

Insight: HFC Amendment Agreement to Montreal Protocol

JOHNSON CONTROLS QUESTION & ANSWER

OCTOBER 2016

WHAT WAS DECIDED?

On Saturday, October 15, 2016 in Kigali, Rwanda, an agreement was made by 197 countries to take actions to address greenhouse gas emissions through the phase-down targets of HFC refrigerants in all industry sectors. The final agreement goal is to achieve an 80-85% global reduction in CO₂ equivalence by 2047. The Montreal Protocol amendment agreement will affect all industries that use HFCs (foams, automotive, commercial refrigeration, air conditioning, etc.). The agreement is not a phase out, like the original Montreal Protocol agreement for ozone depleting refrigerants, such as R-11, R-12, R-22, and R-123, that have a set refrigerant production elimination timeline.

WHAT IS THE TIMELINE AND IMPACT OF THE AMENDMENT AGREEMENT?

As seen in the chart, Summary of the Kigali Amendment to the Montreal Protocol: HFC Reduction Schedule, on the next page, the 197 countries are divided into three categories - Developed Nations, Group 1: Developing Nations, and Group 2: Developing Nations that are on a faster track. Each group has identified different base lines, freeze dates, and reduction steps.

2019 is the first step-down date for Developed Nations and the goal is a 10% reduction of the base line. This step-down will be met (or exceeded) based on the already identified and finalized regulations like the U.S. EPA SNAP Final Ruling and European F-gas Regulation. These regulations first phase-down HFC refrigerants for the industries: foam, automotive and commercial refrigeration, which make up a large market and also have very high leakage rates.

WHAT IS THE POSITION OF JOHNSON CONTROLS?

Johnson Controls congratulates the parties to the Montreal Protocol for taking a decisive step to reduce greenhouse gas emissions by 80-85 percent over the next 30+ years. Johnson Controls is committed to helping meet the challenge by providing products that use low global warming potential refrigerant technologies while improving world class efficiency and driving innovation.

WHAT IS JOHNSON CONTROLS DOING NOW?

Johnson Controls has been instrumental in HFC regulation efforts and has been steadily preparing for the eventual transition to low-GWP (global warming potential) refrigerants. In particular, for YORK chillers which already have R-513A offerings. As announced [January 2016](#), all global YORK air-cooled screw and centrifugal chillers are future compatible with R-513A. And [now](#) the first low-GWP chillers have been added to the YORK chiller portfolio.

Work on scroll-based products to replace R-410A is an on-going effort paced by the need to revise existing, or create new equipment safety standards and building codes around flammability. A particular challenge for the HVAC industry is to address the new class of mildly flammable refrigerants. Johnson Controls has vast experience using flammable refrigerants for mostly industrial systems. However, most commercial installations are not prepared for or can afford the special requirements that mildly flammable refrigerants present. While equipment can be designed and optimized for a variety of conditions, the use of flammable refrigerants requires additional effort and investment in equipment room design, construction, and technology-in addition to enhanced reporting requirements, service technician training and safe handling procedures. [This summer](#), Johnson Controls donated to ASHRAE Research to help fund research that supports the development of safety standards regarding the use of mildly flammable, low-GWP refrigerants.

WHAT SHOULD BE DONE NOW?

There is no need to do anything differently today, as there is no impact to existing chillers or chillers purchased today. Although some low-GWP refrigerants are starting to appear in the market, all of these refrigerants have trade-offs, some with concerns around flammability and toxicity, some that negatively impact capacity and/or performance and all that are more expensive. The best approach is to invest in real world energy efficiency to have the greatest reduction on global warming potential. When considering a chiller's total global warming impact, 95% or more of its emissions come indirectly from the production of the energy used to operate the chiller, while only 5% or even less is from the global warming potential of the refrigerant used in the chiller. Selecting a chiller that impacts the 95% indirect effect drastically reduces the chiller impact to the environment. It's best to invest in real world energy efficiency, and even better when the chiller comes standard with the ability to easily convert to a low-GWP alternative in the future.

To learn more about refrigerants, visit www.johnsoncontrols.com/refrigerants



Summary of the Kigali Amendment to the Montreal Protocol: HFC Reduction Schedule							
		A5, Group 1		A5 Group 2		Non-A5	
		"Developing Countries - Faster Track"		"Developing Countries"		"Developed Countries"	
Countries Included		China, African Group, GRULAC (Latin American and Caribbean Group*), Thailand, Malaysia, Indonesia, Cambodia, West Asian Countries (except those in Group 2), Turkey, Pacific Islands, Maldives, Sri Lanka		GCC (Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, United Arab Emirates), India, Iran, Pakistan, Iraq		Andorra, Australia, Azerbaijan, Belarus**, Canada, European Union with its 28 members, Holy See, Iceland, Israel, Japan, Kazakhstan, Liechtenstein, Monaco, New Zealand, Norway, Russian Federation**, San Marino, Switzerland, Tajikistan**, Ukraine, United Kingdom of Great Britain and Northern Ireland, United States of America, Uzbekistan**	
Base Line Definition in CO ₂ Equivalence	Reference Years	Average of 2020-2022		Average of 2024-2026		Average of 2011-2013	
	Formula to Calculate Base Line	Base Line Group 1 = Average HFC Consumption (2020-2022) + 65% HCFC Baseline (2009-2010)		Base Line Group 2 = Average HFC Consumption (2024-2026) + 65% HCFC Baseline (2009-2010)		Base Line Non-A5 = Average HFC Consumption (2011-2013) + 15% Actual HCFC Baseline (2011-2013)	
Freeze Date		2024		2028		None	
Reduction Steps		Year	Total % of Base Line Remaining	Year	Total % of Base Line Remaining	Year	Total % of Base Line Remaining
		2024	100%	2028	100%	2019	90%
		2029	90%	2032	90%	2024	60%
		2035	70%	2037	80%	2029	30%
		2040	50%	2042	70%	2034	20%
	2045	20%	2047	15%	2036	15%	
<p>* https://en.wikipedia.org/wiki/United_Nations_Regional_Groups#Western_European_and_Others_Group_.28WEOG.29</p> <p>** Non-A5 Countries follow a modified reduction for first two steps 2020 (5%) and 2025 (35%), and the base line includes 25% of HCFC base line.</p>							

TABLE 1:

This chart identifies the 3 groups of the Montreal Protocol Amendment agreement, the base line reference years, calculations, freeze dates, and reduction steps.

The average of the HFC consumption during the reference years is used in the calculation to identify the base line value for the reduction objectives. The inclusion of a percent of HCFCs in the base line calculation acknowledges that there is a significant population of installed equipment that will need service quantities into the reduction periods. The freeze dates identify the cap value for HFC consumption. If consumption values increases from the average reference years to the freeze date, the first reduction step might technically be higher to ensure the reduction step objective of x% of the base line.

Questions? Contact BE-Refrigerants@jci.com