

Briefing paper: HFC availability on the EU market

1 Background

In order to keep track of the functioning of the HFC phase-down mechanism, the EU Commission (DG CLIMA) has been monitoring and analysing the EU refrigerant market, including price developments of HFCs and their alternatives as well as the effects of the quota system and the progress of the phase-down via external consultants since 2015. Based on these data, this briefing paper is intended to provide background on HFC availability since 2015 to the participants of the fourth meeting of the Consultation Forum, pursuant to Article 23 of Regulation (EU) No 517/2014 on F-gases (“F-gas Regulation”).

2 Price development and availability

2.1 Commonly used refrigerants with high global warming potential (GWP)

The price of conventional HFCs (blends) on the EU market has been strongly affected by the phase-down measure. In the first two years of the implementation of the F-gas Regulation (2015 and 2016), there was no perceptible impact on the prices of commonly used high GWP HFC refrigerants. However, from mid-2017 onwards prices for R404A, R410A, R134a as well as R407C rose significantly until reaching a peak in early 2018 of 6 to 13 times higher than the original price (see Figure 1). By design of the HFC phase-down, price increases for high GWP HFC were expected, due to the scarcity created by the quota system, and were intended to stimulate the use of more climate-friendly alternatives. In line with theory, the observed price increases roughly mirrored the climate-warming effects of the different refrigerants with higher prices for the stronger greenhouse gases.¹ The data collected also shows that price increases were passed on from the upper to the lower levels in the refrigerant supply chain (example for R134a shown in Figure 2).² Even though the observed price increases appear to be very high, they never reached the 50 €/t CO₂e limit that was regarded as proportionate in the impact assessment for the F-gas Regulation,³ at any level in the supply chain.

Many companies seemed to have been surprised by the rapid price increases and indicated limited availability of some of these highly GWP HFC refrigerants on the market in the second half of 2017. At the time, concerns were expressed by some stakeholders in view of the upcoming steep HFC phase-down step in 2018.⁴ During 2018, however, prices started to fall. These price reductions have continued until today (end 2019). Still, purchase prices at the lower levels of the refrigerant supply chain (i.e. original equipment manufacturers (OEMs) and service companies) today remain 4 to 6 times higher than those observed in 2015, while world market prices have remained rather stable in the same period.⁵ Only few companies have reported a limited availability of HFC refrigerants over the last two years. In those cases, the companies

¹ See GWP for these gases in legend of Figure 1.

² Increases are shown as relative increases, i.e. in percent. Price increases were handed down in absolute terms, which results in lower *relative* increases at the service company level (as gas prices are higher at this level).

³ See IA: https://ec.europa.eu/clima/sites/clima/files/f-gas/legislation/docs/swd_2012_364_en.pdf.

⁴ E.g. some industrial stakeholders expressed concerns about the unavailability of some HFCs at the F-gas Consultation Forum on 6 March 2018 (https://ec.europa.eu/clima/events/articles/0106_en).

⁵ Current world market prices are comparable with the EU price level before the F-gas Regulation entered into force.

indicated that they could either not obtain the refrigerant from their current supplier or that they had to wait a certain time until they could obtain the refrigerant quantity they requested. On the basis of these indications, it is clear that they were not in a situation where these refrigerants would not be available at all. According to the latest feedback received from participating companies and market experts, almost no problems as regards the availability of HFC refrigerants occurred in 2019.

For early 2020, some companies expect the price level for HFC refrigerants to stabilise at a low level. On the other hand, the lower phase-down step in 2021 may lead to renewed increases in gas prices, in particular for high GWP gases.

