HVAC Refrigerant Regulations

Preparing for the Industry's Upcoming Changes
December 2021

COPELAND
Engineered for Sustainability

Table of Contents

Chapter 1

Refrigerant Changes Coming to HVAC

Chapter 2

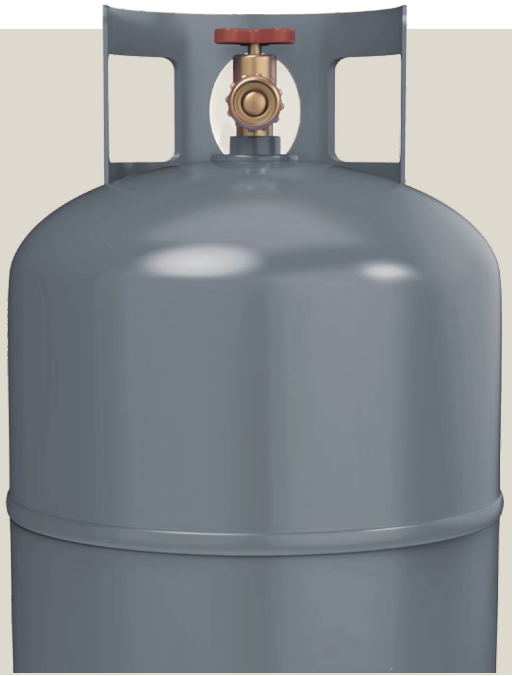
Policy and Regulatory Drivers

Chapter 3

Refrigerant Transition Implications

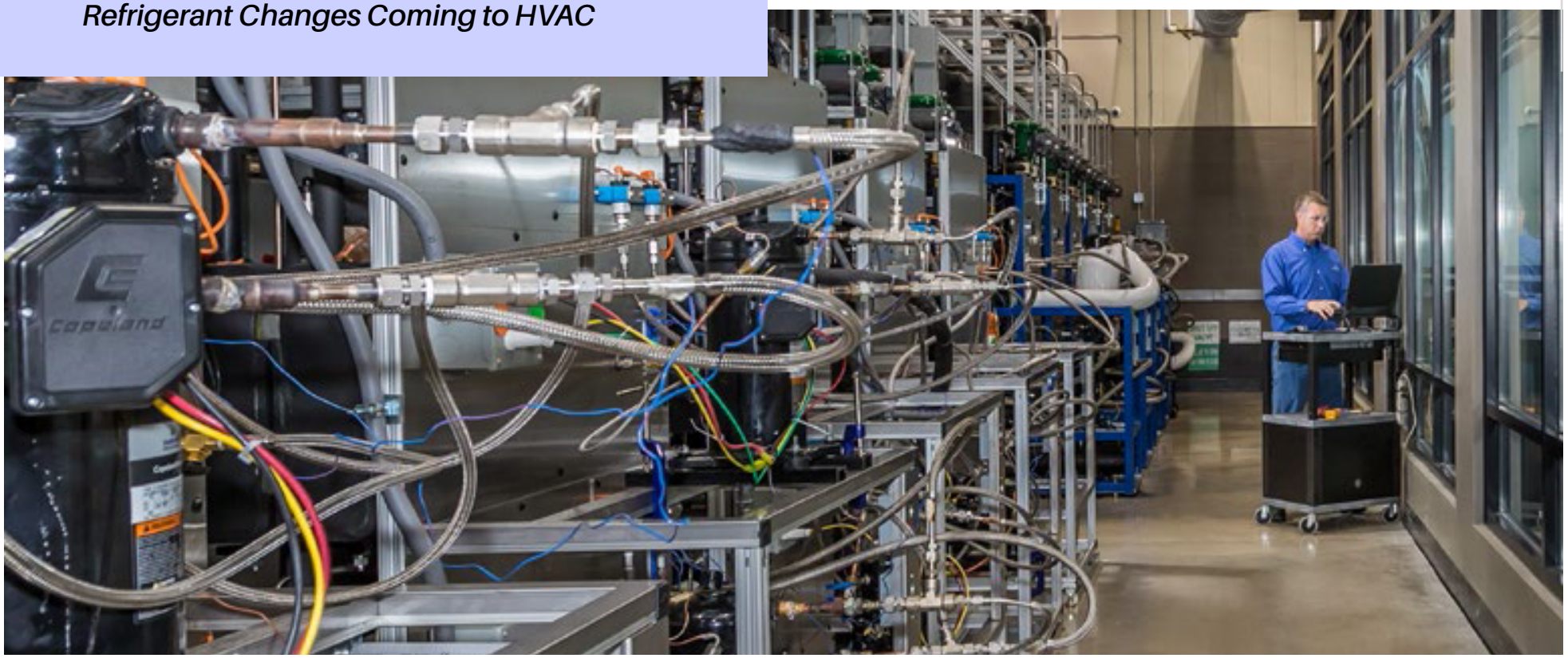
Chapter 4

Copeland Helping Prepare the HVAC Industry



Chapter 1

Refrigerant Changes Coming to HVAC



Refrigerant Changes Coming to HVAC

Changes in refrigerant regulations continue to require equipment redesigns and new solutions for the HVAC industry. Often, changes to government regulations are not without their complexities, difficulties and challenges. However, being prepared for the changes and understanding the impact they will have will allow contractors to identify and take advantage of the opportunities as they present themselves.

