R32

WHITE PAPER

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The Refrigerant Transition: How Did We Get Here and Where Are We Going?

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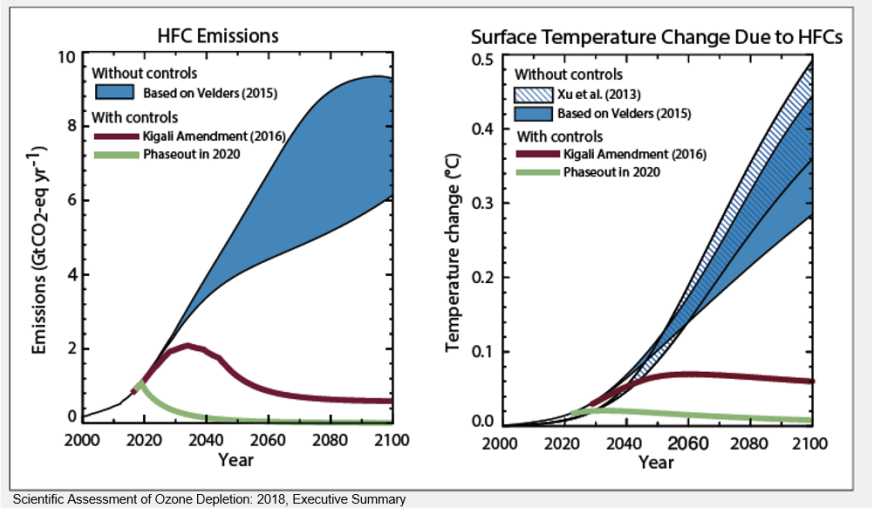
Nope, Earth isn't cooling. Carbon dioxide levels in the atmosphere have been rising steadily since the Industrial Age, contributing to global warming. Independent research shows HVAC's role in this equation: Stationary air conditioning contributes nearly 20% of electrical consumption of buildings today, and the use of air conditioning is projected to triple by 2050.[i] If we continue developing the world as is, without controls, temperatures are forecasted to rise up to 0.6°C directly from HFC emissions. The good news, though, is that research shows that making the right refrigerant choices has the potential to limit the temperature rise due to HFC emissions to 0.06°C. That's six one-hundredths of a degree.[ii] And that's why our industry is striving for decarbonization and improved efficiency.

THE RIGHT REFRIGERANT CHOICES CAN HELP LIMIT TEMPERATURE RISE TO 0.06°C



Scientific Assessment of Ozone Depletion: 2018, Executive Summary

Previous policies, such as the Montreal Protocol, were designed to lessen HVAC's impact on the climate. Specifically, the Protocol was adopted globally in 1989 to protect the ozone layer by eliminating the use of ozone-depleting substances over time. High ozone depletion potential (ODP) chlorofluorocarbons (CFCs) were phased out in 1996; and today, the lower ODP hydrochlorofluorocarbon (HCFC) refrigerants are now mostly phased out, with some exceptions.

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In October of 2016, more than 170 countries agreed to amend the Protocol. The Kigali Amendment was created to phase down hydrofluorocarbons (HFCs) by eliminating their consumption and production. Because of their high global warming potential (GWP), common refrigerants like R-134A and R-410A are targeted in this phasedown.

More recently, the AIM Act, passed into law in December 2020, authorized the U.S. Environmental Protection Agency (EPA) to write HFC phase down regulations, including phasing down their production and consumption, maximizing reclamation, minimizing releases from equipment, and facilitating the transition through sector-based restrictions. The EPA published an interim final rule on the technology transition in December 2023, which includes a limit for refrigerants with up to 700 GWP. Federal deadlines for these phase downs, including manufacturing and import, take effect as early as January 1, 2025, for most HVAC equipment and January 1, 2026 for VRF. For HVAC self-contained products, EPA issued a three-year installation/sell-through period. For residential and light commercial field-charged split systems, EPA issued a one-year installation/sell-through period. As of January 2024, EPA has not provided an installation/sell-through period for VRF. Other rules exist for other sectors and subsectors including industrial process cooling, data centers and more. Further, twelve states have already implemented a January 1, 2024 deadline for chillers used in comfort cooling, banning R-410A and R-134a in new systems.

This places our industry in the middle of another transition to the next generation of refrigerants.

At Daikin, we are all working towards Daikin's Environmental Policy to provide safe and healthy air to the world while striving for zero carbon dioxide emissions by 2050. We're working collaboratively with customers, standards and code bodies, industry associations, governments, regulators, and non-governmental organizations to facilitate the transition to lower GWP refrigerants. As the only manufacturer of both HVACR equipment and refrigerants, Daikin is in a unique position to holistically review refrigerant options. Our approach has always been to choose the right refrigerant for each application, based on the balance of safety, environmental impact, energy efficiency and cost-effectiveness.

That's why Daikin has chosen R-32 as the most balanced replacement for R-410A in residential, light commercial, and applied applications. While R-32's lower GWP of 675 is an important component, the GWP alone is *not* the full measure of emissions.

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While R-32's lower GWP of 675 is an important component, the GWP alone is *not* the full measure of emissions. Emissions come from direct sources, like refrigerant leaking into the atmosphere, and indirect sources, including the energy an air-conditioning unit consumes when it's running. Because the majority of climate impact from HVAC comes from the electrical power consumed over equipment lifetime, a *lower* GWP refrigerant with *lower* efficiency could actually create *more* global warming. In fact, the EPA GWP limit of 700 is intended specifically to allow for refrigerants like R-32 that offer benefits not attainable by common blends.

As a single-component refrigerant, R-32 also offers distinct benefits in cost effectiveness, availability, recyclability, and ease of handling that blends can't match. Used since 2012 in over 230 million units in more than 130 countries and regions around the world, it's the proven choice that become the de facto global standard to replace R-410A.

Learn how R-32 provides a better value for the building owner and a better outlook for our planet at R32reasons.com.

[i] International Energy Agency, "The Future of Cooling: Opportunities for Energy Efficient Air Conditioning," 2018.
[ii] National Oceanic and Atmospheric Administration, "Scientific Assessment of Ozone Depletion," 2018.

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