Figure 1: Average purchase prices of the most commonly used HFC refrigerants at service company level (price index, 2014 = 100 % (baseline))⁶

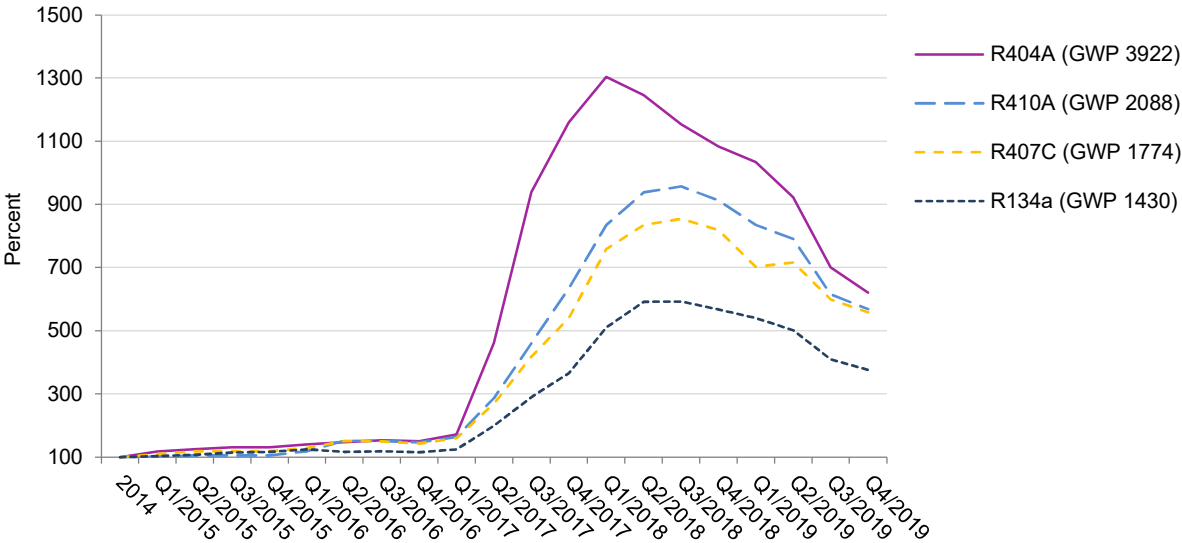
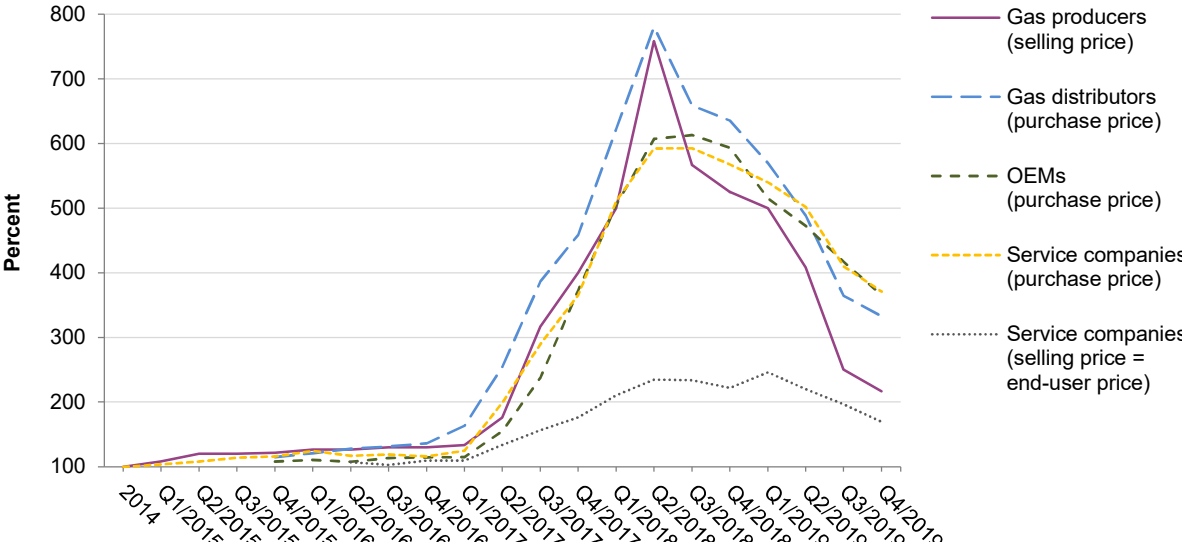


Figure 2: Development of average prices of R134a (GWP 1430) along the supply chain (price index, 2014 = 100% (baseline))⁷