This eBook is designed to help drive clarity and preparation around the upcoming refrigerant changes. It gives industry professionals, including contractors, the information they need to understand the changes, identify opportunities, and have a conversation with customers and partners about what this means for their HVAC system and equipment. It contains the most current information available up to the date of its release.

So what are the upcoming changes?

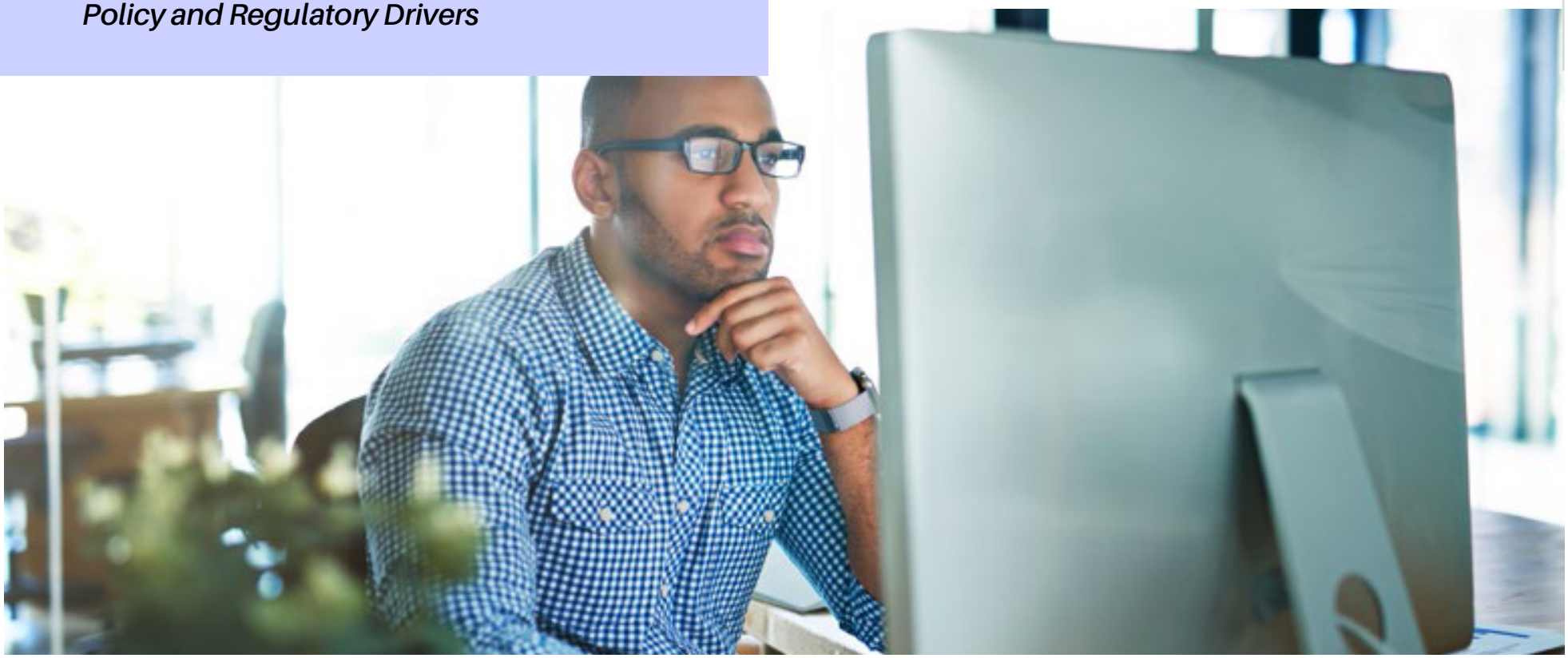
In recent times, refrigerant transitions have been driven by environmental concerns. In 2010, the focus was on the phaseout of ozone-depleting substances that were responsible for the thinning of the Earth's protective ozone layer. This next refrigerant change is focused on moving to refrigerants with lower Global Warming Potential (GWP) to minimize the effects on the Earth's warming.

