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April 2025



Efficient Plants

46 DOE's Better
Plants Program

- 16 IPS Advises on Compressed Air Efficiency
- 20 Breweries Switch to Nitrogen
- 24 Prevost on Compressed Air Pressure Loss
- 27 AHR Expo Cooling Innovations
- 34 CIS Engineers Central Utility Plants
- 40 CTI Celebrates 75 Years

The Atlas Copco logo is displayed in white text on a blue rectangular background in the top right corner. The logo consists of the company name "Atlas Copco" in a serif font, flanked by two horizontal white bars above and below the text.

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COMPRESSED AIR SYSTEM FEATURES

- 16 IPS Advises Midwest Industry on Compressed Air Efficiency**
By Troy Dreier, Compressed Air Best Practices® Magazine
- 20 How Breweries Save By Switching to Nitrogen Gas**
By Brett Maiorano, PEAK Gas Generation
- 24 Compressed Air Pressure Loss Solutions for the Last 30 Feet**
By Carlo Gatti, Prevost



16



20

COOLING SYSTEM FEATURES

- 27 Industrial Chiller and Heat Rejection Innovation at the 2025 AHR Expo**
By Brooke Jones, Chiller & Cooling Best Practices Magazine
- 34 CIS Engineers Central Utility Plants for Extreme Weather**
By Roderick M. Smith and Troy Dreier, Chiller & Cooling Best Practices Magazine
- 40 Cooling Technology Institute Celebrates 75 Years**
By Bill Smith, Chiller & Cooling Best Practices Magazine



27

LATEST NEWS

- 8 Compressed Air Industry & Technology**
- 10 Chiller & Cooling Industry & Technology**
- 14 Industrial Energy & Water Conservation**

EVERY ISSUE

- 4 From the Editor**
- 6 Subscribers From Around the World**
- 46 Column | Better Plants Insights**
- 48 Real-World Installations & Maintenance**
- 49 Advertiser Index**
- 50 The Marketplace | Jobs and Technology**



34



46

Cover image: Participants of the U.S. DOE's Better Plants Program attend in-plant training at an aluminum foundry (courtesy of Oak Ridge National Laboratory).

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» FROM THE EDITOR



Efficient Industrial Operations

Have you heard about the U.S. Department of Energy’s Better Plants program? If not, this month’s cover story is a perfect introduction. Its goal is helping U.S. manufacturing reduce energy intensity by 25% over a 10-year period. It’s already partnered with over 300 of the country’s biggest manufacturers. This month, we debut a column sharing stories from the program. The first column lists benefits and free resources of Better Plants, including bootcamps, in-plant trainings and virtual trainings. Future installments will highlight partner success stories.

This month’s lead story comes from my home state of Minnesota, where Industrial Pneumatic Systems advises industrial customers on energy savings. Owner Rob Hoffman explains how creating air compressor rooms as plenums keeps air compressors running at their ideal temperature in any weather and avoids unnecessary ductwork.

PEAK Gas Generation contributed an article making the case for using nitrogen gas instead of carbon dioxide in beer brewing. While some carbon dioxide is necessary to give beer its fizz, breweries find generating their own nitrogen with 99.99% purity is a cheaper alternative that avoids supply chain issues and doesn’t impact taste.

The last 30 feet of piping in compressed air systems – the “dirty 30” of flexible tubing leading to application points – often creates 30 to 40% of the system’s total energy losses. An article from Prevest explains what plant operators need to know about materials, sizing and threaded junctions. It also presents a new tool called the PPS AMS (Prevest Piping System Air Monitoring System) that finds and stops leaks in this area.

We spoke to the heat rejection experts at CIS Industries of Louisiana for a fascinating and information-packed interview. CIS’s industrial customers need to stay operational even during hurricanes. The interview describes building resilient central utility plants, explores VFD-driven two-stage centrifugal chiller impellers and explains the difference between partial load and partial lift.

This issue also contains two show reports, bringing you highlights from the 2025 AHR Expo in Orlando, FL, and the 2025 CTI Annual Conference in Memphis, TN.

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We salute all Best Practices Magazine subscribers from around the world who own, operate, maintain, engineer and provide expertise for the on-site utilities (compressed air, nitrogen generation, vacuum, blowers, chillers, cooling towers and pumps) powering modern plant automation. This subscriber-driven monthly column hopes to build community and recognize all subscribers!



↓ The grand opening of a BEKO Technologies desiccant dryer production facility in Smyrna, GA, one day before the Best Practices 2024 EXPO & Conference in Atlanta, gave air compressor system experts a chance to learn and socialize. Pictured here are Kyle Randall, Vice President; Chris Armstrong, Regional Sales Manager; Ryan Williams, Regional Sales Manager and Brad Bethards, Inside Sales for Compressed Air Systems of Tampa, FL (left to right). A Kaeser distributor, Compressed Air Systems has provided air compressor solutions since 1963. Visit <https://www.compressedairsystems.com>.

↑ The Best Practices 2024 EXPO & Conference in Atlanta, GA, was the perfect place for on-site utility experts from around the globe to come together. Eric Phelps, National Sales Manager, Bauer Compressors, reminisced with Joe Torchia, President, and Dave Kamienski, Sales Manager, Air & Gas Technologies, an industrial air compressor specialist in New Jersey (left to right). Visit <https://www.bauercomp.com> and <https://airgastech.com>.



← We thank Mike Vollmer, Sherman Group, for being a longtime reader of Best Practices and congratulate him on becoming company owner. Sherman Group, formerly P.F. Sherman, has served the Greater Pittsburgh region since 1949, specializing in both cooling towers and compressed air systems. Sherman Group's product lineup includes SPX Cooling Tech, Sullivan-Palatek and Alfa Laval. Visit <http://shermangroup-pgh.com>.



Submission Guidelines

We invite our subscribers to send in pictures so we can see the people who read our Best Practices magazines! Those holding a recent magazine issue will receive first consideration. Please send a high-resolution picture as a JPG with a note describing the team and company to Troy Dreier at troy@airbestpractices.com.

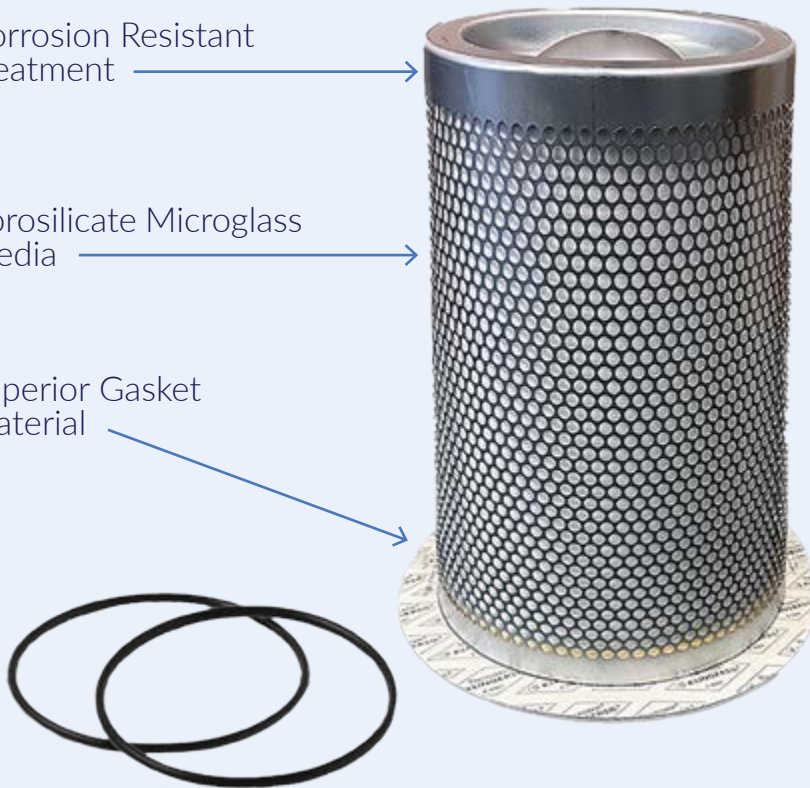
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NEWS / Compressed Air Industry & Technology

FS-Curtis Unveils Toledo Tools Rotary Screw Air Compressors

FS-Curtis announced the launch of its latest rotary screw air compressors, Toledo Tools. Available in 5-50 horsepower (hp) models, these air compressors come in three configurations: base mount (5-50 hp), tank mount (5-20 hp) and UltraPack – featuring a tank-mounted design with integrated compressed air dryer and filters (5-20 hp) – to suit a wide range of industrial needs.

Engineered for maximum performance and reliability, the Toledo Tools series



FS-Curtis has released Toledo Tools, a new series of rotary screw air compressors.

is designed with the end user in mind. Its compact, easy-to-install design makes Toledo Tools ideal for industries seeking a high-quality, space-saving solution.

“At FS-Curtis, we are committed to delivering high-quality, efficient and affordable air compression systems. Our Toledo Tools series embodies this commitment, providing businesses with the reliability and performance they need to excel in any industry,” said Tony Montalto, Director of Technical Product Management, FS-Curtis.

For more information, visit <https://fscurtis.com>.

Call for Speakers at the Best Practices 2025 EXPO & Conference in Kansas City

The Best Practices 2025 EXPO & Conference is now accepting speaker abstracts for its 8th annual event happening Oct. 21-23 in Kansas City. The show focuses on the industrial plant utilities of compressed air, blower, vacuum and comfort/process cooling systems.

Presentations should cover one or more of the conference’s themes: Energy & Cooling Water Conservation or Production Reliability and Safety. Past speakers include professionals from major manufacturing companies, engineering firms, independent auditors, equipment manufacturers, distributors/ reps and mechanical contractors.

“The Best Practices EXPO & Conference was created to bring the industry together to share our knowledge, experience and, of course, best practices,” said Roderick M. Smith, Publisher. “We look forward to welcoming experts from across the globe to share ideas our guests can implement at their facilities to save energy and water and increase production reliability and safety.”

The deadline for Speaker Abstract Submissions is May 21, 2025. Speakers participating in the Conference program will receive complimentary access, a \$675 value. For more information, visit <https://cabpexpo.com/attend>.



The Best Practices 2025 EXPO & Conference has announced a call for speakers for its Kansas City event.

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SUTO iTEC Introduces the S040 Atmospheric Sensor for Real-Time, Multi-Parameter Environmental Monitoring

SUTO iTEC has released the S040 Atmospheric Sensor, a compact device designed to measure temperature, humidity and atmospheric pressure simultaneously. This sensor provides real-time data to support industrial processes and environmental monitoring.

The S040 Atmospheric Sensor provides reliable data with advanced algorithms to ensure accuracy and consistency. It has Modbus/RTU support for seamless network connectivity and is IP66-rated for use in harsh environments.

The S040 Atmospheric Sensor is suited to industries that require precise environmental monitoring, including manufacturing, storage, research and HVAC systems. By combining multiple measurements in a single device, it can simplify monitoring setups while maintaining high accuracy. The S040 Atmospheric Sensor is available globally. For more information, visit <https://www.suto-itec.com>.



SUTO iTEC has launched the S040 Atmospheric Sensor for multi-parameter environmental monitoring.

Atlas Copco Group Announces Acquisition of Dr. Weigel Anlagenbau

Dr. Weigel Anlagenbau, a German provider of compressed air technology, has become part of Atlas Copco Group. The company, based in Magdeburg, sells compressed air technology and offers a comprehensive range of services. Dr. Weigel Anlagenbau also offers advanced installations of air compressors and cooling systems.

“This acquisition will strengthen our presence as well as our customer support within the compressed air and cooling offerings in this part of Germany,” said Philippe Ernens, Business Area President Compressor Technique.

Dr. Weigel Anlagenbau was founded in 1993 and has 45 employees who will join Atlas Copco Group as part of the acquisition. The company becomes part of the service division within the Compressor Technique Business Area. For more information, visit <https://www.atlascopcogroup.com>.





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NEWS Chiller & Cooling Industry & Technology

AIR Control Concepts Announces Acquisition of Midwest Machinery, an HVAC Manufacturer’s Representative

AIR Control Concepts announced the acquisition of Midwest Machinery, a pioneer HVAC manufacturers’ representative that has served the Missouri, Kansas, Oklahoma, Southern Illinois and Northwest Arkansas markets for over a century.

Brad Hobbs, Founder and CEO, AIR Control Concepts, said, “The addition of a storied, century-old company like Midwest Machinery is a complement to what we are building at AIR. Its innovative team brings decades of industry experience and an unwavering commitment to its customer and manufacturer partners.”

As one of the first cooling tower sales representatives in the U.S. over 100 years ago, Midwest Machinery has since expanded to become a complete mechanical solutions provider across the Midwest, building trusted local relationships that span generations.

“Through our new partnership with AIR, we embrace and share its same spirit for innovation and collaboration, working together relentlessly to design and construct better buildings and mechanical systems for our customers and the communities we serve,” said Troy Gladstone, President, Midwest Machinery Company. “This partnership with AIR allows us to preserve our founders’ culture and legacy while securing a stable future for our team and their families.” For more information, visit <https://www.aircontrolconcepts.com> and <https://midwestmachinery.net>.

Tower Tech Expands its Modular Cooling Tower Line with Closed-Circuit Models TTCC-FC and TTCC-HC

Tower Tech announced the expansion of its modular cooling tower line, adding closed-circuit models to its industry-leading open-circuit offerings. Tower Tech offers the open-circuit TTXR and TTXL modular cooling towers and now adds the TTCC-FC (evaporative fluid cooling) and TTCC-HC (hybrid fluid cooling) closed-circuit models. This new line expansion meets a growing market need for modular closed-loop towers with the performance benefits of composites.

“At Tower Tech, we chose to create a comprehensive, engineered technology; we don’t need dozens of products to meet customer needs,” said Mathu Solo, President, Tower Tech. “This has allowed

us to focus on sustainable efficiency, a design that saves valuable resources, including energy, water and chemical usage, all while reducing your carbon footprint.”