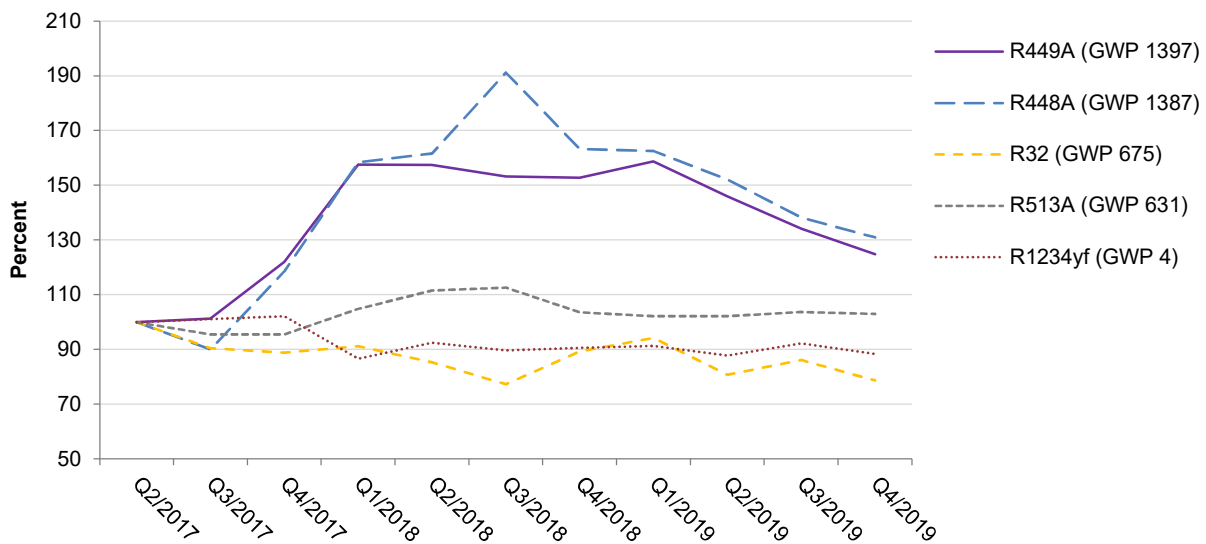
⁶ Data as reported by 28 service companies from DE, EE, ES, FR, IT, PL and PO, with main input from DE and FR.
⁷ Volunteered information from 70 to 80 companies covering AT, BE, CZ, DK, EE, FR, DE, IE, IT, PL, PO, ES, UK, with most data from DE, FR and IT. Companies include 3 gas producers, 10 gas distributors, 25 to 30 OEMs, 30 to 35 service companies, and 5 end-users (numbers for 2019 data).

2.2 Alternatives to refrigerants with high GWP

Since mid-2017, alternatives to the conventional high GWP HFC refrigerants have been increasingly used. The most prominent example was the replacement of R404A in commercial refrigeration, especially after major gas producers significantly reduced or even ceased their supply of R404A in 2017 and 2018. The most common alternatives used were R448A/R449A (blends of HFCs and unsaturated HFCs (HFOs)) as refrigerants for retrofitting existing systems, as well as very low GWP alternatives for new systems (e.g. CO₂ (R744), ammonia (R717), and propane (R290) technologies). From 2020 onwards, R404A cannot be used anymore in new refrigeration systems⁸ and for servicing existing larger refrigeration systems (reclaimed and recycled R404A is allowed under specific conditions to be used until 2030)⁹, which is reducing the EU market demand for this and other highly warming blends (GWP > 2500) greatly, freeing up quota for other gases.

In contrast to the conventional high GWP HFCs, prices for the synthetic (i.e. lower GWP HFCs, HFC/HFO blends) alternatives have remained stable since mid-2017 or showed more moderate price increases, depending on the GWP. While in 2017 there were claims by some stakeholders that these alternatives were not yet sufficiently available, these issues of supply seem also to have disappeared. R32 as R410A alternative with lower GWP (675) is increasingly used in imported RAC equipment and the EU import quantity of HFOs and HCFOs increased to 5.5 times of the quantity in 2018 compared to 2015.

