers within the industry. Women in HVACR has over 1,200 members with 300 working in the field.



LORI TSCHOHL
President

The Current State of HVACR

“ The need for HVAC technicians is growing each year with the demand for HVACR jobs expected to increase more than 15% through 2026. **Women in HVACR are providing mentorship and increasing awareness of careers in the industry to draw more female technicians to the field.** These women will fill a much-needed void in the trades.”

Stats at a Glance



Today, women make up **2.6%** of HVAC workers in the United States

• Of those 2.6%, only **1.4%** of HVAC mechanics and installers identify as female which is approximately 6,272 installers

Minorities in the HVACR industry

18.9%
Latino

8.3%
African American

Average Cost of HVAC Programs



Certificate
\$7K – \$10K

Associate degree
\$15K – \$25K



Projected HVACR workers the industry will be short **115,000** in 2026

Projected HVACR mechanic and installer openings **42,500** per year, on average, over the decade



FROM THE FLOOR



Booth #6643

Doug Bougher
Director of Applied Sales
for LG Electronics USA

The Current State of HVACR

“ The HVACR industry, and heat pump technology more specifically, is in a **unique position for market growth, innovation and education** as residential electrification increases the demand to offer products that can assist in battling the effects of climate change, all while providing opportunities to increase the resiliency of residential power. **Heat pump technology is poised to be a critical component to aide in decarbonization efforts, so the HVACR industry has an opportunity** to bring solutions to market that can help benefit the environment while satisfying owners’ comfort expectations and also to educate contractors on the transition to a cleaner energy future.

Because of the focus on decarbonization and electrification, **every refrigerant-based HVACR system needs to maximize efficiency without sacrificing costs, aesthetics, or comfort**, both of which variable speed compressors and heat pump technology offer to consumers. LG is already a leader in inverter compressor heat pump technology and will continue to expand the reach of this technology to more products in the U.S. because we know it is already aligned with where the market is headed.”

AN INDUSTRY VISION



There has been an **increase in research recently through consortiums and other strategic partnerships to help bolster the credibility and performance of energy efficient HVACR solutions.** In the short-term, this will help fuel innovation, which will result in stronger heat pump performance. In the long-term, these advancements will drive contractor and consumer demand toward heat pumps, which in-turn will provide efficiency and environmental benefits inherent with residential electrification.

The HVAC industry is undergoing a **significant transformation, primarily driven by the shift towards more sustainable and efficient refrigerants.** A prime example is the transition to lower GWP refrigerants such as R32, mandated by new U.S. regulations. R32, a single-component refrigerant, not only enhances product performance but it also simplifies recovery and recycling processes, contributing to reduced environmental impact. It’s an exciting time as we witness these changes fostering a more environmentally conscious future for the industry.

Trending Topics

As consumers continue to move from conventional heating and cooling systems to more energy efficient electrical solutions, they will **realize the benefits of heat pumps such as greater efficiency and the potential tax incentives and rebate opportunities.** Their curiosity needs to be met equally from contractors who have more opportunities for education on energy efficient solutions like heat pumps and variable refrigerant flow units through hands-on training from manufacturers and distributors across the U.S.



Booth #2101

David Budzinski
President of Global Residential & Light Commercial at Johnson Controls

Trending Topics

The biggest factors influencing our customers include decarbonization, evolving regulations and compliance standards, like G36, and artificial intelligence-enabling predictive analytics. As these trends converge – and compete for our customers’ attention – **we’re seeing an increasing interest in the full lifecycle approach to building designs and retrofits.** They’re optimizing their properties with high-efficiency HVAC systems, smart automation, digital solutions and innovative services that benefit each stage of the building’s life, from installation and commissioning to performance and maintenance to optimization and upgrade, rather than simply optimizing one area or stage of the lifecycle. Using this approach, they’re able to address multiple priorities simultaneously, while optimizing building performance to satisfy occupant needs as well as decarbonization goals, and remain competitive well into the future.

DECARBONIZATION



As net zero target dates grow closer, decarbonization continues to be a very high priority in the built environment. Fortunately, many of the solutions we need to reach these benchmarks are available today, and taking a comprehensive approach to HVAC system integration and building energy management can drive greater progress toward net zero goals. By installing high-efficiency HVAC equipment like electric heat pumps, as well as integrating digital technologies and leveraging net zero services, organizations can optimize their buildings and subsystems for both the short- and long-term. We’re seeing more companies adopt digital platforms, such as OpenBlue, our suite of connected solutions, as well as service-based solutions like OpenBlue Net Zero Buildings. **As part of corporate decarbonization strategies, these types of solutions can help companies reliably reach decarbonization and renewable energy goals, while optimizing building performance.** Sequences of operations such as ASHRAE Guideline 36 are expected to ensure that occupants are always provided with a clean, safe, comfortable space to work, live, and play while optimizing energy usage. The flagship BAS, Metasys, offers improved HVAC operations and occupant comfort using G36 standardized control sequences. A successful implementation of G36 will orchestrate waterside and airside applications to ensure that optimal amounts of fresh air are delivered to occupied spaces while maintaining a balance of comfort vs energy usage. Owners can expect repeatable results across their portfolio of buildings by insisting that these industry prescribed factory designed sequences

The Current State of HVACR

“Between evolving efficiency and refrigerant regulations, corporate net zero targets, post-pandemic changes in building use, ongoing talent shortages and the revolution of artificial intelligence influencing building management, **the HVAC industry has confronted multiple, large-scale pressures that have drastically changed the way we design HVAC equipment and controls for the spaces we serve.** Through strategic planning and meaningful innovation, we are transforming the structures where we live, work, learn and play. The industry continues to meet – and even exceed – what is needed to overcome challenges and create spaces that improve well-being, achieve climate goals and lower operational costs.”