At the heart of this issue is the subject of carbon emissions from hydrofluorocarbon (HFC) refrigerants and their potential contribution to climate change. As global, national and state regulations have targeted the phasedown of HFCs in recent years, the industry has seen a shift toward alternative refrigerants with lower-GWP. In some cases, these more environmentally friendly refrigerants require system changes to ensure maintaining performance and compliance with new safety standards, as some newer, lowest-GWP alternatives bear a degree of flammability and others may require higher system pressures to be maintained.

In the remaining chapters of the eBook, we will dive a little deeper into the new refrigerants and their characteristics and explain what they mean for OEMs, contractors and end users, as well as provide information on what you should be doing to prepare.

Chapter 2

Policy and Regulatory Drivers

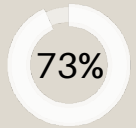


Regulation is routine in the HVAC industry, both in terms of energy efficiency and refrigerants, and this is not the first time the industry has gone through a round of refrigerant regulations, de-listings and adoptions. However, the amount and timing of the changes, combined with the high level of uncertainty surrounding the transition, is making this regulatory cycle more complex than previous ones. Additionally, this cycle is poised to have a significant impact on the types of refrigerants currently used in residential and commercial HVAC equipment.

A recent Copeland survey of contractors and wholesalers found that only seven percent of respondents said they currently have an extensive understanding of upcoming regulations and the requirements for their businesses.

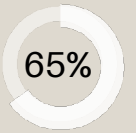
There are currently proposed regulations at both the state and federal level. Copeland's experience with the 2010 phaseout of ozone-depleting substances provides a great foundation to support this next round of changes. In the next chapter, we will look at the refrigerant regulatory framework in the U.S., as well as the most recent regulatory proposals.

How prepared are contractors and wholesalers?



say it will affect their company's daily operations

have not taken action yet to prepare



are concerned about creating new inventory plans

Source: Regulations Readiness Survey, December 2019

Policy and Regulatory Drivers

California was the first state to act with legislation directing the California Air Resources Board (CARB) to reduce HFC emissions by 40 percent by 2030. CARB is the regulatory agency tasked with implementing regulatory requirements to meet this objective, resulting in two major pieces of regulation: Significant New Alternative Policy (SNAP) Rules 20 and 21, which required full adoption as they read on January 3, 2017, with communication that an additional HFC regulation impacting HVAC was forthcoming. SNAP Rule 20 was focused primarily on commercial refrigeration end uses. SNAP Rule 21 was the first attempt to phase down HFCs in air conditioning, as it listed R410A and R134a unacceptable for use in positive displacement chillers as of Jan 1, 2024.