Figure 3: Development of average purchase prices of synthetic lower GWP alternatives at service company level (price index, Q2/2017 = 100 % (baseline))

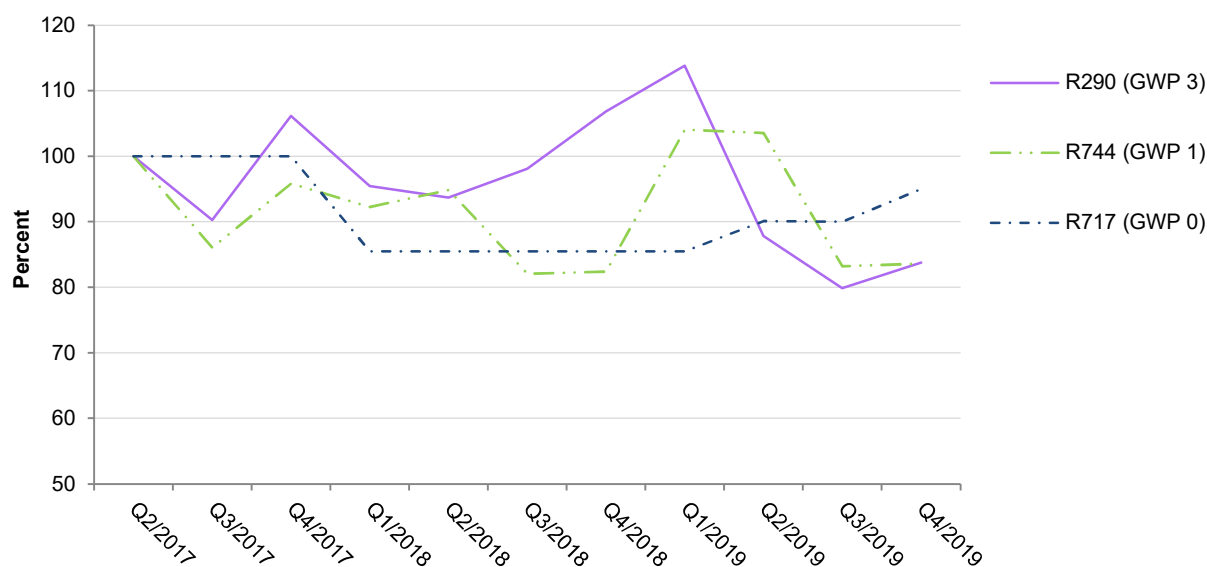


Prices of natural refrigerants such as CO₂ (R744), ammonia (R717) and propane (R290) have seen modest price decreases compared to 2015. There is no constraint on their availability on the EU market, and they are available at low cost, comparable to the initial price level of high GWP HFCs in 2015.

⁸ Excluding mobile systems or if intended for application designed to cool products to temperatures below - 50 degrees Celsius (Annex III, prohibition 12, of the F-gas Regulation).

⁹ Excluding military equipment or if intended for applications designed to cool products to temperatures below - 50 degrees Celsius (Article 13 (3) of the F-gas Regulation).

Figure 4: Development of average purchase prices of natural refrigerants at service company level (price index, Q2/2017= 100 % (baseline))



According to reported data under the F-gas Regulation, the total amount of HFCs supplied to the EU market (including in equipment) dropped by 37 % in CO₂e between 2018 and 2015, whereas the drop measured in mass was only 25 %.¹⁰ This shows a clear shift in the supply towards lower GWP HFCs. Furthermore, the increased use of alternatives, in addition to progress made in reducing leakage rates, are expected to have contributed to alleviating the high prices seen up to early 2018. Some stakeholders claimed that high GWP HFC refrigerants were apparently widely available in 2019, leading to a reduced demand for lower GWP alternatives.

2.3 Reclaimed HFCs

Reclaimed HFCs are not subject to the limits of the HFC phase-down and even high GWP gases can still be used to service larger refrigeration equipment. Reclaimed gases can assure the availability of essential HFCs on the market going forward, especially as the phase-down gets tighter. According to the annual company reporting,¹¹ the amounts of reclaimed HFCs have tripled since 2015 and made up 4 % of the EU virgin HFC supply in 2018 (measured in CO₂e). Still, given the amounts “banked” in equipment that reaches its end of life, there appears to be more untapped potential for increasing reclamation activities in the EU. Demand for reclaimed gases reduces the risk of illegal venting and inadvertent losses at the end of life of equipment. Indications on prices for reclaimed HFCs received from volunteering companies have ranged from 30 to 100 % of the virgin substance price, while the price is usually at the lower end of this range in cases where the companies provided the recovered gases themselves and only paid for the reclamation.

