



Comments to PFAS survey (#01)

Hello

We as Linde Gas AB (SE) kindly ask you to take note of our input on the earlier survey which we see miss out some important information and facts.

We sell refrigerants for refrigeration use – some containing PFAS/PFAS-mixtures and operate also as downstream user of such. As a supplier of refrigerants, we have information about substances and of course technical information both as refrigerants and also connected to the use in refrigeration.

Main use is in applications such as Heatpump, mobile + stationary AC, supermarket and transport refrigeration. We have over the last years seen a drop in use of high GWP gases moving into low GWP gases and also of course natural refrigerants such as R744 and R290. The technical part in refrigeration is under development and more applications can use low or ultralow GWP alternatives. The challenge for many of our customers can be the technology and cost to change from old alternatives to new and modern ones. Many of the newer technics requires a full change of equipment and with that comes cost and the downside with scrapping good running equipment (for sure a negative environmental effect).

Refrigerants and Refrigeration in Europe either goes under local strong regulation (often cope-paste on EU 517/2014) or under the EU F-Gas regulation EU 517/2014. From it we have clear statements when and what to do in order to reduce Co2-negative effect and plan for a better alternative for coming future – examples can be for auto-AC with max 150 in GWP or supermarkets moving away from GWP above 2500 into less or soon below 150 in GWP. Beside we have regulation covering leak-test, how to handle waste refrigerants and how the build away risky equipment.



During 2015 to approx. 2018/2019 the GWP drop moved step by step in a safe way. From 2018/2019 and on we have seen big GWP-drops in many applications and the will to move forward looks strong.

With the knowledge and available equipment a change can be done in different steps. Major steps like going from old high-GWP refrigerants directly into for example R744/R290 is not feasible due to pressure or flammability – new equipment must be installed. In such example it must be better to change to a refrigerant with lower GWP and let the owner plan, save money, and adopt to modern alternative in due time.

As Linde we inform about and launch new modern alternatives on a regular basis – inform customer about new options => all in a good manor to improve use of low/ultralow GWP alternatives with the benefit of less Co2e. For some markets we also move the information and knowledge via our customer to end-users/equipment-owners in order to improve the situation and support the introduction of new modern technical solution when possible.

With EU 517/2014 we have nice and good support with:

- Cap & phasedown => less GWP on the market reduces Co2-emissions
- Service & equipment bans provides clear steps to be taken to make it more in line with expectations and drive to get down in GWP
- Equipment bans like appendix III part 11, 13 and 15 as examples give a strong clear change coming to GWP/Co2

If you need more or other information, please take contact.

Best regards

A handwritten signature in blue ink, appearing to read "Niclas Andersson".

Niclas Andersson

██████████, ██████████@linde.com

Linde Gas AB, Sverige/Sweden

Växjö 2021.09.01