Major Industry Shifts



Since AHR 2024, we have had **some huge regulatory changes.** Most of it we were aware of, but there have been some **surprises on the pace of these changes and how they have driven the adoption of new technologies.** For example, there has been a gain in the heat pump market, but there has continued to be strong demand for furnaces. Another example is the increase in water solutions for residential, such as air-to-water heat pumps. In the commercial market we have continued to see a huge demand for sustainable and efficient data center solutions.

Short-term, healthy environments are top of mind throughout the HVAC industry in today’s world.





David Budzinski
President of Global Residential
& Light Commercial at
Johnson Controls

REFRIGERANT REGULATIONS

As a leader in the transition to lower-GWP refrigerants, **Johnson Controls recently launched a suite of redesigned residential and commercial products optimized for use with the low-GWP refrigerant R-454B.** We've launched a new line of low-GWP commercial rooftop units (RTUs) and we are among the first in market to transition the majority of our residential product portfolio for use with R-454B, including heat pumps, air conditioners, air handler units and indoor evaporator coils. Both are well ahead of the American Innovation and Manufacturing Act 2025 regulatory shift. To make compliance easy for contractors, we've developed our new RDS to detect refrigerant leaks in our equipment that uses A2L refrigerants as well as an RDS Calculator that allows contractors to quickly determine when an RDS is required by building code. In installations of HVAC systems using A2L refrigerants where the refrigerant charge is greater than 4 pounds, the EPA requires equipment manufacturers to equip units with A2L refrigerant leak sensors and control logic that activate evaporator fan(s) and use circulated air to quickly disperse and dilute refrigerant in the event of a leak. Another requirement is that refrigerant charge limits must be based on the minimum occupied volume of the room where the equipment is expected to be used.

Trending Topics continued...



are implemented on every project, reducing energy consumption significantly. Heat pump technology has advanced significantly in recent years, providing an electrified, high-efficiency HVAC option for nearly all applications and carving a path to effectively decarbonization the existing building stock. With 80% of existing buildings expected to still be in use when the 2050 net zero benchmark is reached, retrofits are essential for widespread decarbonization to be successful however, it has posed a significant challenge because of the high-temperature infrastructure typically present within these buildings. Equipment innovations like the 400-ton YORK® CYK Water-to-Water Compound Centrifugal Heat Pump can reach the high-temperature requirements necessary to remain compatible with existing building infrastructures and are four times more efficient than a traditional boiler and chiller combination. As an industry, the focus on decarbonization has transformed the way we design and install HVAC equipment, but it has also created a tremendous opportunity for those who remain educated on the evolving technologies, regulations and incentives. **Today's building professionals and homeowners have an unprecedented number of incentives available at the federal, state and utility levels encouraging decarbonization transitions.** For example, tax credits such as 25C for consumers and 179D for commercial building owners that were expanded under the Inflation Reduction Act (IRA) and can significantly reduce the upfront costs of these systems creating a compelling offer to upgrade and replace less efficient systems.

THE ELECTRIC GRID/ELECTRIFICATION



Electrification is closely tied to both decarbonization and heat pump trends. **Electrification powered by renewable resources is a critical strategy for building decarbonization.** One way we can achieve this is through the increased adoption of heat pumps that can replace fuel-burning and electric resistance heat sources. While rebates and incentives are encouraging homeowners to electrify the heating and cooling systems in their homes, corporate decarbonization targets and emissions regulations are driving building owners to replace the fossil-fuel based boiler systems in large commercial buildings to air-to-water and water-to-water heat pumps. The latest heat pump technologies are making it easier than ever to electrify heating systems, even for industrial applications. While most buildings can be at least partially electrified with a heat pump, some heat pump applications are installed with a backup heat source to maintain heating capacity during the coldest periods of the year. This backup heating source can be fuel combustion or electric-resistance heating. Using fuel combustion as the backup source can reduce source emissions and peak demand on the electric grid by eliminating the use of inefficient electric resistance during critical heating periods. **The latest innovations in heat pump technology are improving heat pump performance in cold temperatures, further minimizing the use of backup heating sources.**

HEAT PUMPS



Both commercial and residential heat pump technology has advanced significantly in a short amount of time, most notably around achieving higher efficiencies in lower ambient temperatures across building types. As part of the Department of Energy's Residential Cold Climate Heat Pump (CCHP) Technology Challenge, Johnson Controls successfully produced heat pump prototypes that can withstand subfreezing weather in residential applications. The prototypes can deliver 100% high-efficiency heating capacity at 5 degrees F ambient temperature without assistance from auxiliary heat. This puts us in the next phase of the challenge, which includes prototype installation and monitoring in various cold climate locations throughout North America. To meet this significant performance

continued... →



David Budzinski
President of Global Residential
& Light Commercial at
Johnson Controls

Most Pressing Issues

From my perspective one of the most pressing issues facing the industry right now is **getting the workforce trained and mobilized on new refrigerant technologies**. Part of that education also needs to be an understanding of the regulatory environment and upcoming regulation changes. Another issue is that specifically here in North America we need to see greater consistency across states and regions when it comes to regulations.