3 Factors affecting availability of HFCs

3.1 Change of market structure

The patterns of the EU refrigerant market have changed over the last five years. The HFC bulk market has grown from just over 100 actors including a few dominant gas suppliers to ca. 2500 actors, many of which hold only small amounts of quota. At the same time, there also have been increased quota transfer activities in the F-gas Portal & Licensing System. As result, buyers today have more options to obtain the desired HFCs.

¹⁰ See EEA F-gas Report 2019 <https://www.eea.europa.eu/publications/fluorinated-greenhouse-gases-2019>.

¹¹ See EEA F-gas Report 2019.

Moreover, some quota holders are end-users and may now be importing themselves instead of sourcing the gas from distributors in the EU. Given that there are many more actors on the bulk market now that can legally import HFCs, the traditional supply chains for bulk HFCs are clearly affected. Competition from a high number of smaller players is also likely to increase pressure on gas prices and contributed to some of the price reductions observed since the beginning of 2018.

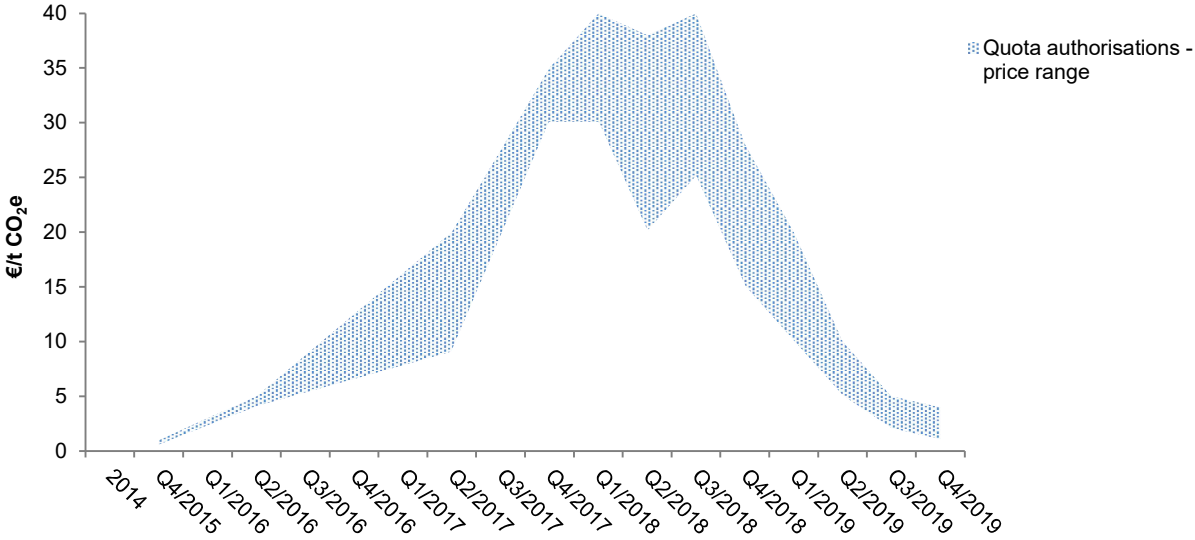
This change in market structure is also apparent when examining trade data such as EUROSTAT imports. A shift from Rotterdam to other EU ports is apparent from 2016 to 2018. These concern legal imports as the total overall quantities as recorded by EUROSTAT match very well the quantities reported under the F-gas Regulation. The recorded increase in imports into countries such as Poland are fully covered by the increase of quotas given out to companies based in Poland.

