Review of the F-Gas Regulation

(Regulation (EU) No 517/2014)

About Bosch Thermotechnology

Bosch Thermotechnology is a leading manufacturer of energy-efficient HVAC1 solutions, headquartered in Germany, and a daughter company of the Robert Bosch group. With its products, Bosch Thermotechnology seeks to improve the quality of life of people all over the world and offer solutions that are future-proof and enable the energy transition. With unparalleled growth of 48% in the heat pump segments in countries like Germany, the issue of sustainability and refrigerants for heat pumps and air conditioning is fundamental on the road to decarbonisation and accelerated electrification.

Executive Summary

Our objective is to ensure that our products can contribute to the energy transition and be rolled-out across different regions and use-cases. The issue created by the tightening of requirements on refrigerants, initiated by the F-gas regulation proposal, and shortly to be reviewed with regards to PFAS in the context of the REACH regulation review, creates major uncertainty for Bosch refrigerant-based products, in particular large output heating and cooling products.

We therefore propose to address this issue by working on exemptions and transitional periods across product ranges, in parallel to the adaptation of our products to the safest and most climate-friendly solution. To this end, EU policy-makers must be urged to work on building a coherent framework which balances the F-gas regulation, IEC 60335-2-40 standard regarding safety and the review of the REACH regulation and its impact on refrigerants. As these legislative pieces are being reviewed separately and according to separate timelines, it is imperative that they are considered as complementary pieces of a single puzzle when it comes to the decarbonisation agenda.

Lack of action in this direction from the EU carries the risk that the technological solutions which the EU seeks to quickly scale up to achieve its REPowerEU objectives, and in particular the 30 million heat pump objective which it has expressed, will not be achieved and will limit the availability of alternatives to phase-out fossil fuels in the coming decades.

Background

The EU F-gas Regulation (517/2014) is focusing on the global warming potential of refrigerants and their use in different sectors and products. Fluorinated greenhouse gases (F-Gases) are a family of powerful greenhouse gases. The most common F-gases in use within Europe are HFCs, ozone friendly, energy efficient refrigerants that are generally of low toxicity and non-flammable, but with a relatively high Global Warming Potential (GWP). The F-gas regulation which applies today, introduced an EU HFC phase-down scheme and a quota system for companies, starting from 2015. It prompted many manufacturers to plan the phase out of refrigerants such as R-407C, R-410A, R-134a and replace them with lower GWP such as R32

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(difluoromethane). R32 is categorised under flammability level A2L (scale from 1, 2L, 2, 3 in ascending order) and thereby requires adequate care regarding health and safety.

The revised F-gas proposal published on 5th April 2022 introduces new restrictions that seek to ensure that F-gases will eventually only be used in new equipment where no suitable alternatives are available. In addition, the revision would require companies to report their annual production, imports, exports and other activities involving HFCs and other F-gases. In parallel, the Commission is also encouraging a switch to natural refrigerants, such as R290 (Propane), which has become increasingly popular due to the reduced ozone depletion and global warming potential. Furthermore, they have improved thermodynamic properties over traditional refrigerant products. However, its high flammability (A3 level) makes its deployment for specific use cases (e. g. indoor installation; high power outputs) difficult and expensive or even impossible in certain cases. While a switch to low GWP refrigerant in small domestic appliances, such as heat-pump tumble dryers, has proved technically feasible without drop in energy efficiency, reliability or safety, this is due to the low amount of refrigerant required linked to the low output. Phase outs for this category therefore represents little to no challenge, whereas the same conclusion doesn't apply for heat-pumps for heating purposes.
In the latter case which we focus on in this paper, the subtle balance between safety, climate friendliness and availability of refrigerants, makes the topic particularly crucial when it comes to decarbonisation of the EU's heating sector and fulfilling the REPowerEU objectives.

Key Recommendations

1. The EU should allow for targeted exemptions of bans on refrigerants until 2030, particularly when it comes to higher output units above 12 kW, to ensure the F-gas regulation enables the rollout of efficient technologies, such as heat pumps, in line with the REPowerEU objectives.
2. The proposal should maintain the current phase-down timeline for the refrigerants quota whilst focusing on a gradual phase-in calendar for natural refrigerants starting in 2028 rather than seeking an immediate phase-out of HFCs[2] without considering market realities.
3. The F-gas regulation should create clear categories within which to identify products and phasedowns. These should rely on clear definitions based on technical/economic feasibility; this is of particular relevance when looking at self-contained units which could create de-facto carpet bans.
4. Policy-makers should ensure a supportive ecosystem exists to accelerate the training and certification of installers to deal with the gradual phase-in of new refrigerants.