Tower Tech’s open-circuit cooling towers have a unique upside-down design that

eliminates side louvers and open basins. This significantly reduces Legionella growth risks and gives the towers a smaller required footprint overall. Made of composites, the towers are also significantly lighter than conventional towers and are factory pre-assembled, allowing for faster delivery

and installation. The high-quality material and engineered technology increase longevity while providing the most reliable redundant operation. The same is true of the Tower Tech closed-circuit line. The TTCC models prioritize water conservation and strict contamination prevention of the process fluid. For more information, visit <https://towertechusa.com>.



TTCC-FC/HC closed-circuit cooling tower lineup

Mokon Announces New Representation from Gem City Plastic Machinery for the State of New York

Mokon is proud to announce Gem City Plastic Machinery (GCPM) is now a representative of Mokon in the state of New York.



Roger Schmitt, Equipment Sales Engineer, Gem City Plastic Machinery

GCPM already covers the Mokon territories of Ohio, Indiana, Kentucky, West Virginia and Western Pennsylvania. For almost 50 years, GCPM has provided top-quality products to the industry. Some of its partners have been with it from the very beginning, including Mokon.

It’s been several decades since Mokon has had

representation in Western and Central New York. Now heading up this territory is Roger Schmitt. He previously worked at Mokon for several years as the National Sales Manager and Applications Engineer. His expertise comes from over 30 years in industrial sales and service working for companies like Airtek, Parker Hannifin, Pfannenbergl and Mokon. For more information, visit <https://www.mokon.com> and <https://www.gemcity1.com>.

Johnson Controls Announces Appointment of Joakim Weidemanis as Next CEO, Succeeding George R. Oliver

Johnson Controls announced its board of directors has appointed Joakim Weidemanis as Chief Executive Officer. He succeeds George R. Oliver following a thorough succession planning process.

Oliver, who led the company's successful transformation into a pure-play building solutions provider, will continue to serve as Non-Executive Chairman of the Board until July 31, 2025. At that time, he will be succeeded as Chairman by Mark P. Vergnano, who has served on the Johnson Controls Board since 2016. Oliver will remain as an advisor to the company until Dec. 31, 2025, to provide ongoing support and ensure a smooth leadership transition.

Weidemanis is a seasoned executive with a successful track record leading global technology-driven businesses and delivering profitable growth. He held several executive

leadership roles over his 13-year career at Danaher Corporation providing him with extensive experience scaling global companies from a foundation of customer orientation, innovation and efficiency. He most recently served as Executive Vice President, Diagnostics and China at Danaher, where he was responsible for operational leadership of an approximately \$15 billion group across eight global technology businesses.

"As I come to know Johnson Controls, I am energized by its mission-driven culture and strong 140-year legacy of developing market-leading technology and solutions that enable customers to manage their facilities in a smarter, more sustainable and more productive way,"



Joakim Weidemanis, CEO,
Johnson Controls

said Weidemanis. "I am deeply passionate about leading global technology-driven businesses that help customers advance their goals and make a meaningful, positive impact on society. I look forward to leveraging my experience and the foundation George and the team have built to deliver on the company's full potential for customers, employees and shareholders."

"Joakim is the ideal person to lead Johnson Controls as CEO," said Oliver. "As we build on the momentum from fiscal 2024, I look forward to working with Joakim and the team to ensure a smooth leadership transition and a promising future for Johnson Controls." For more information, visit <https://www.johnsoncontrols.com>.

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NEWS Chiller & Cooling Industry & Technology

Baltimore Aircoil Company Launches TrilliumSeries® Dry Cooler

Baltimore Aircoil Company announced the launch of its TrilliumSeries® dry cooler. Created to meet the growing demand for sustainable, water-efficient cooling, this high-capacity dry cooler rounds out BAC's portfolio of evaporative and hybrid products offering an innovative option for customers in water-stressed areas.



Baltimore Aircoil Company has launched the TrilliumSeries® dry cooler.

“This product was born from a deep understanding of the challenges our customers face by enabling them to thrive in an era where sustainability is no longer optional,” said Don Fetzer, President, BAC.

BAC developed the TrilliumSeries dry cooler as a breakthrough solution that reduces reliance on water while providing powerful and reliable heat rejection. This is particularly vital for industries such as manufacturing facilities, where uptime and operational efficiency are paramount while minimizing water usage.

The TrilliumSeries dry cooler stands out for its exceptional performance, delivering the highest cooling capacity in the smallest footprint, making it an ideal choice for space-constrained environments. Additionally, it features innovative design elements that minimize maintenance, reduce installation costs and lower noise levels – perfect for sound-sensitive locations. For more information, visit <https://baltimoreaircoil.com>.

Trane® Connect™ Enhances Building Efficiency & Management

Trane® – by Trane Technologies announced the new Trane Connect™ for customers across North America, giving building owners and managers a modern, cloud-based, all-in-one smart commercial building portal to access insights and controls.

The integrated Trane Connect enhances building and operational efficiency that allows customers to improve use of labor and energy, streamline maintenance and increase the life of HVAC equipment. The portal provides access to building systems and assets securely from anywhere, 24 hours a day, saving time and operational costs.



Trane® – by Trane Technologies has unveiled the new Trane Connect™ platform.

Trane Connect collects and analyzes data from HVAC systems to provide actionable insights, empowering facility managers to make informed decisions that enhance system performance and occupant comfort. The platform uses advanced analytics to identify opportunities for energy savings, helping to reduce energy consumption and lower utility costs. For more information, visit <https://www.trane.com>.

Danfoss Appoints Kristian Strand as President, Danfoss Climate Solutions

Danfoss announced Kristian Strand has been named President of Danfoss Climate Solutions. He succeeds Jürgen Fischer who, after 16 years with Danfoss, has decided to retire.

Strand, who is currently serving as Divisional President, Commercial Compressors in Danfoss Climate Solutions, will join the Danfoss Group Executive Team and take over as President of Danfoss Climate Solutions as of April 1, 2025. Prior to his current role, Strand served as Divisional President, Refrigeration & Air Conditioning Controls, in Danfoss Climate Solutions. He has played a crucial role in the Climate Solutions Leadership Team, driving segment strategy and performance.

“I’m honored to succeed Jürgen and to lead this exceptional team. I’m humbled by the responsibility and excited to build on the strong foundation Jürgen has established,” Strand said. “I look forward to working together with the Danfoss Climate Solutions team to continue driving the business forward.”



Kristian Strand, new Danfoss Climate Solutions President

“Kristian brings a wealth of experience and strong business results from his previous roles and shares our ambition and passion for the climate solutions business. I would like to thank Jürgen for his dedication, strong leadership and great contribution to Danfoss and Danfoss Climate Solutions over these past 16 years,” said Kim Fausing, President and CEO, Danfoss.

Fischer joined Danfoss in 2008 as Vice President for Industrial Automation. Since then, he has held various executive leadership roles within Cooling and in January 2020 formed the Climate Solutions Segment. Under his leadership, Danfoss Climate Solutions has transformed to build a large and leading global position in energy-efficient cooling and heating solutions for industrial applications, buildings, infrastructure and the entire food and cold chain – a strong and resilient business which remains core to Danfoss. For more information, visit <https://www.danfoss.com>.

Industrial Sustainability Best Practices Conference 2025 Europe Debuts

The Industrial Sustainability Best Practices Conference is making its European debut in Castelldefels, Barcelona, Spain, June 17-18, 2025. The event will bring together Europe's industrial design engineers, manufacturing facility/maintenance managers and on-site utility technology experts to share best practices.

The two-day conference features keynote speakers from some of Europe's leading firms, a formal one-day Compressed Air Challenge Workshop and networking exhibits showcasing industrial compressed air, vacuum, blower, chiller and evaporative heat rejection technologies.

"Since 2006, the Best Practices Magazines have shared energy/water conservation and safety/reliability best practices to thousands of professionals around the world," said Roderick M. Smith, Publisher. "In 2018, we introduced the Best Practices Conference to North America, and now we're honored to bring this event to Europe. We look forward to building this annual event with the support and expertise of Europe's industry experts."



The Industrial Sustainability Best Practices Conference, a facility utilities decarbonization and water conservation event, is debuting in Barcelona June 17-18, 2025.

The bilingual English/Spanish conference has two main focus topics. Focus topic #1 is for those with vigorous net zero and energy/water conservation goals, focusing on industrial compressed air, vacuum and HVAC/process cooling technologies, all of which represent 10-40% of total energy consumption in a plant. Focus topic #2 focuses on food-safe system design and quality verification. Compressed air, vacuum and chilled water systems can provide unintended ingredients into food and beverage manufacturing. For more information, visit <https://cabpexpo.com/eu>.

Carrier Unveils Major Investment in its U.S. Workforce

Carrier Global Corporation announced the launch of its Carrier TechVantage Initiative. This transformational initiative involves hiring 1,000 service technicians in the United States and providing additional training to over 100,000 Carrier and Carrier partner HVAC technicians within five years. By addressing the growing demand for technical expertise in the commercial HVAC sector, which is driven by rapid growth in industrial facilities and large-scale infrastructure projects, Carrier is setting a new benchmark for workforce innovation in the U.S.

"The demand for skilled service technicians in the U.S. has never been greater, and Carrier is uniquely positioned to lead this transformation," said David Gitlin, Chairman and CEO, Carrier. "Through the Carrier TechVantage Initiative, we're addressing critical

workforce gaps and setting a new standard for excellence in HVAC service. By investing in a world-class training program in the U.S., we are shaping the future of technician development and creating an initiative designed to attract, develop and empower the very best talent." For more information, visit <https://www.corporate.carrier.com>.



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NEWS / Industrial Energy & Water Conservation

Adient's 2024 Sustainability Report Highlights Key Sustainability Wins

Adient, a global leader in automotive seating, released its fiscal year 2024 sustainability report.

The sustainability report included a variety of highlights. Adient has achieved a 38% reduction in global scope 1 and 2 absolute greenhouse gas emissions¹ compared to the base year 2019, with a goal of achieving a 75% reduction by 2030.

As of Sept. 30, 2024, 29% of Adient's total electricity consumption globally is sourced from renewable energy. In fiscal year 2024, the company completed a supply chain mapping project for key forest commodities and launched initiatives to improve water management, achieving a 7% year-over-year reduction in total water withdrawals.

Adient completed more than 1,500 continuous improvement projects in fiscal year 2024, resulting in significant annual savings, including 7,391 metric tons of CO₂e², 53,669 cubic meters of water, 8.8 million kWh-equivalent of fuel, 5,308 metric tons of waste and 62 million kWh of energy. For more information, visit <https://www.adient.com>.

1. Within Science Based Targets initiative (SBTi) boundaries
2. Carbon dioxide equivalent



Adient has released its 2024 sustainability report.

3M Achieves Science-Based Targets Initiative Validation

3M announced its near-term, science-based emissions reduction targets have been validated by the Science Based Targets initiative (SBTi) as being in line with the 2.7°F (1.5°C) trajectory of the Paris Agreement. This milestone reaffirms 3M's ongoing commitment to climate action, decarbonization of its operations and portfolio of products and continual innovation on behalf of customers around the world.

"The validation of our targets by SBTi reflects years of collaboration and dedication by 3Mers working on a detailed action plan to innovate across our portfolio to decarbonize industry, accelerate our climate solutions and improve our environmental footprint," said Gayle Schueller, Senior Vice President and Chief Sustainability Officer, 3M.

The SBTi provides a framework for companies to set targets according to climate science. SBTi offers standards, guidance and tools for establishing emissions reduction targets. The SBTi has validated the following near-term targets for 3M:

- Reduce absolute scope 1 and scope 2 greenhouse gas emissions by 52.6% by 2030, from a 2019 baseline
- Reduce absolute scope 3 emissions by 42% by 2030 from a 2021 baseline

For more information, visit <https://www.3m.com>.



3M refined scopes 1 and 2 near-term targets in alignment with the 2.7°F (1.5°C) trajectory of the Paris Agreement.

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Amcor Releases 2024 Sustainability Report Highlighting Key Achievements



Amcor's 2024 sustainability report shared the company achieved a 9% reduction in absolute greenhouse gas emissions compared to FY23.

Amcor, a global leader in developing and producing responsible packaging solutions, released its 2024 sustainability report. The report shows significant achievements and continued progress in the company's sustainability aspirations.

Peter Konieczny, Chief Executive Officer, Amcor, said, "Amcor has led the way in making

incredible progress designing our products to be recyclable and more efficient, but design alone is not enough. Society needs consumer participation and infrastructure development to make circularity real – to make sure used packaging is not left in nature but recycled to become new packaging. Sustainability is at the heart of our company and drives a sense of purpose, inspiration and energy in everything we do."

Amcor's short-term and net-zero targets have been approved by the Science Based Targets initiative and the company published a Decarbonization Roadmap to share its approach to reach net-zero by 2050. In addition, the company achieved a 9% reduction in absolute greenhouse gas emissions compared to FY23. 14% of the electricity used was renewable, which represents a 64% increase compared to the previous year. For more information, visit <https://www.amcor.com>.

Veolia Selected for CDP's A List and S&P Global's Sustainability Yearbook

Veolia, a water, waste and energy management company, received a double leadership level distinction from the Carbon Disclosure Project (CDP), with an A score for CDP Climate Change and an A- for CDP Water Security. These distinctions reflect the company's transparency and performance in fighting climate change, adapting to its effects and preserving water resources.

CDP is an NGO that provides a platform for companies, cities, states and regions to report their environmental data and actions. This data is then used by a wide range of stakeholders – in finance, procurement, investment and policy – to turn transparency into action. In 2024, over 24,800 companies, representing two-thirds of global market capitalization, disclosed their environmental data through CDP.