Upcoming Opportunities

There is **strong demand right now for sustainable solutions and we are seeing many customers choose to replace old solutions with new energy efficient technology** that are also environmentally friendly. We have also been able to tap into plumbing contractors and cross train them on HVACR solutions, which has opened up a huge additional market to reach end users.

Trending Topics continued...



target, our development team considered the latest technology offerings for compressors, heat exchangers, fans/blowers, as well as intelligent operational strategies. Building off of the CCHP Technology Challenge, our team has also partnered with the DOE's Commercial Building Rooftop Heat Pump Accelerator program. **Using the proven technology of our existing portfolio as a baseline, our team has reimaged packaged heat pump performance to drive greater efficiency in colder climates.** During the process, key considerations included defrost cycles and dual fuel system integration, which rely heavily on advanced controls, such as Johnson Controls Metasys Building Automation System. Air-to-water heat pumps are another technology that has been used widely across Europe that is just starting to build momentum in the U.S. thanks to its inherent sustainability and efficient performance. For example, the Yutaki M R32 monobloc air-to-water heat pump by Hitachi is an all-in-one solution that can deliver efficient heating and cooling while also serving as a domestic water heater or used to heat a pool or heated floors. These exceptional capabilities are achieved through a newly designed, vapor injection twin-rotary compressor that enhances performance within cold climates and supplies 131 F water even at -4 F ambient temperatures. Similarly, air-to-water heat pump technologies are also driving sustainability within commercial buildings. Heat pump chillers like the YORK® YMAE provide a modular, standalone heating and cooling solution that offers heating only and simultaneous heating and cooling capabilities to conserve energy and intelligently move heat throughout the building where it is needed.

A2LS



As the industry moves from HFCs to low-GWP A2Ls, manufacturers, distributors, contractors and industry professionals are preparing to make the transition as smooth and successful as possible. Since many A2L refrigerants are classified by ASHRAE as mildly flammable and this is the first time many contractors and technicians have handled A2L refrigerants, it's important for them to understand best practices and safe handling techniques to safely service, store and transport this new refrigerant type. Becoming familiar with updated codes including UL 60335-2-40, 3rd and 4th editions and ASHRAE 15 and 15.2 and the AHRI Safe Refrigerant Transition Task Force (SRTTF) can help to guide safe handling best practices. Additionally, contractors should complete ACCA A2L refrigerant training and EPA section 608 certification. **Additionally, to help train industry professionals, the Johnson Controls Ducted Systems Academy offers in-person and virtual training courses. We've also collected and developed a library of free online A2L resources for all experience levels.** Another factor that contractors and technicians will have to take into consideration is that some installations of equipment that use A2L refrigerant will require refrigerant detection systems (RDS) to meet building codes, and it will be optional for other installations. While redesigning all residential and light commercial ducted equipment to utilize R-454B and R32 for ductless offerings, Johnson Controls also developed our new RDS to detect refrigerant leaks in this updated equipment. To make it easy for contractors to identify if the RDS is required, Johnson Controls has developed an innovative RDS Calculator tool available in both the product selection tools and the Ducted Systems Solutions App. Additionally, PENN System 550 has A2L refrigerant leak sensors incorporated in the technology in which uses speed of sound technology, the fastest response time on the market, to sense refrigerant leaks in less than seven seconds (T25) and a warm-up time of less than five seconds, complying with international standards. A2L sensors communicate with control modules via Modbus, providing valuable information to service personnel that shortens troubleshooting time.



David Budzinski
President of Global Residential
& Light Commercial at
Johnson Controls



Big Impact Innovations

In addition to heat pumps, AI is positioned to continue to make a huge impact in HVAC. **AI is being used to improve energy use, extend HVAC equipment life, increase reliability, streamline service and more.** We're seeing more service techs using generative AI and co-pilots for troubleshooting rather than paging through manuals. At the same time, AI technology can predict if connected HVAC units may have issues, making it possible for service techs to address potential issues in their earliest stages or prevent them altogether. Both of these use cases can help technicians service equipment more quickly, efficiently and accurately, which can increase equipment longevity and reliability while reducing downtime and total cost of ownership. As AI becomes more advanced and more popular, there can be even more use cases in HVAC.

At AHR in Orlando, I'm looking forward to connecting with critical industry associates, peers and customers. This year specifically I'm excited to show of our new residential and light commercial portfolio which makes use of environmentally friendly refrigerants.

Trending Topics continued...

