ACR
AT WINROCK INTERNATIONAL

HFC Refrigerants

WHAT IS THE CHALLENGE?

A common substitute for Ozone Depleting Substances (ODS) controlled under the Montreal Protocol, hydrofluorocarbons (HFCs) are greenhouse gasses (GHGs) used in a wide variety of applications, including refrigeration and air-conditioning systems.

> ***By providing financial incentives to manufacturers to rapidly transition to ultra-low GWP refrigerants, carbon credits can prevent a significant number of near-term emissions from HFCs, making an important contribution to climate action.***

HFCs are a major climate concern because of their high global warming potential (GWP). GWP is a measure of how much energy 1 ton of a gas, once emitted into the atmosphere, will absorb radiation over a given period of time, relative to the emissions of 1 ton of carbon dioxide. HFCs, when released into the atmosphere, have 100-year GWPs that can exceed ten thousand. Even small amounts of these super heat-trapping gasses can have a significant warming impact on the atmosphere. Currently, HFCs account for around 1% of global greenhouse gas emissions and as much as 3% in many developed countries. According to the U.S. Environmental Protection Agency (EPA), in 2020, almost half of the **376 million metric tons of GHG emissions** from industrial processes in the US came from ODS substitutes, primarily HFCs. Left unchecked, HFCs could account for up to **nearly 20%** of greenhouse gas emissions worldwide by 2050.

HFCs enter the atmosphere through the production, use and disposal of a multitude of appliances and applications vital to modern life. These include the refrigeration units keeping our food and medicine safe and the air conditioning units we need to keep buildings habitable.

The irony is, as climate change worsens and we experience warmer temperatures, the more we will rely on these kinds of appliances.

WHAT IS THE SOLUTION?

When it comes to refrigeration, refrigerants with much lower GWPs exist – some representing more than a 1,000% reduction from what is currently used in refrigerated appliances. At least ten states including California and Washington have introduced regulations to limit use of high-GWP HFCs.

In September 2021, the EPA established a new rule to reduce the use and production of HFCs by 85% over the next 15 years. While the rule is a welcome and necessary step in preventing further warming, the phase-out timeline still leaves an open window for HFCs to continue to be used and produced in the years ahead when we are facing an urgent need to rapidly accelerate our climate ambition to reach the goals of the Paris Agreement.

HOW DO CARBON MARKETS HELP ADDRESS THIS CHALLENGE?

While regulation will certainly begin a shift to lower-emitting alternatives, on its own, it won't require or spur the rapid transition to ultra-low GWP (i.e., < 15) alternative refrigerants we truly need. Long-lived equipment using HFC refrigerants with high GWP will continue to be produced and used in our grocery stores and homes for well over a decade. So, while the regulations are welcome, we're leaving a lot of climate action on the table in the short term.

The ability to generate carbon credits can incentivize manufacturers to quickly start producing appliances that utilize ultra-low GWP refrigerants, support current producers of these refrigerants, and reduce costs for industries that use this equipment to procure sustainable options long before they would be required to do so by regulation or the natural end-of-life of existing products. The carbon credits can also help lower the cost to transition to low-GWP or even natural refrigerants like ammonia and carbon dioxide. Industry estimates show that complete transition to natural refrigerants can cost existing grocery stores upwards of a million dollars per store.

By providing financial incentives to manufacturers to rapidly transition to ultra-low GWP refrigerants, carbon credits can prevent a significant number of near-term emissions from HFCs, making an important contribution to climate action.

ACR'S METHODOLOGY

ACR has published an update to its Methodology for the Quantification, Monitoring, Reporting and Verification of Greenhouse Gas Emission Reductions from Advanced Refrigeration Systems, Version 2.1.

The intent of this methodology is to incentivize GHG emission reductions through the deployment and use of advanced refrigeration systems in i) large commercial refrigeration such as groceries and supermarkets where centralized, high charge size equipment are used, ii) remote condensing units where condensers are located separately from evaporators to save space in smaller stores, and iii) stand-alone commercial refrigeration that includes self-contained refrigeration equipment that are charged and hermetically sealed at the manufacturing facility.

This methodology allows for the generation of carbon credits by manufacturers of stand-alone refrigeration equipment that use refrigerants with GWPs under 15 --and supermarkets and groceries that install new refrigeration equipment with low-GWP refrigerants or switch to approved refrigerants under the EPA's Significant New Alternatives Policy (SNAP) program in existing refrigeration equipment.

ACR has also published updates to its Methodology for the Quantification, Monitoring, Reporting and Verification of Greenhouse Gas Emission Reductions from Certified Reclaimed HFC Refrigerants, Propellants and Fire Suppressants, Version 2.0. This methodology incentivizes use of certified reclaimed HFCs over virgin HFCs. Use of reclaimed HFCs will prevent all GHG emissions associated with virgin HFCs. According to the EPA, in 2020, only 2% of the HFCs available for use in the US came from reclaimed HFCs. This shows that there is still a significant opportunity for additional climate action by incentivizing the use of reclaimed HFCs.

ADDITIONAL BENEFITS

HFCs are not only high-GWPGHGs, but also short lived climate pollutants. GWP is a relative term that represents absolute GWP of a GHG relative to the absolute GWP of carbon dioxide, which is the reference GHG. GWP is normally estimated for a period of 100 years because it takes 100 years for 70% of the carbon dioxide to disintegrate in the atmosphere. However, in case of

short-lived climate pollutants, like some HFCs, 80% disintegration occurs within 20 years. So, HFCs heat the atmosphere at a much higher rate in the first 20 years, several times higher than their 100-year GWP values. Moving away from use of high-GWP HFCs and using reclaimed HFCs provides additional benefit over GHGs like carbon dioxide by avoiding rapid warming of the planet in the short term.

Switching from HFCs to low-GWP natural refrigerants like ammonia and carbon dioxide that are renewable and naturally available in the environment also provides many additional environmental benefits compared to manufacturing synthetic HFC refrigerants.

Contact ACR

For more information or questions on A/R carbon projects, please contact the ACR forestry team at **ACR@winrock.org**