Veolia was also selected for S&P Global's 2025 Sustainability Yearbook, among the Top 5%



A Veolia team member working at Chemours, a chemical manufacturing plant.

of the world's largest companies recognized for their sustainability performance. Within its sector, Multi and Water Utilities, the group ranked 2nd out of 74, with a CSA¹ score of 79/100². For more information, visit <https://www.veolia.com>.

1. Corporate Sustainability Assessment
2. CSA score as of Dec.18, 2024

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IPS Advises Midwest Industry on Compressed Air Efficiency

By Troy Dreier, Senior Editor, Compressed Air Best Practices® Magazine

▶ Industrial Pneumatic Systems is an Atlas Copco distributor in New Prague, MN, servicing Minnesota, North and South Dakota, Iowa and Wisconsin. Roughly 60% of its business is in the Minneapolis-St. Paul metro area.

The company's owner, Rob Hoffman, started in compressed air in 1991 after serving in the Air Force. His first job was with Air Power of Nebraska, which was then a Gardner Denver distributor. Four years later, he moved to Minnesota to take a service tech position with Clayhill, which carried Atlas Copco, working his way up to Service Manager. When Atlas Copco bought out Clayhill he joined CPR Services, which distributed Kaeser Compressors. Kaeser purchased CPR Services in 2012, and Hoffman was given the chance to purchase CPR's Minnesota division. That's when IPS was born.

IPS represents Atlas Copco air compressors. "We put a lot into engineering and energy efficiency," Hoffman said. "We have a nice big selection to pick and choose from to fit certain applications. It's a good, better, best lineup that includes small machines, medium-sized machines and large machines. We have a whole gamut of products that fit pretty much any type of scenario, cfm or pressure."

Above: The Industrial Pneumatic Systems headquarters in New Prague, MN

IPS's customers come from a variety of industries, including food processing, home product manufacturing, medical devices and plastics. The company also works with water treatment plants and supplies NFPA 99 compressed air systems to major hospitals.

Planning for Extreme Heat and Cold

No matter the industry, the geography of the upper Midwest is a challenge. In any year, ambient temperatures can be expected to swing over 100°F (56°C).

"We need to ensure we have the ideal environment for an air compressor, because you can go from extreme warmth, over 100°F (38°C), down to below 0°F (-18°C). Ventilation



IPS's geography includes Minnesota, North Dakota, South Dakota, Iowa and Wisconsin.

is the biggest challenge we have to overcome to make sure we maintain the environment within an optimal 50° to 90°F (10° to 32°C) range. We like to design the air compressor room as a plenum, exhausting hot air from the air compressor into the room and using an externally vented variable speed drive (VSD) fan high on a wall to control the room's temperature, then bringing in ambient outside air through a vent placed lower down and on the other side of the room. That eliminates the need to temper the inlet air to the air compressor. In the past, it was common to hook the air compressor inlet directly to the outside air, but when it's too cold that freezes up the air compressor.

"If you have an exhaust fan with its thermostat set at 70°F (21°C), it'll stay at 70°F. We don't hook up any ductwork to the air compressor; the air compressor is freestanding in the room. Set the VSD exhaust fan to 70°F (21°C) and it will speed up or slow down to maintain that temperature."

Outdoor Compressed Air Drying Challenges

IPS supplies compressed air to a lot of machinery running outdoors, such as dust collectors and feed mills on grain elevators, as well as to other equipment in environments lower than 32°F (0°C). Temperatures that low

require desiccant dryers. Hoffman helps his customers sort out their options and determine which type of desiccant dryer – heatless, heated purge, heated blower purge – is ideal for their needs.

“The customer’s cfm demand will determine which technology is the most energy efficient. At the high end, you can put a refrigerated dryer before a heatless desiccant dryer using dewpoint demand mode. We just did one of those. The customer had issues in the past with water in his line when using only a refrigerated dryer, and he wanted nothing to do with moisture in his air lines. He asked for two desiccant dryers, but I talked him out of it. That setup is hard to control and really inefficient. Instead, we agreed on a compressed air system using an integrated refrigerated dryer and a heatless desiccant dryer with dewpoint demand mode after it. That gives him full redundancy, so if one dryer goes down he’s still operational.”



Rob Hoffman, Owner, and Ryan Hoffman, Marketing Manager, Industrial Pneumatic Systems

Desiccant dryer selection should be based on a compressed air system audit, site conditions, and the cost of energy, and not just the

initial cost of the desiccant dryer, Hoffman noted. Atlas Copco guidance is to use heatless desiccant dryers for 25 to 1,400 cfm, heated desiccant dryers for 100 to 3,000 cfm and heated blower purge desiccant dryers for 350 to 3,000 cfm.

Tips for Saving Energy

No matter the industry, IPS’s clients want to save energy and run more efficiently. With his years of experience, Hoffman is able to guide them towards smart solutions.

“First thing you have to do is a compressed air system cfm demand audit, because if you don’t do an audit you’re jumping into the unknown. We need to know what specific parameters we’re working with. Once we figure out what we need or what the customer profile is, then we can apply the correct machine that fits that application. Without knowing that, you’re making an educated guess.

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» IPS Advises Midwest Industry on Compressed Air Efficiency

Case Study: Processed Metal Innovators Doubles in Size

Processed Metal Innovators, a metal fabrication company in Bloomer, WI, has worked with IPS for years, calling the company for parts and services as needed. When the company finally outgrew its compressed air system and needed to support an expanding operation, it asked IPS to bid on the project. PMI's production facility was expanding from 60,000 to 130,000 square feet, and its four existing air compressors (purchased from Clayhill many years before) couldn't supply the needed cfm.

Hoffman and his team consulted with the company, audited the compressed air system and planned a redesigned air compressor room using the plenum model to optimize energy efficiency and capture and repurpose the heat load for comfort heating at the facility.

The distributor won the bid, thanks in part to the trust it earned from years of reliable service. It added one new 150 hp VSD air compressor with an integrated refrigerated dryer and retired two older units. The job involved installing three-inch piping and other components, including filters and oil-water separators. A local contractor did the installation.

"Integrated compressed air dryers have improved tremendously," Hoffman said. "Today, we try to sell an integrated compressed air dryer most of the time. It cuts down on the installation costs dramatically. They don't need another power source; it's all wired and plumbed. You set it up, and away you go."

IPS is a partner of Focus on Energy, a Wisconsin program to reduce energy waste and promote energy-efficient projects, so it helped the customer prepare an application for incentives from the state before any work was done, completing forms to verify potential savings. In 2024, PMI won an Energy Efficiency Excellence Award from Focus on Energy in recognition of its commitment to sustainability and energy conservation.



IPS's plan for the Processed Metal Innovators compressor room uses a plenum model to keep the inlet air in an optimal range without a lot of ductwork.



Thanks in part to work it did with IPS, Processed Metal Innovators won an energy efficiency award from Focus on Energy in 2024.

"Then, we have to consider the VSD air compressor and energy recovery from the heat. There's more energy in the heat than in the compressed air."

The company sees a strong demand for heat recovery systems. Its top heat recovery use is providing comfort heating to the facility, but it also sees uses in ventilation and water heating.

Multiple VSD Installations

For a few years now, Atlas Copco has trained its distributors on a novel method of combining multiple VSD air compressors in one installation. Rather than using a fixed-speed load/no load air compressor for a base and a VSD air compressor for a trim, the new method uses multiple VSD air compressors. Hoffman had his doubts about the architecture at first, but finds the system provides more stable pressure as multiple VSD air compressors can maintain a closer set point. This configuration is also more efficient with a better specific energy rating. Replacing parts is easier since fewer items are needed in inventory, and the system even runs quieter.

"I like the base load/no load with a VSD air compressor, but we've been taught and trained there are more efficiencies with the VSD air compressor even if we're base loading it, compared to load/no load."

Using a VSD air compressor as a base load air compressor is job-driven, but something Hoffman does when he can. He guides his customers on questions to consider when making a decision.

"First, start with a compressed air system audit to understand if the customer has steady or fluctuating demand throughout the day. After that, do they have funds for the project? That's the big question. And then, does it fit the customer's needs? You could have a 50 horsepower (hp) air compressor at 220 cfm, load/no load, or you could have something at

260 cfm for the VSD air compressor. Do the math, do the calculations with energy and see which one fits to determine which makes more sense,” he said.

Hoffman’s preferred operating range for VSDs is between 30% and 100%.

IPS is also finding success with Atlas Copco Neos drives, which were first used in smaller air compressors but are now in all of their VSD air compressors, as well as their GA FLX line.

“The Neos drive is proprietary. When you get into an industrial setting, your power is usually all over the place with voltage imbalances. Also, it’s a dirty environment. Those two things kill standard, off-the-shelf VSD drives. They don’t like that. The Neos drive was created for fluctuating voltages. With the Neos drive and permanent magnetic motors, everything is compact and there’s still room to work around inside the machine. Plus, they’re highly energy efficient.”

Hoffman appreciates the cooling built into the Neos drive’s permanent magnetic motor. It doesn’t rely on air blowing across the motor for cooling, but rather uses the air compressor’s lubricant. Oil flows through the motor to the airend. It doesn’t rely on external air, which could be dirty, to cool the motor.

“The benefit to customers is that motors run cooler and run in dirtier environments because the motor doesn’t fill with dirt and debris. Also, the footprint is much, much smaller. 100 hp is no bigger than my desk. They’re more upright: The motor airend assembly is now vertical.”

That vertical design means Neos-driven air compressors can fit into a footprint roughly half the size of previous air compressor designs, Hoffman finds. Neos drive air compressors are also quieter than load/no load air compressors.

Single-Point and Remote Monitoring

Hoffman sees the compressed air industry moving to a greater use of integrated

air compressors that include a built-in refrigerated compressed air dryer. Benefits include having one hookup for the installer, and less piping and wiring. Integrated air compressors can also provide single point monitoring with all the data for the air compressor, dryer, dewpoint, drains and filters in one view. It’s something IPS’s customers have benefited from.

“In single-point monitoring, everything is accessed through the controller. It monitors all the air compressor and refrigerated dryer operations, including the dryer inlet and ambient temperatures, refrigeration suction pressure, dewpoint, evaporator pressure and

drain alarms. It’s all monitored in one single point,” Hoffman said.

Atlas Copco’s remote monitoring is called Smartlink. Several of Hoffman’s customers use the paid service. IPS monitors the live data to provide better maintenance.

“It reaches out to us and lets us know if the machine is running hot, if it’s tripped out on overload and if there’s high ambient temperatures, for example. It also lets us know when service is due,” he said. **BP**

For more information on IPS, visit <https://ipscompressors.com>.

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How Breweries Save By Switching to Nitrogen Gas

By Brett Maiorano, Business Development Manager, PEAK Gas Generation

► The brewing industry has long used carbon dioxide (CO₂) in various brewing processes. Carbon dioxide has been the workhorse gas for the industry. It's not only used to carbonate beer and give it fizz, but also to purge oxygen from tanks and lines to prevent spoilage and preserve freshness and flavor throughout the entire brewing process.

About 30% of all carbon dioxide used at breweries is for carbonation. This is why breweries will always need carbon dioxide. However, the remaining 70% is up for debate.

Nitrogen gas (N₂) can be used to replace much of the carbon dioxide at breweries. Storing and transferring beer from tank to tank uses a high volume of carbon dioxide. Other common uses include dry hopping, keg washing and canning. Breweries using carbon dioxide for these applications should strongly consider switching to nitrogen.

The Rise of Craft Brewing

In 1980, there were fewer than 100 breweries in the United States. In 1990, there were fewer than 300. Today, there are roughly 10,000.

Beer can be broadly classified into two fundamental types, ales and lagers. However, there are over 100 styles and sub-styles of beer around the world. They range from light ale to creamy stout. All beers are not created equally; they have nuances originating in their production. All of this makes this market interesting and lucrative. Large breweries

dominated the market for decades, but the small craft brewery business has boomed. This allows the production of every kind of beer so every consumer can purchase the styles and flavor profiles they prefer.

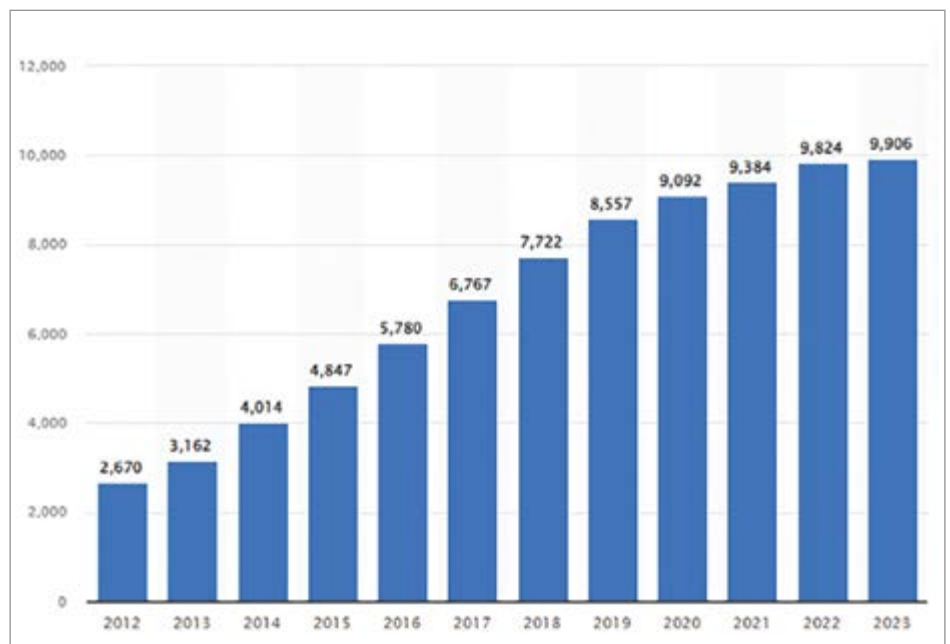
A brewery's size is based on how many barrels it sells per year. Smaller breweries might only sell 1,000 barrels. Many local breweries sell 5,000 to 10,000 barrels. Every state has large local breweries producing well over 20,000 barrels annually. The more barrels breweries make, the more carbon dioxide they consume. The more carbon dioxide they consume, the better the return on investment for a nitrogen generator. Carbon dioxide is sold in pounds, so it's easy to total the number of pounds consumed.