FOODSERVICE/REFRIGERATION TRENDS



The chilled and frozen food industry has been hit by a series of significant changes over the past several years. **Regulations enacted under the American Innovation and Manufacturing (AIM) Act, the Significant New Alternatives Policy (SNAP) program and both state and municipal rulings have placed stringent guidelines on the use of hydrofluorocarbon (HFC) substances and acceptable refrigerant substitutes.** In addition, the use of higher global warming potential (GWP) refrigerants in new equipment will be phased out as early as January 1, 2025, depending on the equipment type and application. Advancements in refrigerant sensors and controls can help to deliver these benefits as the industry adapts to the use of low-GWP A2L and natural refrigerants. However, the higher flammability levels of A2L refrigerants mean that corrective action must be taken swiftly to minimize potential hazards to the user and building occupants. As a result, refrigeration and air conditioning systems that use A2L low-GWP refrigerants and exceed a prescribed refrigerant charge (typically four pounds or more), must be equipped with a refrigerant leak detection system (RLDS). One solution we offer is PENN System 550, which is a plug and play solution that controls space temperature, humidity and system pressures while complying with the newest A2L refrigerant leak detection and mitigation regulations. The unique A2L leak sensors provide tremendous value by quickly sensing A2L refrigerant leaks to ensure the safety of occupants while minimizing system downtime and product loss – which is critical in the HVAC-R industry. Plus, with System 550's 2-way cloud connectivity, text and email alarms can be set to advise service technicians when system-related issues have occurred and must be addressed.

AI + CONTROLS



It's becoming more common to equip commercial HVAC systems with AI-enhanced controls and reporting. **The capabilities these tools provide can give building owners greater opportunity to optimize building performance, improve occupant comfort and well-being, and more easily reach sustainability targets.** AI technologies make it possible for facility teams in buildings and campuses of all sizes to make faster, more confident decisions that can improve the performance and extend the life of HVAC systems. For example, our OpenBlue Connected Chillers use AI to give teams greater visibility into chiller health and potential issues. Using this technology, facility teams can receive predictive diagnostics, monitor chiller performance and make adjustments to improve operations via computer or mobile device. In this way, teams can reduce energy consumption, extend asset life and increase uptime. Some contractors and technicians are also using AI to help troubleshoot customers' systems. AI capabilities can help HVAC professionals identify the root cause of issues much faster. This makes it possible to ensure all parts needed for a repair are on the truck during the visit, to reduce return site visits, provide more efficient service and ultimately service more customers. And from a building management perspective, intelligent building controls can provide a holistic view into contextualized, full-building performance. Through these advanced controls, building managers can optimize system- and component-level assets. And as AI technologies learn from a continuously growing data set, they can also provide deeper insights that make greater cost savings, emissions reductions and occupant experiences possible.



David Budzinski
President of Global Residential
& Light Commercial at
Johnson Controls

Messaging in the Media

The best thing professionals can continue to do to **champion the industry is focus on education for end users, contractors and manufacturers.** The more information that is out there on sustainable solutions the better. When customers are better education on options, it allows for more effective conversations so we can provide the best fit for customers. It is a continued effort by all of us within the industry to work together to ensure education, training and other resources are available, so everyone is on the same page.

Trending Topics continued...

MAJOR SHIFTS IN THE INDUSTRY



The data center industry continues to grow at an exponential rate with the U.S. representing approximately 40% of the global market. To meet this growing demand and better serve the needs of these unique environments, **Johnson Controls recently formed our Data Center Solutions Organization, which offers our full suite of smart building technologies, energy-efficient data center solutions and unmatched service under one umbrella.** Today's data center owners and operators face complex challenges as they strive to deliver the IT infrastructure necessary to keep pace with AI-powered and real-time data processing and meet growing efficiency and water conservation regulations – all while contending with fluctuating land costs. As a result, many data center owners are shifting away from sprawling rural campuses to high-density, multistory buildings. These vertical data centers can quickly become energy-intensive facilities as cooling demands increase with each building level. In response, our team has engineered an innovative portfolio of purpose-built solutions designed to meet the unique demands of data centers including air- and water-cooled magnetic bearing chillers and mission critical air handling units. These modular systems provide the flexibility necessary to accommodate accelerated data center growth while enhancing energy efficiency, reducing water usage and maximizing up-time and reliability. Additionally, our team has optimized our digital platform offerings to optimize data center environments. A recent survey conducted by Johnson Controls in partnership with Forrester Consulting revealed that 93% of surveyed data center leaders were not leveraging fully integrated building systems and equipment . **By optimizing facility operations with a smart building solution such as OpenBlue, data centers can unlock the insights necessary to drive sustainability and optimize building performance.**

Challenges Ahead



Two related challenges I see in the near future of the industry is **training our technicians on recent and upcoming regulatory changes** but also **communicating and educating end users** on the benefits of moving to heat pumps and other sustainable solutions.

Important Discussions



Right now, when we think about discussions we are having within the company and with customers, it is **all about helping our contractors mobilize their workforce** and how can we make our products not just **environmentally friendly but easier to install, commission and service.**



FROM THE FIELD



 @HVAC_JAY604

Jason Norman
General Foreman



What opportunities lie ahead for HVACR/HVACR professionals in the coming year?

Continuing to embrace, challenge, and train on new equipment must be a main focus for anyone not wanting to be left behind. In the past 4 or 5 years a massive push for inverter driven heat pumps have flooded the residential market in my area, replacing traditional furnaces. The pool of qualified technicians available to fix a furnace is vast. The pool of qualified techs able to properly troubleshoot and repair an inverter controlled product is small in comparison. Replacing parts on a gas fired furnace has traditionally been a quick process. working on the refrigeration system of a heat pump will take time and money. Contractors who continue to invest in their workforce will benefit greatly from this new technology.