On December 10, 2020, the CARB board approved an aggressive second phase of rulemaking impacting air conditioning applications. The CARB proposal targets a 750-GWP limit across multiple applications for new equipment in the coming years:

2023 – Room AC and Dehumidifiers

2024 – AC Chillers (Consistent with SNAP Rule 21)

2025 – Residential and Commercial AC

2026 – Variable Refrigerant Flow (VRF) Systems

CARB also introduced the Refrigerant Recycle, Recovery and Reuse (R4) program, which proposes requiring the use of reclaimed refrigerant in new stationary air conditioning equipment and VRF systems.

Another player at the state level is the U.S. Climate Alliance. Formed in 2017 with a shared commitment to reducing greenhouse gas emissions, its membership now includes 24 states and Puerto Rico, which accounts for 55 percent of the U.S. population, an $11.7 trillion economy*. Following California's lead, 11 additional states have now adopted SNAP Rules 20 and 21 into state law.

*www.usclimatealliance.org/publications/2019/7/1/montana-governor-steve-bullock-becomes-25th-governor-to-join-us-climate-alliance

COPELAND
Engineered for Sustainability

Federal framework – AIM act

In December, with HFC requirements already in place in several states, Congress passed the American Innovation and Manufacturing Act, or the AIM Act of 2020, paving the way for a safe and effi cient transition to lower-GWP refrigerants. The legislation phases down the production and consumption of HFCs over a 15-year period, limiting the supply of new HFC refrigerants and creating more value for reclaimed refrigerant. It also authorizes the Environmental Protection Agency (EPA) to establish sector-based GWP limits and standards for the management of HFCs used in service, including the recovery of "used" HFCs.

The legislation phases down the production and consumption of HFCs over a 15-year period through the use of an allowance allocation program.

The AIM Act makes possible a federal phasedown of HFCs, which provides certainty and consistency with the federal approach. However, as we'll explore in the next chapter, the characteristics of these new fluids require updated safety standards.

Timing: Several petitions have been fi led relative to GWP limits for residential and light commercial air conditioning and heat pumps as well as comfort chillers. These petitions largely align with the 750 GWP limits and timing proposed by the California HFC rulemaking discussed in the previous section.

Characteristics of Lower-GWP Refrigerant Substitutes

Refrigerants are classified by ASHRAE 34 in terms of toxicity and flammability. R-22 and R-410A are both categorized as A1 refrigerants, or lower toxicity/no flame propagation. Many of these new lower GWP fluids, however, are classified as A2L or lower toxicity/mildly flammable. Safety standards for equipment Underwriters Laboratories [UL] (UL 60335-2-40) and application

(ASHRAE 15) have been updated to include mitigations to allow for the safe use of A2L refrigerants, but state and local building codes today only allow for A1 refrigerants to be used in many cases. The timing of these building code updates could take years, as many code cycles operate on a three or more year schedule. The American Heating and Refrigeration Institute (AHRI) and its members are joining forces with other influencers to educate states and localities on the need to update building codes or risk not having the ability to transition according to the timeline specified.

Refrigerant safety group classification

Increasing flammability

Higher flammability	A3	B3
Lower flammability	A2	B2
	A2L	B2L
No flame propagation	A1	B1
	Lower toxicity	Higher toxicity

Increasing toxicity

EPA-Approved Refrigerant Substitutes – SNAP Rule 23

As HFC refrigerants like R-410A and R-134a have been deemed unacceptable for long term continued use, there has been an aggressive search for viable lower-GWP refrigerants that could be used in residential and commercial air conditioning and comfort chiller applications.

In May 2021, the EPA published SNAP Rule 23, which lists several mildly flammable A2L refrigerants as acceptable, subject to use conditions, in new residential and light commercial air conditioners and heat pumps. This includes R-32, R-454B, R-452B, R-454A, R-454C and R-457A.