Putting Old Wives' Tales to Rest

For decades, brewers thought carbon dioxide was the only gas that could be used in brewing. This has been debunked, and nitrogen is now used in a myriad of brewery applications.

Conversations on nitrogen replacing carbon dioxide have taken place in earnest for the last five to ten years. Brewers and brewing associations now discuss the topic on a regular basis. Brewing is a large market with a diverse pool of owners. It takes time to undo years of old wives' tales, anecdotes, rumors and myths about nitrogen use in brewing.

Nitrogen is known as the world's safety blanket, but it is easy to understand why changes in



The growth of breweries in the United States

this market are slow. Beer has been made for about 5,000 years! When considering replacing carbon dioxide with nitrogen, brewers have some major reservations. The switch absolutely cannot negatively affect the taste of the beer. Unacceptable levels of oxygen (O₂) cannot be introduced into the beer. Cost is the strongest consideration: Buying green is great, but if it costs more companies will resist. Businesses need to be profitable.

Brewers Gain a Stable Supply at a Consistent Price

Nitrogen can function as a direct replacement for carbon dioxide in several brewery applications. Nitrogen is not as soluble in liquid as carbon dioxide. Oxygen will not dilute beer as previously expected.

Breweries making nitrogen instead of purchasing it alleviate three ongoing pain points plaguing owners. First, doing so reduces supply chain issues as there's no dependency on a supplier. Second, inflation is a nonissue because the biggest cost of making nitrogen is electricity, making nitrogen is sustainable and a green initiative. It is hard to find a more sustainable resource than nitrogen since it makes up 79% of the air we breathe!

Why would a brewery have a gas company make carbon dioxide offsite, liquify the gas so it can be transported, deliver it in a large truck and put it in a carbon dioxide liquid storage tank, turn that liquid into a gas once again and pay for it all in perpetuity? A nitrogen generator can be installed in the brewery, letting it produce gas for significantly less cost.

Carbon dioxide prices experience wild swings depending on the location, periodic shortages and force majeure. Force majeure is a common contract clause freeing the supplier from obligation or liability when an event beyond their control occurs. This clause was invoked widely during the COVID-19 pandemic. Brewers were left with no carbon dioxide and couldn't brew beer.



Nitrogen gas can be substituted for carbon dioxide in many brewing processes.

Recent shortages were related to contamination at one of the largest carbon dioxide producers located in Jackson Dome, MS. Shortages have significantly and negatively impacted several industries.

Nitrogen Applications in the Brewing Process

All brewers have their own recipes, thoughts, beliefs and methods. Each brewery has an opinion about how much carbon dioxide can be replaced by nitrogen.

I visited a large brewery in New England last year and a brewer said he thought he could replace 50% of carbon dioxide. This is still a large amount, and I wasn't going to argue with a master!

Breweries use stainless-steel tanks to store their product, and these are sized in brewer barrels (BBLs), which represent 31 gallons or two kegs. Tank sizes range from one to 10,000 BBL and higher. Activity starts in the fermentation tank. These stainless-steel vessels are specially designed for fermenting the wort. The wort is the sweet infusion of ground malt or other grain before fermentation. The

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»» How Breweries Save By Switching to Nitrogen Gas



Nitrogen gas isn't as soluble in liquid as carbon dioxide and won't dilute beer.

tank must maintain the right temperature for fermentation. Tanks are made with food-grade materials to prevent contamination and corrosion allowing for the safe processing of wort and the development of flavors by microorganisms. Nitrogen can be used to purge oxygen from the headspace in beer tanks to minimize dissolved oxygen levels in the final product.

After fermentation is complete, the beer is moved to what are known as bright tanks. Bright tanks are bottom pressure-rated temperature-controlled tanks used to hold beer that is ready for packaging. The primary reason for this tank is to clarify and carbonate the beer before it is packaged. This is the last step in the brewing

process. The term “bright” comes from the clear appearance of the beer after it settles in the tank. At this time, carbonation levels can be measured.

Nitrogen can be used in dry hopping. Dry hopping is a technique where hops are added to beer late in the process to add flavor and aroma. Nitrogen gas protects the beer from exposure to oxygen during the dry hopping process.

Canning is another process where nitrogen can be introduced rather than carbon dioxide. Nitrogen is used to purge oxygen from the empty cans. Nitrogen can also be used to purge the headspace of filled cans. This preserves the freshness, quality and taste of the beer by preventing oxidation. Some breweries introduce liquid nitrogen into the can before sealing to extend shelf life. About 30% of the total carbon dioxide consumption is essential for carbonation. Americans do not like their beer flat so this is not negotiable!

Nitrogen Doesn't Negatively Impact Taste

For decades, the idea of using nitrogen instead of carbon dioxide caused brewers to become anxious. Brewers wanted to know the parts per billion of the oxygen coming from the nitrogen generator. Nitrogen purity is measured in parts per million, not parts per billion. This took



Many brewers are now comfortable with 99.99% nitrogen purity.

some time to become accepted. Many breweries are now comfortable with 99.99% nitrogen purity. This varies depending on the brewer. Some find that a lower purity such as 95% can work, as well. It's inexpensive to make nitrogen so using 99.99% has become the default purity. 99.99% is 100 parts per million. This seems like a lot of oxygen for a brewery, but it is not. Carbon dioxide contains oxygen, as well, hence the “oxide” in the name.

Brewers were certain the oxygen present in the nitrogen stream would foul their beer. Breweries measure their final product for dissolved oxygen (DO) levels, a sensitive and accurate way to ensure beer has the right amount of oxygen. This helps with consistency and quality. Most found nitrogen isn't as soluble in liquids as initially thought. When using nitrogen and reading the DO levels there was no or minimal increase in the oxygen levels, and therefore no negative effect on the beer.

Lower Costs to Both the Environment and the Budget

Carbon dioxide is a greenhouse gas. It absorbs and radiates heat which contributes to the warming of the earth's atmosphere. It's widely recognized as the most anthropogenic or human-caused greenhouse gas. The greenhouse effect of trapping heat can result in severe



Brewery tank sizes range from one to 10,000 BBL and higher.

weather events, rising sea levels and disruptions of ecosystems.

Let us now answer the question all breweries ask when considering this decision: Making nitrogen is much less expensive than buying carbon dioxide from a gas company and having it delivered. Breweries choosing delivery pay for each pound of carbon dioxide at varying levels of cost depending on the location and amount of gas used. In addition to being charged per pound, there are numerous surcharges including tank rental fees, delivery charges, hazmat fees, driver surcharges and environmental fees. Below is a basic example of a small brewery replacing 70% of its carbon dioxide.

Before

- 100,000 lbs. of carbon dioxide consumed per year
- \$0.35 per pound (costs vary) = \$35,000 for carbon dioxide

After

- 30,000 lbs. of carbon dioxide for carbonation and 70,000 lbs. replaced with nitrogen
- 70% replacement means a savings of \$24,500 per year or just over \$2,000 per month to apply to the purchase of a nitrogen generator

According to the Brewers Association, Congress is exploring providing access to credits and incentives to end-users such as breweries to procure and maintain carbon dioxide recapture and reuse equipment. That option is available for large breweries consuming millions of pounds of carbon dioxide. These breweries can afford the high cost of carbon dioxide reclamation equipment.

The better option for smaller breweries is switching to nitrogen. Congress could easily add nitrogen generation to the list of credits and incentives. If all breweries were made to replace carbon dioxide with nitrogen, the environment would benefit, as would

breweries since their costs would go down. Talk about a win for all! **BP**

About the Author

Brett Maiorano has sold nitrogen generators for over 25 years. He grew up in Connecticut, and has lived in Raleigh, NC, for the last 33 years. Family, friends and sports take up most of his free time.

PEAK Gas Generation makes the i-Flow Mini and Prime nitrogen gas generators, both of which offer a small footprint. The Mini can deliver up to 220.4 scfh of nitrogen gas at 99.99% purity, while the Prime can deliver up to 1794.8 scfh at 99.99% purity.



About PEAK Gas Generation

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Compressed Air Pressure Loss Solutions for the Last 30 Feet

By Carlo Gatti, Product Manager, Prevest

► The efficiency of a compressed air system is typically assessed across three main sectors: the compressor room, the main distribution network and point-of-use service drops. Each of these segments offers numerous energy-saving strategies and proper installation practices.

In recent times, the significance of material quality used within air compressor rooms and main distribution networks has been increasingly recognized, leading to advancements in energy conservation within these pivotal sectors. However, this focus on material enhancements has not always translated to the last 30 feet of the compressed air system, an area notorious for its loss in efficiency. Here, 30 to 40% of a compressed air system's total energy losses can occur.

To address inefficiencies at service drops, one must first understand what a pressure drop entails. A pressure drop is the reduction in compressed air pressure from the air compressor output to the final application. System leaks diminish air pressure, causing the air compressor to exert extra effort to maintain the required pressure. Leaks also disrupt airflow patterns, creating turbulence that

increases friction and reduces airspeed. Proper management of leaks can offer substantial annual savings in compressed air consumption. Cumulative minor pressure losses within the compressed air distribution network may result in significant pressure reduction, compelling the entire system to operate at elevated pressures to deliver the necessary pressure to end-users. For instance, a tool requiring 100 psi that experiences a 30 psi pressure drop would require the air compressor to operate at 130 psi, drastically increasing energy consumption and costs.

“The Dirty 30”: Common Problems in the Last 30 Feet of Piping

Turning our focus to the final section of the compressed air system – the point closest to consumption and use – the following factors are crucial for improving efficiency: minimizing pressure drops and leakages, ensuring overall safety, reducing maintenance costs, identifying potential issues and hazards, enhancing worker efficiency and guaranteeing air quality and energy conservation. The primary contributors to energy loss within the last 30 feet of the compressed air system can be attributed to four key areas: piping materials, sizing, threaded junctions and end-use materials.

The choice of **piping materials** for the final sections of the compressed air network, such as service drops, is paramount. Using outdated materials can lead to corrosion and, as a result, disrupt laminar airflow, causing substantial pressure drops, leakages and air contamination. Specifically, corrosion can exacerbate the inner surface of the compressed air pipes, impeding airflow and increasing leak incidence. Selecting materials that resist corrosion and leakage is crucial for maintaining unobstructed airflow. Moreover, mitigating moisture is vital, as excessive moisture in compressed air pipes can cause corrosion, particularly in vulnerable materials.

A good starting point to calculate the pressure drop linked to different materials



A technician using a pneumatic tool for precise metalwork.

Above: Prevest headquarters in Annecy-le-Vieux, France

Surface Material	Absolute Roughness Coefficient - ϵ in (feet)
Aluminum	$3.3 \cdot 10^{-6}$
Stainless steel	$5 \cdot 10^{-5}$
Steel commercial pipe	$1.5 \cdot 10^{-5}$
Welded steel	$1.5 \cdot 10^{-5}$
Galvanized steel	$5 \cdot 10^{-4}$
Rusted steel	$5 - 133 \cdot 10^{-4}$

Table 1. The Absolute Roughness Coefficient of common materials in compressed air piping

is understanding the Absolute Roughness Coefficient of the materials used. Some examples are in **Table 1**.

The friction caused by different piping surfaces generates turbulence and pressure drop. Consider a short drop pipe (30 feet) with a diameter of 1 inch working at a pressure of 116 psi and transporting approximately 88 scfm. If the material has a minimum roughness of aluminum (which has an Absolute Roughness Coefficient of $\epsilon = 3.3 \cdot 10^{-6}$ feet), the pressure drop will be approximately 1.02 psi (below 1%). If the material roughness is rusted steel, the pressure drop will be more than double (between 2.4 and 5 psi).

Industrial plants losing a lot of pressure in their compressed air systems need to raise their overall pressure to compensate. The rule of thumb is every extra 2 psi adds about 1% to the compressed air system's energy costs. Consider the costs of a 20 horsepower (hp) air compressor for the last 30 feet of a compressed air system. Energy costs for 24/7 operation can be around \$13,000 to \$15,000 per year (at \$0.10/kWh). A 1 to 2% increase in energy use would add another \$150 to \$300 per year to the energy bill only for one 30-foot span with a high Absolute Roughness Coefficient.

Simplify Piping Configurations

Correct **sizing and configuration** in a compressed air system are also critical. Inaccuracies in sizing can induce velocity increases or turbulence, resulting in pressure drops. Similarly, a poorly conceived compressed air distribution system with lengthy runs

from the air compressor to the application point can cause friction losses and, with multiple connections, significant pressure drops. Simplifying the compressed air network with fewer drops and bends will help alleviate these issues.

For example, taking the previous example (a 30-foot drop using 1-inch piping, a pressure of 116 psi and 88 scfm), the installation without connections has a pressure drop around 1.02 psi. If the same system includes five elbows, one nipple, one valve and a manifold, pressure drop doubles to around 2 psi. The cost per year from the pressure drops alone could be around \$150 to \$300.

Check Piping System Connections

All the **threaded junctions** in a compressed air system (especially in the last 30 feet) that aren't well connected are potential leak areas, due to contractions, expansions and



This air treatment unit is on a gantry for easy portability.

vibrations (all of which are normal in the life of a compressed air system). This problem is especially great in older compressed air piping networks.