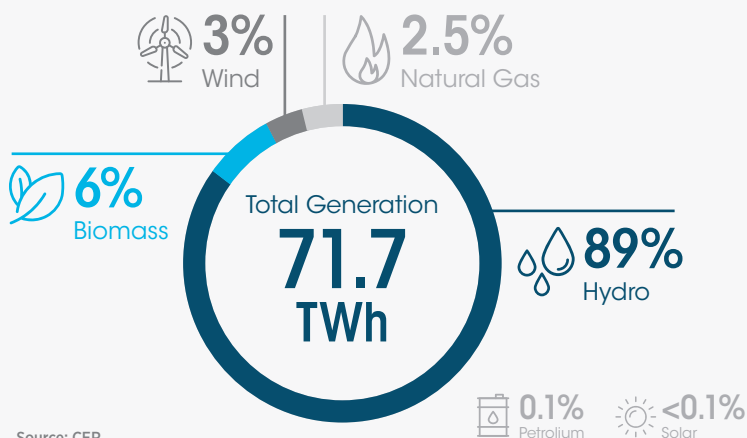
“ When people ask me what I do for a living I respond with ‘I move BTU’s’.

I was given opportunities early in my career and was pushed to grow, I feel it is my personal responsibility and take great pride in supporting those I work with and others in this great community through learning, training, and developing.”



What is some audience-driven relevant information on emerging topics within the industry?

Everyone loves to use words like Decarbonization and electrification to move away from fossil fuels. However, where is their electricity coming from? **I live in an area where 89% of our electrical energy comes from hydro-electric dams. Stating that we have an abundance of “clean energy” is great but the infrastructure to support the distribution of that power is grossly undersized considering future growth in the province.** Lets continue this trend but embrace the safe use of natural gas burning appliances.



What are the most pressing issues facing your sector of the industry?

The team I work with is amazing! However, as we grow and bring on new techs it can sometimes be a long and frustrating process getting even seasoned journeypeople up to speed. I wish more manufactures embraced QR codes on the inside and outside of their equipment to be able to quickly and efficiently obtain IO manuals and troubleshooting guides.



What innovations, in your opinion, have the potential to make the biggest impact?

GAP and GEHPs and GEHP VRF for me have so much more potential. Although decarbonization has been a hot topic for several years, if the electrical infrastructure isn't available to support it, what then? In British Columbia Canada we have an abundance of natural gas available in existing buildings, harvested in our own province.

 @HVAC_JAY604

Jason Norman
General Foreman



HVACR remains a widely discussed topic in the mainstream media, how can professionals champion the industry?

I find myself in social settings talking about the trades, and how fondly I enjoy working as a Tradesperson. It's really interesting to me to see peoples reactions when I talk about how it's not working in ditches and dingy constructions sites, it's so much more than that. There is a never ending career path that can lead in so many different directions. From apprentice, journey person, manager, business owner, technical sales, the fact is the skills you learn will last a lifetime. The more that one applies themselves and continues their education while in the trades the greater their opportunities.

In a Nutshell

- Gas absorption heat pumps, Gas engine heat pumps, and Gas engine heat pump VRF are some of my personal favorite topics to bring up when networking with other technicians.
- Continuing to attract and retain top talent continues to be a priority at EGM. A solid work life balance is key, but so is engaging in internal and external training to continue to groom techs to push their comfort levels and grow. Top talent wants to work with top talent.
- I hope to see you at the show in Orlando February 10-12, 2025! I will be there along with 3 other coworkers checking out booths that are both fun and engaging. Face to face meetings with subject matter experts and creating inroads for technical support is a key focus. Don't forget to stop and say hi to me on the floor!



ON THE MIC



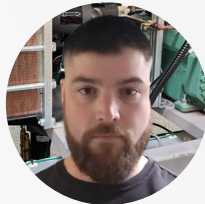
ON THE MIC

@advanced_refrigeration_podcast



Brett Wetzel

Sole MBR, Advanced Refrigeration Podcast and Training LLC; CSME-Commercial Refrigeration Educator; Mentor of The Year 2024; CO2-Trainer; Podcast Host, Advanced Refrigeration Podcast



Kevin Compass

Podcast Host of Advanced Refrigeration Podcast; Start up/Commissioning at Climate Pros, LLC

Let's Chat

Our podcast is dedicated to educating technicians, engineers, and other refrigeration professionals. We aim to provide valuable insights and knowledge across the refrigeration industry, helping to bridge the gap in technical understanding and industry best practices. Whether you're just starting out or are a seasoned expert, we focus on sharing information that enhances skills and keeps professionals up to date with the latest advancements and techniques.

The Advanced Refrigeration Podcast is available on all major platforms including Apple Podcasts, Spotify, and Google Podcasts. You can also listen directly on our website at [advancedrefrigerationpodcast.com](https://www.advancedrefrigerationpodcast.com).

HOT TOPICS:

- Decarbonization
- All Refrigerant and regulation updates
- Foodservice/Refrigeration Trends
- AI + Controls
- Workforce Development
- Major shifts in the industry
- New technologies on the horizon

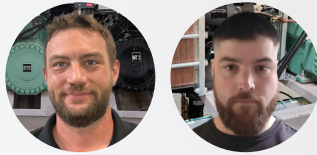
“ HVACR is in a transformative phase, driven by a combination of regulation, technology, and sustainability. As we approach 2025, the focus is not only on efficiency but also on how we can integrate emerging technologies like AI and decarbonization to create smarter, more sustainable systems.”



What are the hot or trending topics being discussed currently?