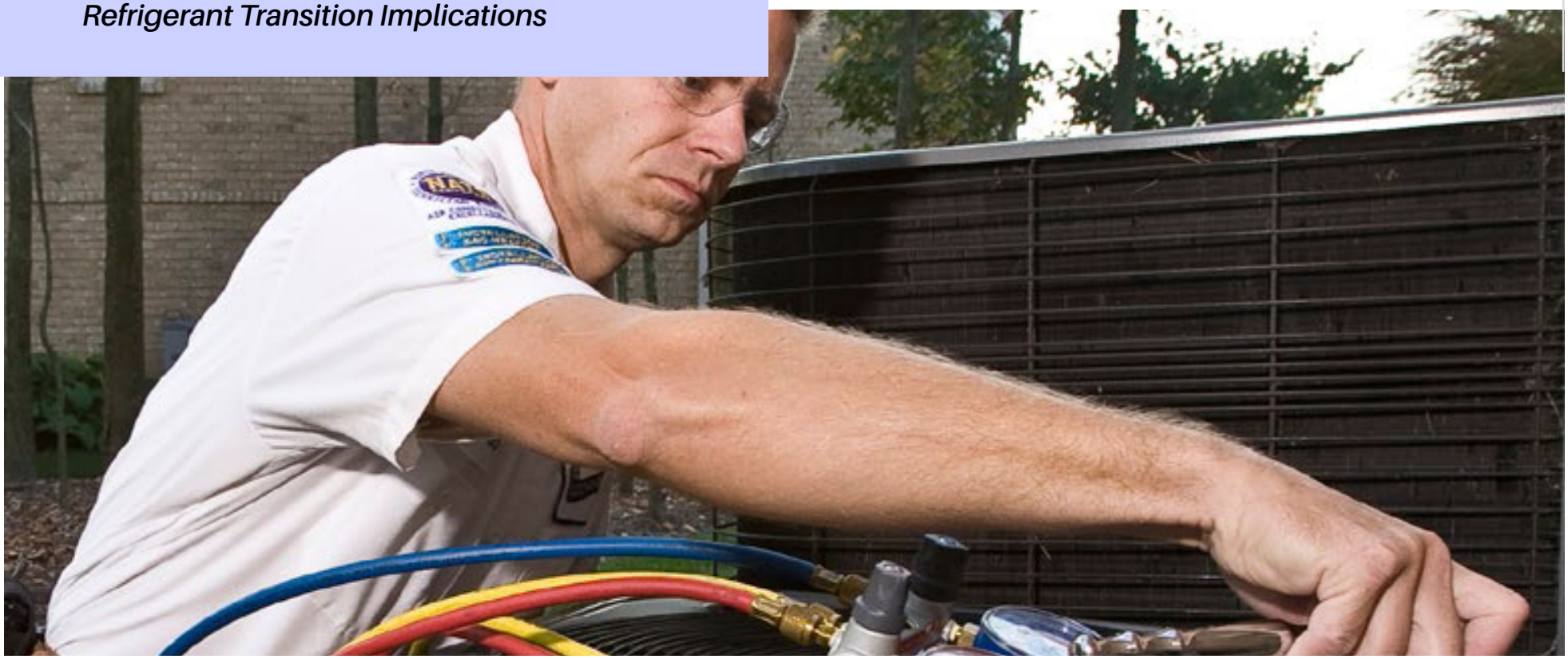
Safe Handling of A2Ls

Given that the industry is moving toward the use of mildly flammable A2L refrigerants with updated safety standards, it is important that training programs be evaluated and updated as appropriate. While these refrigerants are not as flammable as propane, precautions still need to be taken to minimize risk as they are transitioned into use.

There has been a concerted effort underway by technical committees and governing bodies to provide guidelines on how to safely use these refrigerants. AHRI's Safe Refrigerant Transition Task Force was formed in 2019 to evaluate and address gaps across the entire supply chain during the transition to low-GWP refrigerants. The task force is made up of AHRI members and stakeholders employed with contractors, government agencies, the fire service, unions, training organizations and other businesses. Many resources have now been developed to educate stakeholders on the safe handling of A2Ls, including webinars, blogs, and training specific to helping HVAC professionals on best practices and safe handling of A2Ls.

Chapter 3

Refrigerant Transition Implications



OEMs

For OEMs, it means redesigning units for new refrigerants, including the safety mitigations and without significantly impacting the weight, size and cost of the equipment, while maintaining the necessary efficiencies. OEMs are also updating product materials, websites and marketing to help educate the channel on the coming changes.