Consider a 30-foot rusted steel pipe system with three to four threaded junctions which cause



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1/32-inch diameter leakages. Calculate the total leak cost for the previous example with this formula:

Compressed air leak cost = # of leaks x leakage rate (cfm) x kW/cfm x # of hours x \$/kWh

Cost from 1/32" leaks = 2 x 1.55 x 0.61 x 0.17 x 8760 x 0.1 = \$ 462.89

Component Leaks Can Add Up

Selecting high-quality **end-use materials** for push fittings, filters, tools and quick couplings is critical to compressed air system efficiency. Over their lifespan, these components accumulate several leaks that drastically affect compressed air system performance. For pipes and fittings, a smooth and consistent flow is best maintained by using corrosion-resistant and leak-proof materials.

These components add pressure drops or leakages according to their quality or mounting type, reaching up to 10 to 20% of compressed air lost. In our example, the cost for energy loss per year could be around \$1,300 to \$2,000 or more.

All in all, a 20 hp air compressor with energy consumption between \$13,000 to 15,000 per year providing compressed air to 30 feet of rusted steel pipe with low-quality materials could have the following costs:

- Pressure drop linked to materials: \$150 to \$300 per year
- Wrong size and configuration: \$150 to \$300 per year
- Leakages in pipe junctions: \$200 to \$500 per year
- Poor end-use materials: \$1,300 to \$2,600 per year
- Total: \$1,800 to \$3,700 per year

That figure represents 20 to 30% of the air compressor's total energy consumption.

Introducing the Prevest PPS AMS

To simplify monitoring in the last 30 feet of a compressed air system, Prevest is introducing the PPS AMS (which stands for Prevest Piping System Air Monitoring System).

This system uses automatic valves and sensors to ensure compressed air piping networks operate as they should. It monitors and calculates energy savings and leakage costs.

Valves and sensors are installed at each compressed air piping drop and can be remotely monitored, allowing users to not only have useful KPIs and statistics on hand, but also manage valves (with manual, automatic and timer settings) and set parameters with minimum and maximum values (including temperature and pressure).

The system's monitoring offers detailed information to better control the final 30 feet of every installation, including precise leak detection, leak cost calculations, safety alerts, minimum and maximum pressure and temperature readings, costs for the full compressed air system and cost savings.

In an emergency, owners can use the PPS AMS to automatically open or close the compressed

air flow, helping avoid damages or compressed air losses.

Users can view data on leak detection (volume and energy costs), flow (volume and energy costs), pressure, dew point, valve functioning and fluid controls. Data can be transmitted by Bluetooth or Io-Link, or output to a spreadsheet. This allows the owner to make reports and study trends.

The system's alarms notify users when flow, pressure, dew point or temperature go outside set ranges. Additionally, the system monitors for even minute leaks and calculates estimated energy costs for them.

These features make it an ideal add-on for any compressed air network. It not only reduces leaks and saves on energy costs, but also helps plants operate more sustainably.

About the Author

Carlo Gatti has worked in the compressed air market for 24 years. His professional activities have focused on the design, production and management of technical products for fluids under pressure to generate, control and transmit power in industry.



About Prevest

Prevest designs, develops, manufactures and markets a complete range of products for the distribution of compressed air including networks with safety fittings, filtration solutions and pneumatic equipment. For more information, visit <https://www.prevestusa.com>.



A rendering of the Prevest PPS AMS

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How One Lumber Mill Saved 70% on Energy Costs

The Challenge

At a Kentucky lumber mill, the plant manager was faced with growing production demands. He expected to need a 75 hp or 100 hp unit, since the plant's existing system was running constantly on a **40 hp modulating compressor**.



The Turning Point

Instead of jumping straight into purchasing a larger unit, Kaeser suggested a **compressed air audit** before committing to a bigger compressor. The audit revealed the system's power consumption was excessive, and surprisingly, a 20 hp compressor could handle the load.

The Bold Proposal

To help the plant manager understand the real potential savings, Kaeser offered a **25 hp rental compressor**. The plant manager was skeptical, but ultimately agreed, keeping the old unit as backup.

The "Aha" Moment

When the new compressor was up and running, the plant manager called Kaeser, convinced something was wrong. He reported that the new compressor kept turning off.

"Exactly. Your old compressor runs all the time, wasting your money. Our compressor only runs when you need it."

The unit continued turning off and on without causing low pressure in the plant.

The system only used energy when it was necessary, significantly reducing waste.

The Smart Move

Impressed by the results, the plant manager decided to replace the outdated 40 hp modulating compressor with a **40 hp variable speed compressor**. The new unit handled the plant's existing and new demands without the need for a more expensive unit. **What stood out even more was the impressive 70% reduction in energy costs!**

How They Did It

- 1. Lower Pressure:** System pressure was reduced from 113 psig to 105 psig, saving energy without affecting production quality.
- 2. Smarter Compressor Technology:** The variable speed compressor only ran when needed, maximizing efficiency and reducing wear and tear.

A Smarter Investment Pays Off

The mill's smart, data-driven approach to compressed air systems saved 70% in energy costs while improving efficiency. They avoided unnecessary upgrades by evaluating their true needs, offering a model for other facilities seeking energy savings and sustainability.



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Solutions that Drive Performance

Problem:

Sandvik Coromant, a global leader in metal cutting tools, faced challenges with an aging compressed air system.

Solution:

Kaeser conducted an Air Demand Analysis, uncovering significant energy-saving opportunities. The solution included state-of-the-art rotary screw compressors, dryers, and a SmartPipe distribution system. Sandvik has since estimated nearly \$90,000 in annual energy savings, and feels well-equipped to achieve their sustainability goals.



Problem:

High pH levels from various processes in a sugar processing plant were eating through stainless steel, concrete, and damaging their compressor, leading to frequent replacements and downtime.

Solution:

Kaeser recommended relocating the air system outside in a custom-built enclosure. This enclosure houses two separate air systems tailored to different seasonal processes. The customer is highly satisfied with the effectiveness of this innovative compressed air solution.



Problem:

A sawmill was facing issues with moisture in their compressed air system. During the winter, water in the system would freeze, leading to costly production delays and maintenance expenses.

Solution:

Based on Kaeser's recommendation, the sawmill invested in three rotary screw compressors, a dryer, and a Sigma Air Manager. Since switching to Kaeser, they've had no water present in the system, and reported an increase in uptime as well as a reduction in maintenance costs and labor.





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Industrial Chiller and Heat Rejection Innovation at the 2025 AHR Expo

By Brooke Jones, Digital Content Editor, Chiller & Cooling Best Practices Magazine

▶ The 2025 AHR Expo, co-sponsored by ASHRAE and AHRI, was held Feb. 10-12 at the Orange County Convention Center in Orlando, FL, concurrent with the ASHRAE Winter Conference. More than 1,800 exhibitors and 350 speakers drew in over 50,000 attendees. HVACR professionals from across the globe gathered to discuss the latest regulation updates and explore innovations. This article focuses on chiller, heat rejection and related cooling technologies for industrial use.

Chillers

Atlas Copco Compressors highlighted several technologies for industrial use including the air-cooled TCX process cooling chiller. With 15 models available, it offers cooling capacities

from 4 to 90 kW. The newly launched TDV Series industrial adiabatic cooler was also on display. The company offers custom builds for this product and has worked with projects up to 500 tons. TDV models are available in both adiabatic and dry fluid versions. “The reason we’ve moved to closed-loop coolers as opposed to open-loop towers is because the water savings provided by this equipment completely outpaces an open-loop tower,” explained Daniel Perez, Business Development Manager, Atlas Copco. “On average, a 100-gallon open-loop system will lose about 8 million gallons of water per year, just through the evaporation process.”

The Johnson Controls booth featured the modular YMAE R-454, air-source, VSD, scroll heat pump chiller, which can make chilled water and hot water up to 140°F (60°C) in -13°F (-11°C) ambient temperatures. “An installation in the Northeast has 5,000 tons of CYK heat pump chillers producing 41°F (5°C) for its campus chilled water loop and 160°F (71°C) for the hot water loop. This installation saves the campus 59 million GPY of water, 20,000 metric tons of CO₂ emissions and 380,000 million BTUs of natural gas,” said Todd Grabowski, President, Global Data Center Solutions, Johnson Controls. “The issue of carbon isn’t just an issue for the biggest

Above: The 2025 AHR Expo at the Orange County Convention Center in Orlando, FL. Photo courtesy of AHR.



Greg Aylor and Daniel Perez of Atlas Copco Compressors (left to right) with a TDV adiabatic cooler



Todd Grabowski of Johnson Controls with a 3,200 ton centrifugal chiller.

>> Industrial Chiller and Heat Rejection Innovation at the 2025 AHR Expo



Adam Crimboli and Trevor Ramsey of Daikin Applied (left to right) with the Trailblazer® AGZ-F



Marcos Awad of SMARTT with the company's new VSD modular chiller



Michael Medlock of ClimaCool, a Climate Control Group brand



Pat Carus of Multistack with an MFH water-cooled MagLev® flooded heat recovery chiller.



Anthony LaRicca of Budzar Industries with a cascading chiller system



Kevin Shewmaker of LG with an inverter scroll heat pump chiller

companies to solve, but all companies.”

Johnson Controls also showcased its largest 3,200 ton centrifugal chiller redesigned for new refrigerants like R-1234ze.

Daikin Applied displayed a Magnitude® magnetic bearing chiller. This centrifugal chiller is capable of 90 to 1,560 tons and features a hermetic, direct-drive motor. The Magnitude models use R-1233zd(E), R-513A and R-515B refrigerants. The company also displayed a Trailblazer® AGZ-F air-cooled, scroll chiller that provides 30 to 230 tons and uses R-32. Addressing manufacturing plants looking for a starting point to increase energy efficiency, Adam Crimboli, Regional Equipment Sales Manager – Southeast, Daikin Applied, said, “You have to do a full lifecycle analysis to determine what’s best for your application. That involves the actual energy analysis of the equipment being used.”

Montreal-based SMARDT displayed its new AeroPure™ air-cooled chiller – a magnetic bearing, oil-free, centrifugal chiller capable of 60 to 710 tons. It’s compatible with R-1234ze, R-515B, R-513A and R-134a refrigerants. “Manufacturers can use a multiple refrigerant compressor to save energy, and this can also help with redundancy. This can be especially beneficial for plants that need 24/7 cooling,” said Marcos Awad, Global Director of Sales/ Applications Engineering, SMARDT. The company also showed its new modular chiller option featuring variable speed scroll technology. It’s available in 30 and 40 ton modules, and can reach up to 400 tons with 10 units connected in parallel.

Attendees were able to explore Climate Control Group’s offerings through large touch screens around the booth. Several new chiller products are on the horizon for 2025, including vapor injection – a refrigerant compressor technology that allows for high lift, creating the ability to produce hot water with low ambient air temperatures. It will use low-GWP R-454B. When asked about solutions for manufacturing plants looking to be more energy efficient,

Michael Medlock, National Decarbonization Strategy Leader, ClimaCool, recommended heat recovery. “Don’t waste energy. If you’re cool in one area of the building and heating with something else on the other end of the building, you’re wasting energy.”

Heat recovery was a hot topic at the Multistack booth. On display was an MFH water-cooled MagLev® flooded heat recovery chiller, able to reach water temperatures up to 145°F (63°C) and available in capacities starting at 80 ton. This chiller features oil-free, magnetic levitation bearings in a high-lift centrifugal compressor. “We’ve been leaders in heat recovery for a long time, but we’re continuing to take everything we know and try to do it in different sizes and applications. It’s our contribution to decarbonization and electrification,” said Pat Carus, Western Regional Manager, Multistack. “30% or more of what we do has some component of heat recovery.”

Across from the Multistack booth was Budzar Industries, a Multistack subsidiary focused on industrial applications. On display was a cascade chiller system with a set point of -121°F (-85°C). It was cascading a two refrigerant circuit – R-404A brought the temperature down to -22°F (-30°C) and then a second circuit with R-508B brought the temperature down to -121°F (-85°C). “This product is used in pharmaceutical manufacturing and has the capacity to go down to -121°F (-85°C) and up to 392°F (200°C). It controls a jacketed vessel to make medicines,” explained Anthony LaRiccia, Rubber Sales Manager, Budzar.

LG showcased its inverter scroll heat pump chiller, offered in 17, 20, 33, 40 and 60 ton models. With a 20.13 Integrated Part Load Value (IPLV) and COPH up to 3.5, energy efficiency is a major focus. It uses low-GWP R-32. “LG is unique in how we build our chillers. DX circuits reside in all air-cooled chillers, and



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Musa Kurtulmus, Chris Wells, Jeff Thibodeau, Evren Yazici and Matt Smith with Mikropor (left to right) displayed the company's atmospheric air filtration solutions.



Andrew Kollasch of EVAPCO with an eco-Air Adiabatic Fluid Cooler



Emily Rose Giunta, Marshall Zabel and Joe Evans of SPX Cooling Tech (left to right)



Jim Dyer, Kimberly Glasko and Jimmy Horton of Nimbus (left to right) with the VIRGA III



Micah Curtis, Director of Sales, Tower Tech with a modular composite cooling tower



Ben Seidel and Adrienne Lowke Stoinoff of Baltimore Aircoil Company (left to right) with the TrilliumSeries Adiabatic Cooler – Model TRF

the norm has been two circuits. LG has built our chillers with multiple independent circuits, which gives us immense redundancy when it comes to just refrigeration power,” explained Kevin Shewmaker, Regional Sales Engineer, LG. Another highlight of the booth was the LG oil-free water-cooled inverter centrifugal chiller using R-1233zd. The company has made water-cooled chillers since 1968 overseas, and has just begun bringing them to the U.S.

Heat Rejection

EVAPCO’s booth featured its adiabatic fluid cooler from the eco-Air Series, which includes a variety of adiabatic and dry cooler options. First introduced in 2018, this product has undergone improvements with the latest model released in 2024. On display was the single stack product used for large industrial applications, but the company also offers a double stack option. “I would say almost every large industrial manufacturing job we work on is evaluating adiabatic cooling,” said Andrew Kollasch, Product Application Manager, EVAPCO.