Position

We fully support the Paris climate agreement to the intermediate REPowerEU and 2030/2050 climate targets as part of the European Green Deal objectives. We also broadly welcome the Commission proposal of a revised F-Gas Regulation. Indeed, the current legislation has proven to be a powerful driver for the industry to transition towards lower GWP solutions through the development of energy efficient, safe and affordable alternatives, where technically possible and affordable. We therefore believe, the revised F-gas regulation should build on the solid framework and legacy of 517/2014 without imposing overly stringent requirements which could delay or limit the availability of key technologies to address climate change such as heat-pumps or air-conditioning systems.
In the current context, we strongly believe, that it is of utmost importance to remain committed to a multi-technology approach especially with regards to equipment critical to the decarbonisation of heating in the EU, such as heat pumps. This will not only benefit the EU's 2030 climate and energy goals, but also allow us to deliver on the geopolitical targets expressed in the REPowerEU Communication related to a quick and

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decisive reduction of natural gas consumption largely imported from Russia. Ensuring the compatibility between the goals of the F-gas regulation and the availability of equipment should also translate into more attention towards end-users and their well-being. Indeed, when using refrigerants with a low GWP, these may also be significantly more flammable, thereby bearing a significant risk that higher prices for producers' safety requirements could impact end consumers.
We would therefore urge policy-makers to pursue a balanced and proportionate approach between restrictions on use of HFCs and the cost-benefits of potential alternatives to guarantee an optimal outcome for society when considering safety and GWP. This path should also take into account that increasing demand for heat-pumps will mathematically push the demand for refrigerants up, creating a potentially destabilising push and pull dynamic in the market which could create spiraling costs for customers. In addition, flanking factors such as the need for an increased number of trained installers would be further exacerbated in the case of transition to new refrigerants and the HFCs' phase-down. This may further delay the achievement of the objectives of REPowerEU, notably the installation of 30 million heat pumps by 2030. The proposed revision should fully take into account the cost and feasibility of alternatives which we've tried to summarise in the below:

Simplified Overview Refrigerant Use Cases

		Refrigerants classes		
	Typical use case	A1 (e.g. R410A; R407C)	A2L (e.g. R32; R454B)	A3 (e.g R290)
Air / Water Monoblock outside (<12kW)	Heating/cooling houses with sufficient place for outdoor installation			
Air / Water Monoblock outside (>20kW)	Heating/cooling houses with sufficient place for outdoor installation			
Air / Water Split Unit	Heating/cooling houses with sufficient place for outdoor installation and cost optimisation			
Residential Air Conditioning	Home cooling			
Other: VRF Systems; Liquid / Water Indoor unit; Air / Water Monoblock inside; Exhaust Air Heat pumps; Domestic Hot Water Heat pumps				

State of the art
Safety restrictions require adaptations
Significant safety restrictions or technically unfeasible (eg availability of components)

We strongly believe in the need for accelerated energy efficiency and climate neutrality of the building sector through accelerated electrification and the replacement of old and inefficient appliances with future-proof solutions such as hybrids and H2-ready boilers. In this context, the need for a faster scale-up and roll-out of highly efficient heat pump technologies will play a central role in achieving the EU's 2030 and 2050 climate targets; we implement this every day through our commitment to innovation with our latest investment decision earmarking 300 million euros to heat-pump scale-up in the next 3 years.
However, with the current F-gas proposal we see major limitations which significantly prevent specific refrigerants from being used in heating and air conditioning equipment and hence will create de-facto bans of both refrigerant and product categories if implemented according to the Commission's current proposal. As expressed above, such a dynamic, at a time where demand for refrigerants will increase along with demand, could create significant imbalances if not tackled in a coordinated way across F-gas, REACH and the review of safety standards. As we support all efforts to reduce emissions and recognise the need to ensure efficient appliances are sold on the market, we wish to ensure the F-gas regulation remains fit for purpose. To this end, we urge policy-makers to re-introduce the following principles in the upcoming discussion:

I. REPowerEU Compatibility

We acknowledge the Commission's wish to accelerate the phase down of fluorinated gases to meet Europe's climate neutrality goals and align the proposed regulation with the Montreal Protocol. However, imposing stricter bans or quota reduction on the use of HFCs regardless of feasibility and cost-effectiveness criteria, would run counter to the recognised priority of deploying heat pumps across regions and building typologies, as envisaged in the REPowerEU Communication. In addition, flanking legislation are creating a dangerous lack of certainty for industry

- The REACH regulation, which will be reviewed in the coming years, risks to impact and restrict the availability of HFOs to replace refrigerants being phased-down in the F-gas regulation
- Standards for safety such as IEC 60335-2-40, while creating important safeguards for customers, carry the risk of making transport and use of certain refrigerants disproportionally complex

Therefore, as a first step and ahead of the upcoming REACH revision, we strongly encourage policy-makers to maintain the existing pace and scale of the "Phase down" of the F-gas regulation 2014/516. This would ensure a more calibrated approach capable of ensuring a gradual phase-out of HFCs. Inevitably, any imminent limitation on the availability or the choice of refrigerants, through quotas or the addition of priority sectors, would necessarily slow down the progression of the market, especially in the case of heat pumps, which play a decisive role in reducing dependence on natural gas imports along with futureproof H2 boilers. In isolation, the current F-gas proposal therefore proves to be incompatible with both the REPowerEU ambitions and the Energy Efficiency First principle, particularly considering that the refrigerants are sealed and therefore not emitted.