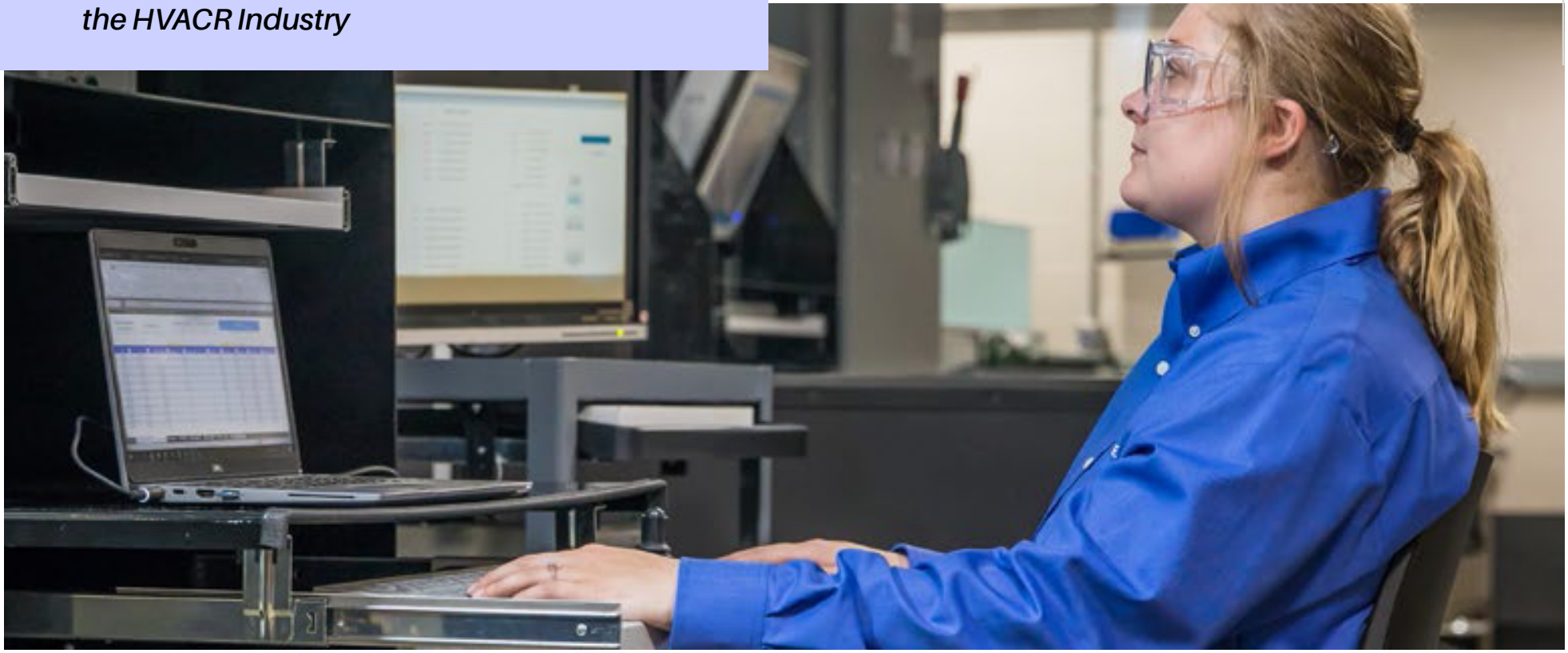
Distribution

For distributors, contractors, technicians and others down channel, education is important. First and foremost, it is important to understand the equipment changes and safety mitigations that are required for systems using A2L refrigerants and how they might impact installation and service. Copeland, system manufacturers and Air Conditioning Contractors of America (ACCA) can be great sources for this information.

Equally important is the role contractors can play in educating residential and commercial end users of the changes. For many end users, the only things they may notice are that equipment costs might change or installation may take longer or require additional steps. Contractors should explain the necessary A2L mitigations and safety features of the equipment, how to monitor that the system is operating properly and what to do in the event of a leak.