Right now, the focus is heavily on CO2 & A2L refrigerants and how the industry is adapting to new regulations. There's also growing interest in the role of more advanced controls and how we can improve workforce development to keep up with the fast pace of these technological changes.

Since the last AHR Expo, we have been discussing the major shift in Refrigeration Technologies. We're also focusing on Workforce development and Training.



“ In the short term, we’re seeing rapid shifts towards the decarbonization efforts. Long term, machine learning will revolutionize how we manage and troubleshoot HVACR systems, improving both performance and energy efficiency.”

By the Numbers

Refrigeration accounts for



15%
of global electricity
consumption

- Commercial and industrial refrigeration systems are significant energy consumers worldwide, highlighting the need for energy-efficient technologies and practices.

CO2 refrigeration systems are seeing a

20% growth rate
annually

- Due to increasing environmental regulations and the push for natural refrigerants, CO2 systems are becoming more popular, especially in supermarkets and large commercial applications.



Energy savings of
up to 30%
with advanced AI-driven
refrigeration controls

- Smart control systems utilizing AI and machine learning can optimize refrigeration performance, leading to significant energy savings and more efficient system management.

In a Nutshell

- We feel that EPA guidelines are the most pressing issue facing HVACR right now as an industry.
- Controls and predictive failures are the innovations that have the potential to make the biggest impact.
- The most important discussions we are having right now are about new controls and natural refrigerants.
- We are most looking forward to exploring new technologies at AHR Expo this year.



A2L refrigerants are expected to make up
50% of new installations
by 2025

As more countries and industries adopt A2L refrigerants due to regulatory changes, their market share is rapidly expanding, particularly in the commercial refrigeration sector.



40% of refrigeration
technicians
are expected to retire
within the next decade

This creates a pressing need for workforce development and training to fill the growing skills gap in the HVACR sector.



HVAC SCHOOL
FOR TECHS BY TECHS



Bryan Orr
Co-Founder and President of Kalos Services Inc.; Host of the HVAC School Podcast

Let's Chat

Established in 2016, the HVAC School podcast was launched to help HVAC/R professionals learn the tools of their trade from their van between service calls. It has featured a unique lineup of guests over the years and covered a vast range of topics from the basics of residential HVAC installation and service to emerging technologies in the commercial refrigeration world.

HOT TOPICS:

- A2Ls
- Workforce Development
- Inverter-driven equipment
- Building performance (leakage)

“ Our trade has never had more opportunities for people of all walks of life, and we're seeing a massive influx of younger workers into the trade. As they seek the opportunities our trade has to offer, we must prepare to invest in them not only by preparing to provide training that enlightens and entertains but also by focusing on career pathing.”



What are the most pressing issues facing HVACR right now as an industry?

As an industry, we currently have a labor shortage and have to rethink work-life balance for the people currently in the trade. We also have a greater focus on our trade's environmental impact and must adapt to a changing regulatory landscape. The economy is also showing some signs of cooling, and inflation remains a challenge for HVACR business owners, technicians, and customers alike.



What are the hot or trending topics being discussed currently?

The HVAC industry is typically associated with the mechanical sector, but many contractors are also breaking that mold and tackling indoor air quality, building science, electrification, and challenges with our current electrical infrastructure.

Since the last AHR Expo, our podcast has been focused a lot more on A2L field training and best practices so that HVAC professionals can work on A2L equipment with confidence. Workforce development has also been a more frequent and popular topic, especially as we've seen younger workers show interest in the trade and begin working for our HVAC company.

Lately, we've been having discussions about younger and more experienced workers in the trade and where there are opportunities to listen to and appreciate each other. We're also seeing an increasing need to address technician mental health and balance productivity, so HVAC School wants to shed light on ways we can transform the design and leadership stack in our industry to pay more attention to the needs and insights of the field worker. On the show floor, AHR showcases technologies and educators who bring out the best in tradespeople, which reduces callback rates and can create a ripple effect that boosts productivity, confidence, and professional development.



HVAC SCHOOL
FOR TECHS BY TECHS



“ Society is more aware of our trade’s impact than ever before, especially when it comes to energy usage and the need for an ever-developing technical and mechanical workforce to keep our current infrastructure and way of living intact.”

By the Numbers

The four-year degree is not the fairytale dream that schools and guidance counselors make it out to be.



In 2020, the student loan debt in the United States exceeded

\$1.7 trillion

with over 5.1 million direct loan borrowers

Young people should be aware of these facts and understand that college should not be an expectation; there are other paths, many in the HVACR industry, that won’t saddle them with student loan debt that they’ll be paying for at least 10 years.

Upcoming Opportunities & Challenges

Most of the opportunities I’m excited about deal with innovative ways to use natural refrigerants and store energy. I’m intrigued by the use of heat recovery and heat pump chillers using R-290 in residential HVAC and CO2 refrigeration on the heavy commercial side of the industry. Cold storage banks for load shifting are also an interesting technology that I’m keeping my eye on.

An ongoing challenge that we’ll continue to face is the perceived value of the mechanical trades worker and hands-on labor. The economy is very sales-focused, and quality sometimes takes the back seat to quantity. Hard skills are where tradespeople earn our worth, and the ability to braze in a compressor or run ductwork should not be undervalued or seen as “less than” selling new units, even when it might be more convenient or lucrative to push sales.



What innovations, in your opinion, have the potential to make the biggest impact?