II. Restrictions on the placing on the market – article 11

We support the EU ambitions to restrict the use of refrigerants where alternative solutions available on the market are technically and economically feasible. Although coherent with the Climate targets, these restrictions on placing on the market and sale would be subject to specific criteria. Indeed, as specified in Article 11, the Commission may exceptionally exempt for up to four years those F-gases whereby "alternatives are not available, or cannot be used for technical or safety reasons" or where the alternative "would entail disproportionate costs".

Here, it is still unclear what the Commission means with the concept of "disproportionate costs" and much less clear to whom this exception refers to, whether industry or end-users. As our priority is the safety of our products and the attention to our customers, the steeper phase-down proposed in the revised F-gas regulation removes any sort of flexibility when choosing refrigerants, thus leaving only natural refrigerants that, due to their higher flammability, would significantly increase safety costs for end-users. To this end, the recovery and recycling of refrigerants when servicing is performed, should be clearly addressed. We therefore urge the Commission to strengthen/clarify the provision under Article 11 to provide fast-track exemptions. This would protect customers from higher economic burden stemming from increased phase-down ambitions and would ensure that industry is able to quickly provide cost-effective solutions to decarbonise the heating sector.

III. Clear and cross-sectoral definitions

The current HFC quota reduction proposal of the European Commission will be equivalent to a ban by 2030 and in the lead-up will already have a very strong impact on the price of refrigerants and hence appliances, as scarcity increases. In this context, the lack of clear and cross-sectoral definitions in Annex IV - based on placing on the market prohibitions referred to in Article 11(1) – is particularly worrisome given the broad interpretation of heating and cooling equipment. In the case of "self-contained air-conditioning and heat pump equipment" (Annex IV – 17) or "Split air-conditioning/heat-pump equipment" (Annex IV – 18) many products

would be considered non-compliant and hence create a significant discrepancy between high EU ambitions and feasibility.
By pursuing this approach, the Commission excludes the possibility of a tailored approach in line with the reality of technological developments and customer needs. These differ depending on the type of unit (monoblock or split system) and their typical use-case as well as the availability of technically feasible and cost-efficient alternative solutions. In addition, the move to natural refrigerants may create significant limitations concerning size (e.g. 30kW with existing refrigerant threshold of 5kg). Where on the one hand F-gas alternatives can be introduced with few changes in outdoor installations other established uses cases such as ground source (liquid/water) heat pumps (installed indoors) face tremendous costs increases due to the more difficult safety concept. Considering their high-efficiency, we urge policy-makers not to create a de-facto ban for this key product segment. To avoid this, both definitions formulated by the Commission should be adapted to avoid a lengthy and complete redesign of systems from manufacturers, as well as a complete retraining of installers to handle specific flammables.
Similarly to point 17 and 18, the vagueness of the clause “except when required to meet safety standards” mentioned in Annex IV point 18 (b & c) opens up different interpretations. Broadly and poorly defined bans (under Annex IV) would nullify investments which have already been made by the heating & cooling sector to comply with the current phase-down agenda of the Regulation and they will affect the market access for existing highly efficient heat pump solutions while creating the risk of higher economic burden for vulnerable customers as well as lack of solution for buildings suitable for ground source (liquid/water) heat pumps. To this end, we urge the Commission to provide clarity and regulatory stability for the industry.

IV. Training

As health and safety of consumers and installers is always at the core of our focus, clear safety guidelines, as they exist today, help ensure that products are handled with care. With the EC’s current proposal, and in parallel with the prior need to increase installer availability to deal with growing demand, adequate re-training and certification of existing installers for natural refrigerants will create additional bottlenecks, if not done gradually and in a coordinated way.
The revision proposal seeks to include natural refrigerants, such as CO2 and R290, within the F-gas training and certification process for installers. While natural refrigerants are a key solution in the mid to long-term, and whereas many heat-pump and air-conditioning products are already being designed on that basis, we also see that more ambitious and immediate product bans would require an adequate number of trained engineers in a very short time to handle the increased use of flammable refrigerants. In addition, changes to standards such as EN60335-2-40 risk making product adaptation and installation more complex.
Considering the emphasis put on heat pumps in the REPowerEU plan, the F-gas revision does not sufficiently take into account the existing lack of installers and the additional formal training for natural and highly flammable refrigerants, thus further delaying the availability of installers and the rollout of heat pumps. Accordingly, it is most unlikely that the installer base would manage to upskill technicians in time as there remains a shortage of both training facilities and trainers across the EU. To this end, we encourage the Commission to consider a longer transitional period for existing installers and certifications until 2030, in parallel to the accelerated upskilling foreseen in the REPowerEU’s proposed Partnerships for skills.