Chapter 4

Copeland Helping Prepare the HVACR Industry



Copeland Helping Prepare the HVACR Industry

Product innovation

Copeland is launching its next generation A2L platform. These compressors are optimized for lower-GWP fluids, delivering the highest efficiency to help our customers meet the new energy standards. Most importantly, Copeland is working closely with industry experts, partners and equipment manufacturers to help ensure the transitions are as seamless as possible and that viable refrigerant options are supported and understood. The hope is that this process will better position the industry and each individual end user to reduce carbon footprints and minimize the impact of climate change through responsible energy use.

Educational support

We are proactively educating and informing HVACR professionals on the impending changes. We encourage HVACR professionals to visit our E360 blog for the latest insight on the transition from our experts, and AC & Heating Connect for additional information, including podcasts and technical tips.

Copeland scroll compressor technology

Recognized for its energy efficiency and reliability, scroll compressor technology has helped shape the HVACR industry and drive greater comfort and efficiency. Since scroll technology's broad commercialization more than 30 years ago, the technology has driven many of the industry's efficiency gains and more than 190 million scroll compressors have been installed worldwide.

Copeland scroll compressor technology has been instrumental in helping the industry confront and overcome a number of challenges, including the previous moves to a 10 Seasonal Energy Efficiency Rating (SEER) standard and a 13 SEER minimum, as well as the phaseout of R-22 refrigerants. Scroll technology has evolved through the years as market dynamics and regulations have evolved. Modulation technologies such as two-stage, tandem, variable speed and digital have delivered comfort and efficiency beyond base tier products.

Copeland continues to innovate and invest in scroll technology to meet future regulatory dynamics. Copeland's commitment to supporting the industry includes not only the advancement of scroll technology, but also investments in our labs and extensive North American supply base that allow us to adjust production capacity and support business continuity.

COPELAND
Engineered for Sustainability

The Helix Innovation Center

Copeland is committed to realizing and accelerating the next generation of innovation to help solve some of the world's biggest HVACR challenges. The centerpiece of this commitment is The Helix Innovation Center, which is fueling new kinds of research, collaboration and conversations that are playing a pivotal role in preparing the industry for the coming energy and refrigeration changes.

Within the 40,000-square-foot, $35 million research and education facility is a working commercial kitchen, grocery store and a fully functional, two-story, 2,000-square-foot residential home that features Copeland's comprehensive suite of residential solutions.

The Helix offers research teams an opportunity to do rapid prototyping and use practical applications to develop and test their innovations for enhancing residential and commercial building controls, efficiency and comfort. This hub of technology and innovation also allows Copeland to demonstrate its differentiated approach to the advancement of sustainable solutions and help execute Copeland's sustainability framework aimed at decarbonizing energy sources, improving energy efficiency and reducing waste, managing and controlling emissions, and electrifying supply and end use.

Located on the campus of the University of Dayton, the center is an industry-first, $35 million hub dedicated to advancing research and education for the global HVACR industry. Since opening in 2016, The Helix has become a place where Copeland collaborates with customers, HVACR industry partners and industry educators, as well as experts from other industries who can bring new perspectives to specific challenges.

Sidney Innovation Lab

The Helix is not the only place we are doing advanced research and development. As part of the recent $100 million renovation of Copeland's Sidney, Ohio, campus, we created 110,000 square feet of innovative development lab space collectively known as the Sidney Innovation Lab.

$100 million renovation

110,000 square feet of lab space

60 individual testing rooms

The cutting-edge lab is focused on product research, development and testing of the next generation of compressors, refrigerants, electronics, controls and other critical technologies for the global HVACR industry. It is designed to accelerate product development, collaborate with OEM partners and end-user customers, and help deliver simplified lower-GWP solutions.

Much of the research and work being done in the new facility, which features 76 compressor test rooms, is focused on testing designs and products that are capable of reaching the higher efficiencies required by government regulations and ensuring that these products perform effectively and safely with the more sustainable, alternative refrigerants becoming available.