The SPX Cooling Tech – Marley booth was buzzing with excitement over news of its new Aftermarket Parts Trailer going on tour across the U.S. “This is not just a component showcase. We’re taking our training on the road,” said Emily Rose Giunta, After Product Manager, SPX Cooling Tech. “The Aftermarket Parts Trailer has a lot of real parts, not demos. They’re not 3D printed. We want to teach people hands-on, right at home.” The booth featured models of its adiabatic cooling systems, such as the Marley OlympusV Fluid Cooler, and had a Marley WaterGard – a cooling tower filtration system – on display.

Nimbus highlighted its full line of VIRGA™ hybrid adiabatic cooling systems, available in four configurations. At the front of the booth was a VIRGA III, a one-fan unit with an EC motor, capable of up to 50 tons. It’s constructed from 304 stainless steel with copper coils, and has coated fins and coils that repel water to

minimize potential calcium buildup. “Cooling towers are efficient at what they do, but they use a massive amount of water. Adiabatic coolers use about 80% less water if sized the same,” said Jerry Petit, Director Business Development & Sales, Nimbus.

Tower Tech drew in visitors with its factory-built, modular composite cooling tower. Unlike a traditional induced draft cooling tower where fans are on the top, this product’s fans are at the bottom. “We have technology that allows us to put the mechanical equipment – the fans and motors – at grade level where they’re easy to access,” said Micah Curtis, Director of Sales, Tower Tech. “If there’s a motor failure, you don’t need a crane. All routine maintenance is done with a boots-on-the-ground approach.”

Baltimore Aircoil Company’s booth had a TrilliumSeries® Adiabatic Cooler – Model TRF.

Its capacity range is 350 to 1600 kW and the maximum entering fluid temperature is 140°F (60°C). While not at the show, the company has a new innovation – the TrilliumSeries Dry Cooler. “You have energy use and water use, and both are precious resources. We want to find a happy medium between those. The controls in all our hybrid products are set up so owners can choose whether they want to rely more on energy or water to support their operations, or they can set it in the middle and let it operate automatically,” said Adrienne Lowke Stoinoff, National Sales Manager HVAC and Manufacturing – North America, BAC. “Energy and water use is key to what we’re trying to do as a company.”

The highlight of the Delta Cooling Towers booth was its new TMX Series Cooling Tower. The tower sump is molded from non-corroding HDPE in a single, continuous piece over 20 feet long, eliminating joints, seams or welds prone



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Jay Flaherty and John Flaherty of Delta Cooling Towers (left to right) with the TMX Series Cooling Tower



Howell Feig of Danfoss with the BOCK HGX56 CO₂ T



Tunji Asiwaju and Anthony Mihajlovic of Armstrong Fluid Technology (left to right) with a Design Envelope Horizontal End Suction Pump with permanent magnet motors



Richard Kirkpatrick of ABB with the newly unveiled EHR

to leaks and maintenance issues. “We had to build one of the biggest molding machines in North America to create this series,” said Jay Flaherty, Northeast Regional Sales Manager, Delta Cooling Towers. Models range from 300 to 3,250 tons. “One cell can cool about 600 tons compared to our previous cooling tower that got up to 420 tons. This allows us to use fewer cells in a smaller footprint.”

Refrigerant Compressors

Danfoss received an AHR Expo Innovation Award in the refrigeration category for its BOCK HGX56 CO₂ T, a transcritical six-cylinder

CO₂ compressor using R-744. It has expanded range to enable larger refrigeration and heat pump applications with a smaller footprint, and strong energy-efficient performance. The company also introduced show attendees to the Danfoss Turbocor® Active Cooling Variant with an oil-free check valve and oil-free suction ball valve. This is used to cool the electrical components in Turbocor refrigerant compressors and can handle SST up to 86°F (30°C) for cooling applications and SDT up to 179°F (82°C) for heating applications. Danfoss Turbocor celebrates 30 years of operation in 2025.

Copeland held a press conference led by John Schneider, President, HVACR Technologies, Americas, and Patrick Forsythe, Chief Technical Officer, to discuss the company’s recent innovations and growth. Since divesting from Emerson in 2023, the company has launched over 100 products and filed 430 patents. Forsythe discussed how Copeland is addressing global challenges – including energy transition, refrigerants transition and food and pharmaceutical availability – with innovation. “Innovation is not a department at Copeland. It’s not a specific team. It’s in our DNA and our work is focused on the technical

solutions for some of the most pressing global challenges,” Forsythe said. Copeland also highlighted its oil-free centrifugal compressor with frictionless Aero-lift™ bearing technology, developed for the 50 to 200 ton capacity range and compatible with R-1234ze, R-515B and R-513A.

Motors, Drives and Pumps

On the first day of the show, ABB unveiled its latest innovation: EHR, a direct drive EC motor technology for fan wheels. It has two frame sizes ranging from 1 to 7.5 horsepower. EHR supports variable speed operations and is designed for direct drive applications. “EHR delivers as much as 40% improved power consumption compared to fixed speed solutions, leading to significant energy savings,” said Richard Kirkpatrick, Global Product Manager for Integrated Motors and Drives, ABB. Also on display were the Baldor-Reliance® Cooling Tower Direct Drive and the ABB drive package, which can replace the

gearbox, driveshaft and motor typically used in industrial cooling tower fans.

Armstrong Fluid Technology ended day one of the show with a press conference to announce the launch of several products including Envelope™. This integrated digital platform connects components in a mechanical system and has the ability to create detailed performance profiles. Pratik Sharma, Global Director, Building Services & Performance Management, Armstrong, said, “The true power of the Envelope platform is in how it enables system optimization through performance

coupling with partner products or solutions. Working within this platform, Armstrong and digitally controlled solutions of all types can connect and coordinate operations for improved performance and efficiency. Components that can be connected to Envelope include chillers, cooling towers, boilers and heat pumps made by a wide range of well-known industry manufacturers.”

The 2026 AHR Expo will next be held Feb. 2-4 at the Las Vegas Convention Center in Las Vegas, NV. For more information, visit <https://www.ahrexpo.com>. **BP**

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CIS Engineers Central Utility Plants for Extreme Weather

By Roderick M. Smith, Publisher, and Troy Dreier, Senior Editor, Chiller & Cooling Best Practices



► CIS Industries is a supplier of industrial and commercial HVAC solutions and technologies based in New Orleans, LA. Founded in 2004, it's grown to 11 offices across the Southeast. It represents Carrier chillers and Marley cooling towers and fluid coolers, among many other lines.

Chiller & Cooling Best Practices sat down with three of CIS's officers, Mikel Bonano, Jr., CEO; Keith Earhart, Vice President, Engineered Sales and Strategic Accounts and Joseph Bonano,

Above: CIS Industries headquarters in New Orleans, LA

Louisiana Controls Manager; to discuss staying operational during extreme weather events, the benefits of two-stage centrifugal chiller impellers and a massive project CIS undertook for Tulane University.

For part two of this interview, which discusses energy conservation, heat pump chillers and ASHRAE guideline 36, visit <https://coolingbestpractices.com>.

Best Practices: What geographies does your company do business in and what market segments are important to you?

Mikel Bonano: Our corporate headquarters is in New Orleans, LA. We have sales coverage throughout Louisiana, Mississippi, Arkansas, Tennessee and Florida. Additionally, we work on projects throughout the U.S. with strategic clients. We focus on industrial manufacturing, as well as healthcare, education and hospitality.

Best Practices: How was the company founded and what's the structure of the organization?

Mikel Bonano: The company was founded in 2004 by my father – who had previously spent over 40 years in the HVAC industry –



Mikel Bonano, Jr., CEO



Keith Earhart, Vice President, Engineered Sales and Strategic Accounts



Joseph Bonano, Louisiana Controls Manager

and me. Over the years, we have had several acquisitions and mergers to build what the company is today. We now operate five major divisions: Mechanical Solutions is our applied equipment division, Air Products is our air distribution division, Hydronics is our hydronics division, Building Technologies is our building automation and service division and Supply is our parts division. Each group has its own leadership team.

Best Practices: What services does the company provide?

Mikel Bonano: We provide services from a project's start to finish. That includes engineering design and selection assistance, logistics during construction, building automation installation and commissioning, startup and service for the equipment we provide. Our goal is to bring a superior level of customer service to all interactions. It's important our customers understand when they buy equipment from us, they have a partner throughout their ownership of the equipment.

Best Practices: For industrial plants, do you provide ongoing maintenance?

Mikel Bonano: Our industrial service team is more regionally focused and primarily services cooling towers. That's a growth opportunity for us moving forward.

VFD-Driven Two-Stage Centrifugal Chiller Impellers

Best Practices: What challenges are unique to the Gulf Coast?

Keith Earhart: For one thing, what happens when we have a hurricane? We have a 50,000-ton central utility plant for a medical center. It has to be operational, so we have to design for extreme conditions. We have to design for what happens if the fill in the cooling tower gets ripped out. Can we still run the central utility plant? Can these chillers still run with 105°F (41°C) condenser water and stay online so the

surgery can function? We have to design for unique and robust scenarios and draw it out on paper.

Believe me, we've seen it over the last 20 years. We've had incidents during Hurricane Sandy where the hurricane came in, the cooling towers had to be shut down and we still had to run the chillers. We had to run at an elevated temperature so they could reject the heat to keep those surgeries online.

Certain areas have cost-effective water and certain areas don't. We have a lot of facilities that use well water, which is cheap, but carries significant challenges from a maintenance perspective on the cooling towers, and the make-up water, filtration and reverse osmosis systems needed.

Other areas have cheap water, but don't have it on that scale. We're working on a large project

in North Louisiana where it doesn't matter how cheap water is, they can't get enough of it. So that facility is going with massive chillers running 135°F (57°C) condenser water and it's all going to be air-cooled.

Best Practices: How do you run chillers at those higher temperatures?

Keith Earhart: It starts with the initial design. We'll evaluate it with multiple off-design conditions. It might be designed for 42°F (6°C), but what happens when somebody opens an OR hybrid suite and we can't control the humidity? Now all of a sudden we need 38°F (3°C) chilled water. We design from day one to do 38°F (3°C). We also ask, what sort of capacity can we get if we have to do 42°F (6°C) and we have to do 90° to 100°F (32° to 38°C) condenser water? What does that look like? Can we design our centrifugal chiller impellers to handle that? And more importantly, can we design our

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impellers to ramp down, to run efficiently? If we say, “I want a chiller that can do 100°F (38°C) condenser water and still give me 70% capacity,” and I did that with a single stage impeller with a constant speed, its performance at everyday conditions of 42°F, 85°F (6°C, 29°C), would be terrible.

We’ve pretty much exclusively shifted to two-stage centrifugal chiller impellers on everything, as well as VFD-driven, regardless of whether it’s 480 volt or medium voltage or even high voltage. We’re going to insist on some sort of part load capability and, more importantly, part lift capability. Everybody has a part load.

In most of our applications, we don’t see part lift. When we drive an industrial plant, that kilowatt process is constant year-round. What we do see is part lift. We see that today, it’s probably 75°F (24°C) outside today and the day before was in the upper 80s. That’s a significant change in the wet bulb and the lift profile of our chiller plants. We need to operate efficiently and reliably in all of those scenarios.

Single-Stage and Two-Stage; Partial Load and Partial Lift

Best Practices: So a two-stage centrifugal chiller impeller provides a lot more capability and performance at high temperatures?

Keith Earhart: Yes. A single-stage will be more cost-effective on an initial setup, but your initial purchase price is a small percentage of your lifecycle cost. Think about what this is going to look like a month from now. What does it look like in eight months? What does it look like in eight years? We standardize on two-stage centrifugal chiller impellers for that, as well as VFDs. We’re also big proponents of heat pump chillers for that scenario and not oversizing things. A lot of times people will come in and say, I have this load, so here’s what I want. Okay, well, what happens when you lose a chiller? Let’s walk through a scenario where we have to take something down for maintenance: How are we going to operate then?

Best Practices: Can you explain the difference between partial lift and partial load?

Keith Earhart: Lift isn’t a measurement of work, but the byproduct of that work. Load is how much tonnage, how much BTU do we have to remove? Lift is sheer capacity: What does it take to get this done? We can have 1,000 tons of capacity, but if we’re riding at too hot or cold water, it’s not useful capacity. Lift is basically how cold do we need it and how hot do we have to be to reject to atmosphere? In a hospital, that’s somewhere in that 42° to 38°F (6° to 3°C) range on the chilled water. For condenser water, we’re designing our towers for 85°F (29°C), leaving at 95°F (35°C), so from 95° to 42°F (35°C to 6°C), that’s our lift. We have to account for approach temperatures in the tubes, which can vary with maintenance.

If we have a facility that uses river water and has copper-nickel tubes, for example, the approach temperature is significantly higher overall. If they have fouled tubes, if they don’t have tower separators, if they don’t have sweeper systems, that lift can get pretty high. We will design a half-degree approach on the

Tips to Prepare Central Utility Plants for Hurricanes

Keith Earhart offers advice on preparing for one of the most challenging weather events around: Designing hurricane-proof cooling systems.

“First of all, we have to do everything we can to make sure our cooling towers can not only withstand the wind force but also stay operational. There are two defining factors here: anchorage wind loading and structural wind loading. Anchorage wind loading says, I can withstand a hurricane. My cooling tower will be on the roof. Now, the fill might be in the parking lot next door, but I didn’t drop the tower on my neighbor. That’s fine for your everyday building, but that’s not fine for a hospital. That’s not fine for an industrial facility that makes money by staying operational. We have to test to be operational during and after a hurricane.