I think utilizing hot and cold energy storage in residential applications will have a massive impact. Heat recovery chillers can change the HVAC and plumbing landscapes for the better, and I am excited to see how that technology develops.

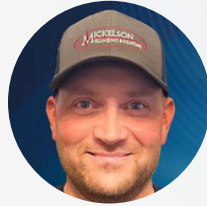


HVACR remains a widely discussed topic in the mainstream media, how can professionals champion the industry?

I haven’t seen much positive discussion about HVACR in the mainstream media, and it usually only gains traction whenever there are environmental policies that affect the trade. I’d like to champion the importance of skilled trades to society as a whole when those jobs are done with professionalism. I want to promote the artisan who works with their hands and does quality work for the betterment of other people all across the world.



At this year’s AHR Expo, I’m excited to connect with other educators and influencers, especially those who engage the youth in HVACR education. I enjoy connecting basic science and physics with HVACR, so I look forward to discussing how people have done that in their communities and how we can make the trades more accessible and appealing to young people.



Andy Mickelson
Co-host, Make Trades Great Again Podcast



Eric Aune
Co-host, Make Trades Great Again Podcast

Let's Chat

Our audience is a mashup of many trades and even non-trade pros. We reach a huge audience monthly with downloads ranging from 10-20K monthly for audio and a social audience upwards of 1M across multiple channels. We focus on real industry experience of the day to day operations of our own small plumbing & heating companies. Both Andy & I have been in business ourselves for a combined 35+ years. We talk about trending topics in the skilled trades and business environment without the hard pitch to sell programs or softwares. Its real talk with and from industry pros who are still turning wrenches while running their own businesses.

We get a ton of feedback on many topics. Some are right in front of us, like "fleets transitioning to electric vehicles, how will it work?" And setting yourself up for success when starting your business. We continue to talk about the changes in the industry but never stray from whats important to our audience everyday too, like having the right tools to run a successful business.

“ The HVACR industry continues to evolve in every aspect, not just refrigerant changes but with whole new crossovers into other industries like plumbing as well with heat pump water heating systems becoming a new norm.”



What are the most pressing issues facing HVACR right now as an industry?

The skilled trades have been getting older and older without great success in bringing in a new generation or workforce. We need to rethink how our industries are run from the very bottom to the top. "This is how we've always done it..." cannot be an acceptable ethos any longer. We must rebuild and that will be uncomfortable for most.



The need to operate more efficiently and the use of digital tools to run a successful business are top of mind and the biggest action items for independent contractors throughout the service industry.



How has the industry changed or is changing?

The industry of tomorrow is not the same as the HVAC industry of yesterday. Modern recruiting and training are just the start.



Trevor Matthews
Founder at Refrigeration
Mentor Inc.

Let's Chat

The Refrigeration Mentor Podcast is all about Training Education and Mentorship, our main audience is supermarket and commercial refrigeration technicians, refrigeration service managers, refrigeration business owners and refrigeration manufactures. We focus on refrigeration technical knowledge and professional development.

HOT TOPICS:

- A2Ls
- All Refrigerant and regulation updates
- AI + Controls
- New technologies on the horizon

“ I do not believe refrigeration is talked about enough in the mainstream media for the number of things it does for the planet and all the people on it. We need to do more work to help people understand how vital refrigeration is to everyday life.”



In the US HVACR technicians do not require any certified training expect EPA608 and very few towns requiring certifications. This is unacceptable.



What are the hot or trending topics being discussed currently?

CO2 refrigeration and R290 are a hot topic lately and will continue to grow in North America.

We have frequently been covering R290 and technician professional development and technical growth on our podcast. Also how to fast-track technicians' technical knowledge and get performing higher level of service faster.

In a Nutshell

- An issue facing HVACR is that there are less people wanting to get into supermarket side of refrigeration.
- There is an opportunity for massive growth for skilled technician who understand natural refrigerants and controls.
- Big impact innovations include supermarket controls and advanced predictive maintenance.
- I'm looking forward to hopefully seeing more refrigeration booths at this year's AHR Expo.
- Upcoming challenges for the HVAC industry include troubleshooting advanced technologies and the way training and development is delivered to technician and refrigeration businesses.

**Tersh Blisset**

Champion of Automation Innovation and Co-Host of The Service Business Mastery Podcast

**Josh Crouch**

Master of Digital Marketing Innovation and Co-Host of The Service Business Mastery Podcast

Let's Chat

The 'Service Business Mastery' podcast, under the Skilled Trades Syndicate, primarily caters to small business owners in the HVAC, plumbing, and electrical service industries. We focus on challenges specific to these sectors, offering insights into business operations, technology integration, and industry trends, aiming to help business owners streamline their operations and maximize profitability through the effective use of technology.

Currently, the most important discussions on our podcast involve exploring how AI can be seamlessly integrated into existing HVACR systems and the implications of regulatory changes. These discussions are directly related to the show floor, as we seek specific solutions and partnerships that can help our audience adapt and thrive.



What major shifts/changes if any have you noticed in the field?

Since the last AHR Expo, we've extensively covered the integration of AI and automation into HVACR systems on our podcast. These discussions have revolved around how these technologies not only improve efficiency and reduce costs but also how they are changing the skill sets required in the industry.

“ As we approach the 2025 AHR Expo, the HVACR industry is being revolutionized by automation and AI. These technologies are not just add-ons but are central to driving unprecedented efficiency and precision in our systems. The evolution towards more intelligent solutions is setting a new standard for operational excellence.”