3.2 Effects on quota availability due to pre-charged equipment

Pre-charged RAC equipment needs to be accounted for under the quota system since 1 January 2017. Importers of equipment need to obtain quota authorisations from quota holders in order to cover their imports, thus affecting the total quantity of quotas available for bulk imports. Authorisation prices rose in parallel to bulk gas prices until mid-2018 and some participating companies reported that prices reached a level of over 40 €/t CO₂e. Since then, prices have strongly fallen to 1-4 €/t CO₂e at the end of 2019, which is comparable to 2015 prices (Figure 5). Given that authorisation prices are linked to quota scarcity they can also be seen as a possible indicator on the likelihood of problems regarding gas availability. The reported shortages by some market players in 2017/2018 coincided with peaks of authorisation prices. In 2018, equipment importers built up a reserve of 2.5 times the quantity of authorisations used in 2018 to be prepared for future years, which was equivalent to 36 % of the 2019 maximum quota allocation.¹² This quantity can serve as a buffer in case gas prices should rise significantly in the near future, and should prevent that quota needed for bulk gas provision would be used up by equipment importers to a relevant degree.

Furthermore, according to the latest EEA report, equipment imports represent only about 10 % of the total imported amount (based on CO₂e). There has been a decrease from 2017 to 2018 in total HFC RAC equipment imports in CO₂e, largely as a result of the ongoing switch to the refrigerant R32 with medium GWP (675) (from the commonly used R410A (GWP of 2088)). This switch will also guarantee that the authorisation reserve will last longer and that there would be little drain on the bulk quota in the next years.

Figure 5: Development of quota authorisation prices since 2015 (price range, in €/t CO₂e)



¹² See EEA F-gas Report 2019.

3.3 Stockpiling

A number of stakeholders indicated, as reasons for price reductions in 2018, the oversupply of refrigerants and low demand due to a stockpiling of refrigerants in 2017 in preparation for the steep phase-down step in 2018. Some companies had apparently built up large stocks of high GWP HFC refrigerants, when the prices were already relatively high in the expectation that prices would rise even further. This “rational” behaviour by market players mirrored the large stockpiling that took place in 2014 in anticipation of the phase-down measure. Poland has collected data on 2017 stockpiling at national level and found that quantities four times (!) the annual market supply were put on stock in preparation for the 2018 phase-down step. Anecdotal evidence from other EU Member States showed that gas bottles became sparse in 2017 as distributors/users were stocking them in large amounts rather than using the gas and returning the bottles for refilling. Conversely, during 2019 companies were said to be rather reluctant to build up stocks and some companies raised concerns regarding uncertain future price and market developments. These activities can further explain the occurrence of availability issues that were observed in late 2017 and the mitigation of these issues the following year including the decline of prices.

3.4 Illegal imports

There is evidence of illegal imports of HFC into the EU, a behaviour incentivised by the high prices seen in 2017 and early 2018 in the EU compared to world market prices. Customs have increasingly seized illegal shipments as border enforcement is being ramped up. Some industry stakeholders maintain that the observed gas price decreases are to a large degree the result of illegal imports and their ready availability on the EU market, in particular for R134a, which is used in significant quantities in the passenger car sector to service air conditioners. At this moment in time and based on the data available, it appears that imports outside the quota system is mainly in the form of customs evasion and it does not appear feasible to make any sound quantification of the extent of illegal imports and hence its relevance for the price development. Given that lower level of prices was observed at the end of 2019, the incentive for illegal trade is currently lower, at the same time as enforcement including the severity of penalties is being strengthened. Thus, it is likely that the relevance of such activities will be declining.

4 Conclusions

There is currently no shortage of HFC refrigerants on the market, as a technology shift to lower warming alternatives is ongoing and such alternatives are available in sufficient number. Prices have come down from their peak in 2018 but innovation is ongoing, in particular because renewed price increases may be expected for the future. The reason for declining prices may include the successful transition to alternatives in some important sectors, better leakage prevention and higher reclamation rates, stock building in 2017 to prepare for the 2018 phase-down step, and the change of traditional supply chains. In addition, illegal import would come on top of the legal supply of HFCs to the EU market. It will be important to closely continue monitoring the market and the gas prices going forward, in particular as another phase-down step (to 45 % of the 2015 baseline) will take place in 2021.