“When it’s a hospital, we absolutely have to be online. We have to say, if we have to shut down the fans on the cooling towers, we can pump water but what’s the performance going to be in that scenario? With no fan flow, no airflow, it’s still going to reject heat. It’s just going to take a lot higher temperature based on a wet bulb to reject the heat. So what does that balance condition come out to? Is that going to then go from 85°F, 95°F (29°C, 35°C) up to 90°F, 100°F (32°C, 38°C)? Are we going to get closer to a 3°F (2°C) delta on the tower? Is it going to be 105°F (41°C) condensing water temperature?

“Based on that, now we have to run with 105°F (41°C) condenser water. Let’s send that back to our chillers and see if our chillers can handle it. Can we design our chillers and impellers to work with 105°F (41°C) condenser water and still put out reasonable chilled water? Maybe it can’t do 38°F (3°C), but it can maintain 42°F (6°C) at 95% capacity. The design process involves working backwards based on what we think is going to happen in a critical event.”

evaporator and condenser, but as we've seen, two degrees is common and eight degrees happens. Maybe you put these in a casino and they're not doing the maintenance, and the cooling towers are next to a shelf parking lot or run an 8°F (4°C) approach. Well, how in the world are we going to unload a centrifugal chiller with an 8°F (4°C) approach on a condenser? How are we going to get that down to 30% load? Because in that scenario we are doing foot on the gas, foot on a break at the same time, just so we don't go into a surge. So that's where our two-stage centrifugal chiller impellers have an advantage on overall lift stability even at part-load conditions.

The difference between partial load and partial lift is a common misconception. Someone might say, "I'm going to put a VFD on this centrifugal chiller so I can get part-load." In reality, that doesn't play into it. Our overall load is controlled by the guide vanes; they

control how much refrigerant flows through the refrigeration compressor. The lift is just the coldest leaving water to the hottest leaving water. So are we going out at 42°F (6°C) and are we going out at 95°F (35°C), or are we going out at 38°F (3°C) and going out at 100°F (38°C)?

In some scenarios, we haven't done maintenance on these centrifugal chillers. They're fouled and now instead of putting out 42°F (6°C) water, I have to put out 40°F (4°C) refrigerant temperature because I have a massive approach overall. So with a VFD, what we get is the ability to change the impeller's tip speed.

Lift is determined by how fast the leaving tip speed of the impeller is and how fast we can get that refrigerant out. We've probably all been in a mechanical room when we heard it surge and it sounds like a herd of elephants

running through. That's the refrigerant molecules going the other way. But if we have a scenario where we design for massive lift and we're flinging refrigerant out there fast for our 100°F (38°C) condenser water scenario, and we don't need that on a day like today when we provide 65°F (18°C) condenser water, now we're driving with our foot on accelerator and our foot on a brake at the same time. We would much rather get rid of the brake and take our foot off the accelerator. Let's slow it down, use that VFD to spin the centrifugal chiller impeller only at the position we need, and control the actual tonnage by the guide vanes.

Best Practices: Is that one of the strengths of the Carrier AquaEdge water-cooled centrifugal chiller and similar products?

Keith Earhart: Yes, Carrier focuses on lift stability. We've had some scenarios in the

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past – and it's not just centrifugal chillers, but positive displacement, VFD screw refrigeration compressors, as well – where a hospital lost a

cooling tower, and were able to keep that positive displacement chiller online. We've had surgeons who saved lives because of that. So their design

philosophy for screw refrigeration compressors became “three more moving parts than an anvil.” We need it to work no matter what.

Tulane University's Central Utility Plant

CIS Industries has a long history of working with Tulane University, supporting its chillers and cooling towers, but recently it undertook a massive project for the institution. The university has a goal to be carbon-neutral by 2025, so it needed a significant overhaul to its main central utility plant as well as controls for 53 buildings totaling 6.5 million square feet of space.

Not counting the initial design and evaluation, the full project took two years to complete. CIS provided the equipment, front-end planning, building automation, commissioning and maintenance. The Arkansas-based engineering firm of Bernhard TME provided lead design engineering. The university projects it will save \$4.6 million annually in energy costs as a result of the work. Here's how Keith Earhart explains it:

“The project included some traditional facilities: They pull chilled water off of a massive central utility plant where we provided three 2,400 ton centrifugal chillers with VFDs at 480 volts. It was interesting finding a VFD large enough for that. There are not a lot of manufacturers for 3,000 amp VFDs. We ordered those from Rockwell Automation. Anytime you're talking 3,000 amps, you're not talking about off-the-shelf VFDs.

“The idea is to provide something with a significant lifespan, not just 15 years, but 30-plus years of expected, efficient operation. The chillers were selected to run with 38°F (3°C) chilled water. They need to run with elevated 10°F (6°C) above design condenser water. They need to provide not just high-lift scenarios but low-lift scenarios.



Three centrifugal chillers at Tulane University's central utility plant

“What happens if we run 48°F (9°C) chilled water and we want to run 55°F (13°C) condenser water? Can we handle it? Can we handle the lift differential? They had to be designed for all different scenarios because this is a central utility plant. We have to account for everything.

“Facilities in Tulane's uptown campus had a lot of existing controls from different manufacturers. These are operational hospitals. We had to do a control retrofit. We had to do a central utility plant retrofit, and they can't go offline. We have experiments that have been running for 20 years. We can't do anything to impact that.

“Joseph Bonano's team did an excellent job of doing all the design work beforehand, doing a lot of homework before we even set foot on site, and pre-building all of our panels in our UL-rated shop. Everything went out to the field with full control panels and wiring. That way, if we take a panel offline, we can put the new panel in and reuse the existing box, getting them up and running in a hurry.

“This project involved a school and a hospital. We have different standards in both. It's not a big deal if a school gets a little warm while we do a changeover. It's a big deal if it's a hospital with surgeries going on. Planning it out was extensive, but based on all the homework, the commissioning was fairly quick.

“We were able to commission that job faster than a lot of our other projects because we spent so much time on that front end, designing the controls, chillers and heat pump chiller to make sure it was the right size. It wasn't running at 20% load, where it's less efficient. It was designed to run at 75% load. It integrated with the boilers and the cooling towers. We had to reuse a lot of existing cooling towers and pumps. You work with what you've got.

“This project is ongoing. We still get calls asking us to tweak or adjust different sequences of operation or provide integration for freeze protection. As you can imagine, with 53 buildings, there's no end to the number of ways to improve it.”

It might be a little more expensive initially, but it will run 24/7. We've done that in lots of scenarios. We have absolutely tested the robustness of these chillers, often in real-world scenarios. We've been fortunate to come out of those unscathed.

Centralized Control of Centrifugal Chillers and Pumps

Best Practices: When I think controls, I'm thinking of primary and secondary load-responsive chillers with VFDs coming with a centralized control system. Is that where you're at?

Joseph Bonano: That's correct. Some engineers design chilled water plants to always maintain a static chilled water setpoint of 42°F, 45°F (6°C, 8°C) and so on. Other engineers take energy savings a step further and design chilled water plants to give chillers a certain flow setpoint and make the chiller go to a certain load capacity so the chiller operates within its efficiency curve. If it gets out of its efficiency curve, we turn on another chiller and load that one up so we're staying within the efficiency curve instead of loading one chiller to 100% outside of its efficiency curve. An example of this is determining when to turn on two smaller chillers as opposed to turning on one large chiller. In Tulane University's case, a heat pump chiller is our first stage [see sidebar]. Then, depending on load, we turn on either water-cooled chillers or air-cooled chillers.

Best Practices: Do you implement master controls that tell machines when to turn on and off?

Joseph Bonano: Yes, that is one of our core principles. More basic approaches tend not to handle that, but on energy-saving projects, absolutely. We control flow to make sure those chillers can only use a certain amount of demand or lift.

Best Practices: Is there a Carrier product line that provides a master control?



An Automated Logic controller in the central utility plant at Tulane University

Joseph Bonano: Automatic Logic Corporation (ALC), a Carrier subsidiary, does have a chilled water optimizer, which has specified sequences

meant to run central utility plants at high efficiency. It's designed for however many air-cooled chillers, water-cooled chillers or cooling towers you have on-site.

Best Practices: Does it also control pumps?

Joseph Bonano: It does. One of the main functions is flow. We can look at Delta P and say, for this plant we want to operate between 3 and 15 delta P. It will know that and be able to modulate pumps based on that. **BP**

For more information on CIS Industries, visit <https://cisindustries.com>.

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Cooling Technology Institute Celebrates 75 Years

By Bill Smith, Regional Sales Manager – Eastern U.S. & EMEA,
Chiller & Cooling Best Practices Magazine



► The 2025 Cooling Technology Institute (CTI) Annual Conference for manufacturers, owner-operators and suppliers of heat rejection equipment was held Feb. 2-5, 2025, at the Peabody Hotel in Memphis, TN. This article shares updates to CTI standards and acceptance test codes, synthesizes the event’s educational curriculum, shares perspective and highlights products and services offered by firms at the event’s trade show.

During the luncheon, Jim Baker, President, CTI, shared a history of the CTI to recognize its 75-year anniversary. In 1959, Phillips 66

joined, so participation went beyond cooling tower manufacturers. In 1962, suppliers to the industry became involved. In 1965, the board of directors formed with three-year term limits, still the same as today. In the 1970s, the Summer Meetings began. In 1992, the STD-201 program started. In 1993, the multi-agency testing program began. In 1999, the organization’s name was changed to the Cooling Technology Institute.

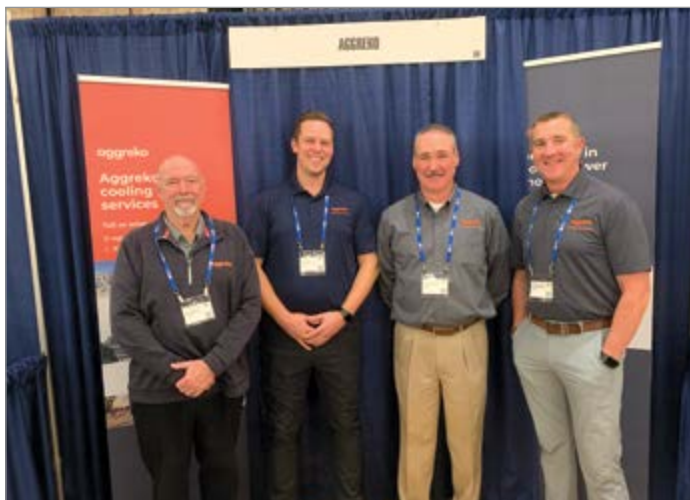
“Over the past 20 years, we’ve survived so many hurdles, and are stronger than ever before. Our codes and standards are used worldwide. Our

certification is the benchmark in the world,” said Vicky Manser, Administrator, CTI.

Codes and Standards Updates

CTI’s three standing committees – Engineering, Standards & Maintenance (ESM); Performance & Technology (P&T) and Water Treatment (WT) – gather at the event to review, draft and update CTI’s existing and developing acceptance test codes (ATC) and standards (STD) covering thermal performance, sound,

Above: A field-erected evaporative cooling tower (Image courtesy of EVAPCO)



Gary Hooper, Mike Zaulak, Billy Childers and Travis Whaley of Aggreko Cooling Tower Services (left to right)



Frank Morrison, Nick Mascarenhas and Steve Kline with BAC (left to right)

drift, materials, plume abatement, vibration, fire resistance and more.

Sound certification (STD-204) is soon going under board approval, targeting 2026, and is only available to companies with thermal

certification, according to Baker. It's often impossible to do a sound test onsite at an installation. Being able to certify sound performance ahead of time brings value to the purchaser and industry, according to Jacob Faulkner, Director of Engineering, Cooling

Tower Test Associates. CTI has been working to harmonize international codes and the CTI sound test code before a certification is released so there's no question about the validity of the calculation, said Scott Nevins, Director of HVAC Product Development, EVAPCO and Chair of P&T.



Stefan Guetzov with Cool Water Technologies



Jacob Faulkner with Cooling Tower Test Associates, and Ian Butler with Eurovent Certification (left to right)

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» Cooling Technology Institute Celebrates 75 Years



Bret Calkins with EvapTech



Kaleigh-Ane Kugel and Gary Stauffer with SPX Cooling Tech (left to right)



Jason Hill with Brentwood Industries



Mark Donoghue, Jamie Wilde, Gary Dicker, Gary Mirsky, Jim Baker, Jeff Ebert, and Brandon Smith at the Galebreaker Industrial booth (left to right)



Kris Herijgers and Dan Rosseljong with Sumitomo Drive Technologies (left to right)



Aakash Patel and Peter Turnbull of Benton International and TOYOMO Advanced Materials (left to right)

“A UV study is occurring and we’re approaching a second round of testing laying out a procedure for UV testing of thermoplastic fill materials. UV degrades plastics over time, and standardizing a minimum threshold for the degree of UV resistance is important for the industry,” said Joseph Evans, Senior R&D Engineer, SPX, and Vice Chair, ESM. “In addition, we’re beginning work on STD-137 (Fiberglass Pultruded Structural Products for Use in Cooling Towers), codifying fiberglass design, because the American Society of Civil Engineers just released the load and resistance factor design, extremely important for the field-erected fiberglass industry.”

Lastly, a thermal performance certification program for adiabatic fluid coolers is under development.

Educational Curriculum

The Conference featured around 30 technical paper presentations, the owner/operator session, a water treatment panel discussion, a half-day educational seminar and the longstanding ask-the-expert seminar.

The educational seminar, chaired by Frank Morrison, Technical Director, Global Marketing, Baltimore Aircoil (BAC) and Jared Medlen, Project Manager, Mesa Associates, featured: *Fundamentals of Cooling Fan Performance* by Sander Venema, Manager Engineering and Production Support, Howden Netherlands; *Essential Pump Fundamentals for Optimizing Cooling Tower Performance* by Matt Derner, Manager, Education and Energy Efficiency Training Resources, Hydraulic Institute; *EHS Considerations for Today’s Cooling Water Treatment* by Barbara Keeler, Process Safety Manager, and Felix Dornier, Director of Technical Services, Valero Energy and *Heat Rejection for High Density Computing* by Steve Kline, Global Technical Director, BAC.