What are the hot or trending topics being discussed currently?

In the skilled trades, particularly within HVACR, hot topics include the deployment of AI-driven analytics to optimize system performance, the use of automation in streamlining service operations, and the efficiency gains from advanced software programs. These tools not only improve service delivery but also empower technicians with insights that were previously unattainable, enhancing both service quality and customer satisfaction.



In Orlando we are particularly looking forward to exploring the latest advancements in AI applications within HVACR, especially those that promise to simplify the integration of these technologies into small and medium-sized enterprises.



Trending Topics

THE ELECTRIC GRID/ELECTRIFICATION

Business owners can integrate AI to optimize the energy use of systems transitioning from fossil fuels to electric power. This can be particularly appealing in markets with high electricity costs or aggressive carbon reduction goals, allowing businesses to offer cost-effective, compliant solutions.

HEAT PUMPS

AI can be used to maximize the efficiency of heat pump operations, particularly in variable climates. By offering AI-enhanced heat pumps, business owners can provide solutions that adapt to changing weather conditions and user preferences, reducing energy use and enhancing comfort.

LIVING HEALTHY (IN RELATION TO HVACR AND PLUMBING)

Utilizing automation to control and monitor HVAC and plumbing systems can ensure optimal conditions for health. Business owners can offer systems that automatically adjust to maintain ideal humidity and temperature levels, reducing the risk of mold and ensuring clean air and water.

A2LS

AI can help monitor systems for leaks and efficiency degradation, which is crucial as regulations push for the use of lower GWP refrigerants like A2Ls. Business owners can offer services that use AI to ensure systems are always running within regulatory requirements, avoiding fines and reducing environmental impact.

PLUMBING TRENDS

Automated systems for detecting leaks and scheduling maintenance can prevent costly repairs and water damage. Business owners can leverage these technologies to offer preventative maintenance services, appealing to both residential and commercial clients who are interested in protecting their properties.

FOODSERVICE/REFRIGERATION TRENDS

In foodservice, AI can be used to predict equipment failures and optimize refrigeration cycles based on load and external temperatures, reducing energy costs. Offering these smart refrigeration solutions can help business owners target large commercial clients looking to cut operational expenses.

IAQ

AI-driven ventilation systems can analyze air quality data in real-time to adjust filters and flow rates, ensuring optimal indoor air quality. Business owners can integrate these intelligent systems into their offerings, particularly for clients in regions with poor outdoor air quality or stringent health regulations.

AI + CONTROLS

By offering AI-based diagnostics and control systems, business owners can provide predictive maintenance and energy management services. These systems learn from historical data to optimize performance and anticipate failures before they occur, saving clients time and money.

WORKFORCE DEVELOPMENT

Business owners must focus on training their teams not just to install but also to maintain and optimize AI-driven systems. Offering certification in these areas can be a market differentiator, attracting clients who seek the most skilled professionals for their advanced systems.

MAJOR SHIFTS IN THE INDUSTRY

The shift towards fully automated, AI-driven HVACR systems is a major industry trend. Business owners need to prepare to offer comprehensive solutions that include smart home integrations and automated energy management, appealing to tech-savvy consumers.

NEW TECHNOLOGIES ON THE HORIZON

Emerging technologies like blockchain for secure, automated service contracts and advanced machine learning models for dynamic system optimization are areas to watch. Business owners can begin to explore partnerships with tech developers to stay at the forefront of these trends.

CYBERSECURITY

With the increase in connected HVACR systems, implementing robust cybersecurity measures is essential. Business owners should offer systems with built-in security features and provide ongoing support to protect clients from cyber threats, adding value and trust to their services.



How has the industry changed or is changing?

In the short term, the rapid integration of AI and automation into HVACR systems is enhancing real-time diagnostics and predictive maintenance, drastically reducing downtime and operational costs. Long-term, we're seeing a foundational shift as these technologies enable fully autonomous systems that optimize themselves for performance and energy efficiency, representing a major leap forward for the industry.

Upcoming Opportunities & Challenges

The coming year is ripe with opportunities for leveraging IoT and AI to create more efficient, predictive maintenance models in both HVACR and plumbing. There's also significant potential in expanding green technology and sustainable practices, which are increasingly in demand.

A major challenge in the near future is managing the transition to low-GWP refrigerants across all systems. We are closely following developments in refrigerant technology and regulatory changes to keep our audience informed and prepared.



What are the most pressing issues facing HVACR right now as an industry?

The most pressing issues currently facing the HVACR industry include the need for skilled labor, the impact of regulatory changes on refrigerants, and the challenges of adopting new technologies. In our sector, specifically, the challenge is integrating these technologies in a way that complements existing workflows and enhances service delivery.



HVACR remains a widely discussed topic in the mainstream media, how can professionals champion the industry?

HVACR professionals can champion the industry by emphasizing its role in promoting health, comfort, and sustainability. Highlighting how the industry continuously adapts to technological and environmental challenges is crucial. This advocacy is important to attract new talent and to ensure continued investment in the sector.



The innovations that have the potential to make the biggest impact include AI-driven diagnostics and the increased use of sensor technology in HVACR systems. These technologies can drastically improve the predictive capabilities of maintenance routines and enhance system longevity and efficiency.

See you
in Orlando!