Many technical paper presentations were given by companies exhibiting in the CTI

Expo highlighted below. Due to article space constraints, all exhibitors, paper authors and co-authors could not be included.

Heat Rejection Equipment Technology

Aggreko Cooling Tower Services discussed the remote monitoring capabilities of its GT-40 (900-4,000 GPM) and GT-20 Series (400,1,600 GPM) cooling towers. Operators have access to real-time water temperatures, water flow, fan speeds and power consumption, and have the option for Aggreko Remote Monitoring for additional peace of mind.

Baltimore Aircoil Company (BAC) recently launched its TrilliumSeries Dry Cooler with nominal capacity up to 10,000 MBH (115°F [46°C] EWT, 105°F [41°C] LWT, 95°F [35°C] dry bulb) in five models from 80-160 total horsepower (hp). Nick Mascarenhas, Chief Thermal Engineer, BAC, was recently appointed to the CTI Board of Directors.

Frank Morrison, Technical and Marketing Director, BAC, presented a paper along with Bob Cunningham, Principal Consultant, International Water Consultants, titled *Environmental Consequences of Evaporative Cooling Restrictions*. Incentives are being given to users replacing evaporative systems with alternative technologies. This paper made the following recommendations to the Southern Nevada Water Authority and other jurisdictions that may follow in evaporative cooling restrictions: Reevaluate the ban on all evaporative cooling; recognize the unique considerations in Southern Nevada; clarify the definition of evaporative cooling and conduct evaluations of the energy and water use of water-cooled systems with evaporative heat rejection versus air-cooled and swap cooler systems.

Cool Water Technologies, based in Astoria, NY, offers a range of CTI-certified factory assembled

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cooling towers including counterflow, crossflow and forced draft evaporative models, as well as closed circuit coolers.

Eurovent Certification is recognized as a global leader in third-party performance certification for the HVACR sector. Eurovent has a collaborative arrangement with CTI to use STD-201 for certification compliance.

EvapTech is celebrating its 20-year anniversary. The field-erected cooling tower subsidiary of EVAPCO offers new and replacement FM-approved crossflow and counterflow, and the Meridian Series modular cooling tower. Key features of

the FRP-framed Meridian are FM approval options, a pressurized water distribution system, custom fill, high-efficiency drift eliminators (<0.0005%) and maintenance and accessibility options. Its nominal tonnage per

cell is rated from 1,427 tons up to 3,597 across the model range.

Mike Partington, Manager – Engineering Parts, SPX Cooling Tech, presented *Sound*

Directivity Index and Influence on Sound Power Calculation.

Joseph Evans presented *Adiabatic Pre-Cooling Fundamentals and Research*, where he offered research comparing once-through media-cooled adiabatic coolers, recirculating media-cooled adiabatic coolers and once-through spray-cooled systems. Topics included hot water delivery rates' effect on thermal capacity, scale and adiabatic pad life and an overview on saturation efficiency – a ratio of air temperature drop across media.



Guilherme Marangoni de Castro of WEG

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Exam Schedule (limited spots available):

- Tuesday, October 21** 2:00PM
- Wednesday, October 22** 2:00PM
- Thursday, October 23** 8:30AM & 10:30AM

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Component Suppliers

Brentwood Industries is celebrating its 60-year anniversary. Its team also presented technical papers – *Creating an Industry-Wide Fill Performance Test Standard: The Time Has Come* by Dylen Ziegler, Application Engineering Manager, Cooling Tower, and *Parameter Study of Mechanically Loaded Bottom-Supported Cooling Tower Fill Packs* by Angela Zaorski, Lab Supervisor.

Galebreaker Industrial discussed its windscreen solutions for cooling towers and air-cooled condensers (ACCs). ACCs are an increasingly popular cooling system in power plants that use air to condense turbine exhaust steam, reducing the need for water. Developing a CTI test code for ACCs is also being revisited, according to Scott Nevins, Director, HVAC Product Development, EVAPCO.

Robert Ballantyne, RWI Enhanced Evaporation, presented *Floating Cooling Tower Auxiliary Heat Rejection*. RWI manufactures the Hydracool floating cooling tower, which can be installed floating in ponds at industrial sites.

Sumitomo Drive Technologies displayed the Hansen M5CT vertical right angle 2-stage industrial gearbox series (7 sizes 13-53 kNm). Hansen and Sumitomo merged in 2011. The M5CT is a combination of the best of Sumitomo and Hansen. For example, the gearbox is designed with Sumitomo's splash lubrication system and the legacy Hansen cooling fin design.

TOYOMO Advanced Materials, and its partner Benton International completed the process for CTI FRP Material Certification including flame spread rating in accordance with requirements of CTI Standard STD-13. They're the first to receive this recognition. "We're testing for the rate of flame spread, smoke density and toxicity levels. We're also testing physical failure limits, and we've passed all parameters," said Peter Turnbull, Business Development Director, TOYOMO Advanced Materials.

WEG discussed the W23+ Sync synchronous electric motor line meeting ultra-premium (IE5) and higher efficiency levels, cutting losses by more than 40% compared to the IE3 efficiency.

CTI is calling for new and young faces to get involved to ensure another 75 years of fulfilling its mission.

"My vision is to begin the training and transition from the old guard to the new. The education and relationships you can build at CTI are priceless," said Baker.

"Coming from an active board member, I'd like to extend a personal invitation to young process and utility engineers to attend. The unbiased training from the technical papers, and the networking is very valuable," said Ian Horne, Senior Water Technology Specialist, Air Liquide.

The CTI 2026 Annual Conference and Expo will take place Feb. 8-12, 2026, at the Westin Galleria in Houston, TX. [BP](#)

For more information about the Cooling Technology Institute, visit www.cti.org.

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BETTER PLANTS  INSIGHTS

Understanding the Better Plants Program

By Alex Botts, Research Associate, Oak Ridge National Laboratory



Energy managers, maintenance managers and plant engineers attended a Better Plants Energy Bootcamp at Oak Ridge National Laboratory.

► You may have heard about the U.S. Department of Energy's Better Plants program through articles in this magazine, but have you wondered what the program is and what it offers U.S. manufacturers? If so, I hope this column helps or at least intrigues you enough to learn more.

What Is the Better Plants Program?

Better Plants is a Department of Energy-funded companion to the Better Buildings program tailored for the unique challenges of the industrial sector. The Better Plants program is a public-private partnership aiming to help leading manufacturers boost efficiency, increase resilience and strengthen economic competitiveness. As of 2024, the program includes over 300 unique partners representing more than 3,700 facilities across the U.S. The program has partners from almost every manufacturing sector, including automotive, chemical, steel and food and beverage. In total, partners account for over 14% of the U.S. manufacturing energy footprint.

How Better Plants Works

The program is voluntary and available to any manufacturer or wastewater treatment facility in the U.S. The program works with partners (companies) to establish long-term energy, water or waste goals. The base commitment is to reduce energy intensity by 25% over a 10-year period across all U.S. manufacturing operations. Partners are expected to meet regularly and report energy data annually. In return, partners receive tailored support in the form of recognition, access to innovation, workforce development and technical assistance.

Key Benefits to Better Plants

1. Recognition

Goal Achievement: As partners reach their program goals, they are recognized for their accomplishments, typically at the program's annual summit and in the progress report.

Awards: Once a year, partners can submit projects and practices that have been implemented during the previous year. The top applications receive awards.



Participants at a Better Plants Energy Bootcamp learned to identify leaks in compressed air systems.

Solution Center: This website (<https://betterbuildingsolutioncenter.energy.gov/better-plants/solutions>) is a one-stop shop for all things Better Plants, including webinars, case studies, past presentations, program announcements and upcoming events. Case studies come from partners to provide recognition of their sustainability efforts.

2. Access to Innovation

Technology Days: This annual event allows industrial energy and R&D professionals to explore cutting-edge technologies while connecting with experts from national laboratories.

Industrial Technology Validation

Program: This program assesses the performance of emerging industrial technologies in industrial settings and shares results through publicly available measurement and verification reports.

3. Workforce Development

Bootcamps: Intensive three-and-a-half-day workshops held at Oak Ridge National Laboratory are open to partners and non-partners. Bootcamps offer relevant material for those new to industrial energy efficiency and seasoned professionals seeking to refresh their knowledge.

In-Plant Trainings: Partners apply to host trainings at their site. These are typically a two-and-a-half-day deep dive into a system with extensive prior data collection. The program offers in-plant training for most industrial systems including energy treasure

hunts, compressed air systems, steam systems, process heating systems, 50001 Ready and water efficiency.

Virtual Trainings: Sessions are held once a week for four to eight weeks depending on the topic. Participants are given homework based on their home facility, leaving with actionable items to improve their systems.

4. Technical Assistance

Technical Assistance is Better Plant's bread and butter. This is why partners join the program and stay for the long-haul. The program's technical assistance evolves based on the partner's needs.

Financing Navigator: This decision-tree tool helps partners choose the best financing opportunities for their sites.

Diagnostic Equipment Tool Loan Program:

The program offers an extensive lending library at no-cost. Partners are guided on equipment selection and application to gather data.

Guidance Documents: Focused documents designed to help partners on their sustainability journeys.

Free Software: Tools include MEASUR for energy assessments and VERIFI for utility bill tracking and regression analysis.

Overwhelmed by all the opportunities and don't know where to start? Don't worry, Better Plants has a resource to help with that too. When a partner joins the program, they are assigned a Technical Account Manager (TAM). A TAM is the connection between the partner and the resources available. Partners get regular meetings guiding them to resources and providing an external perspective on their sustainability programs. Partners also receive help submitting data to the program. TAMs are well-versed in manufacturing systems. For many partners, a TAM is the most valuable resource.



A portion of the Diagnostic Equipment Loan Program's inventory for partners to view.

Think the Better Plants program sounds too good to be true? Consider it the best-kept secret for U.S. manufacturers – although we wish everyone knew about it! The program offers a wide array of resources, many of which are also

available to the general public. This column barely scratches the surface. Stay tuned for upcoming columns highlighting success stories and explaining how your company can take advantage of these resources. In the meantime, visit <https://betterbuildingsolutioncenter.energy.gov> to learn more or get started. **BP**

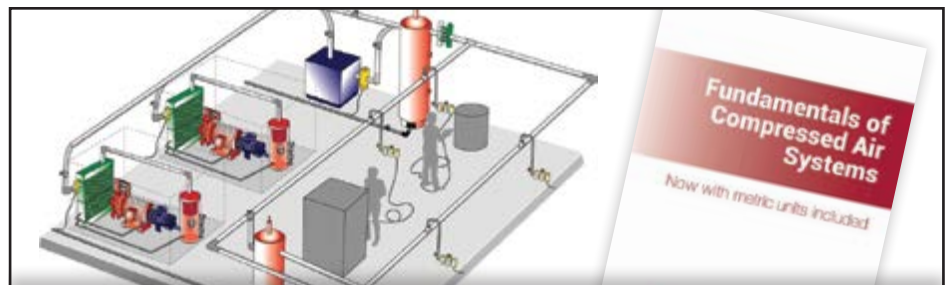
About the Author

Alex Botts is a Research Associate at Oak Ridge National Laboratory, serving as a Technical Account Manager for the DOE's Better Plants Program. She supports industry partners with data analysis, Energy Treasure Hunts and software, guiding them to achieve energy savings and developing training programs.

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Real-World Installations & Maintenance

Edited by Troy Dreier, Senior Editor, Compressed Air Best Practices® Magazine

There's much we can learn from real-world compressed air, blower, vacuum, chiller and cooling tower installations. This column asks readers to share lessons learned from system installations and maintenance practices they encounter in the real world.

Pressure Swings Cause an Explosion

Ron Marshall is Chief Auditor for Marshall Compressed Air Consulting in Winnipeg, Manitoba, and Training and Social Media Coordinator for Compressed Air Challenge. Visit <https://www.compressedairaudit.com> and <https://www.compressedairchallenge.org>.

Loud noises coming from the air compressor area in this Canadian metal foundry were the first signs its air compressors had poor pressure control. The storage receiver pressure relief valve frequently opened, causing the noises. One night, the flexible connection on the output of one air compressor failed dramatically, sending metal fragments raining across the production floor. Luckily, no one was hurt.

The solution here was improving the air compressors' pressure control so they don't produce significant swings in pressure.



Poor air compressor pressure control caused this flexible connector to fail.



Keep Safety Valves in Good Working Order

Paul Edwards, President, Compressed Air Consultants, has over 40 years of experience in the compressed air industry. He's based in Charlotte, NC. Visit <https://www.loweraircost.com>.

Edwards discovered this plugged safety valve while auditing the compressed air system of a cement plant. It's likely this dry tank's safety valve was leaking, and someone chose to plug it rather than fix the problem. Plugging it, of course, defeats the purpose of the safety valve.

Plugging this dry tank's safety valve was a poor way to stop a leak.

Submission Guidelines

We invite subscribers to share stories and photos of remarkable system installations they've come across. Email Troy Dreier at troy@airbestpractices.com. Please send a high-resolution image as a JPG or GIF file and a note describing the installation. If we publish your submission, we'll thank you with a \$25 Amazon gift card.



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Unipipe	17	https://www.unipipesolutions.com	Compressed Air and Gas Institute	45	https://www.cagi.org/performance-verification
Bauer	19	https://www.bauercomp.com	Compressed Air Challenge	47	https://www.compressedairchallenge.org
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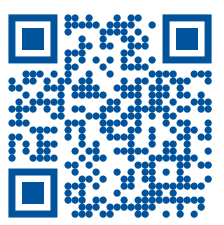
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