German Federal Environment Agency

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# Options for reducing emissions of fluorinated greenhouse gases (F-gases) at European level

## Contribution from the German Federal Environment Agency (UBA) to the revision of Regulation (EC) no. 842/2006 on certain fluorinated greenhouse gases

The following paper represents the UBA's position on options to reduce F-gas emissions in the European Union.

## 1. Introduction

HFCs[1] and, to a minor extent, PFCs are used to replace ozone depleting substances (ODS) under the provisions of the Montreal Protocol and the European Regulation controlling the use of ODS, but they cannot be seen as long-term alternatives. As they are among the most potent greenhouse gases in the atmosphere they contribute to global warming and are therefore included in the Kyoto Protocol's basket of gases. Decomposition products might have further impacts on the environment but there is still a lack of scientific knowledge about the long-term behaviour of these long-lived substances.

Use and emissions of F-gases have been increasing and are foreseen to increase even more rapidly if no further steps are taken to control them. In view of the commitments under the Kyoto Protocol, the European Council's objective to reduce greenhouse gas emissions by 80-95% by 2050 compared to 1990 levels and the environmental impact of these F-gases, there is a need to give a clear signal regarding their use: That they should be used only where no appropriate alternatives are available.

Although the European Parliament and the Council already adopted measures in the year 2006 these are insufficient to stop further increase in F-gas emissions or to decrease them. Further action is needed. We therefore welcome the fact that the European Commission's report COM(2011) 581 comes to the same conclusion. Just as several industry associations we also back the EU's support of global action to reduce F-gas emissions under the Montreal Protocol.

The European Commission has invited stakeholders to comment on possible options for cost-effective reduction of F-gases. This paper is a contribution by the German UBA additional to our comprehensive technical report "Avoiding fluorinated Greenhouse Gases – Prospects for Phasing Out" released in June 2011 (1).

## 2. General approach

We support a clear internationally binding regulation of HFCs in order to prevent an increase in their emissions worldwide. We therefore welcome initiatives under the Montreal Protocol to phase-down HFCs as long as they are ambitious and take the availability of environmentally sound alternatives as well as existing company initiatives appropriately into account.

[1] HFC=Hydrofluorocarbon, PFC=Perfluorocarbon, ODS=Ozone Depleting Substances (=CFCs and HCFCs)

Should it become apparent that the international discussions to that end are unsuccessful, we would be willing to support the European Commission's proposal to further discuss and assess the option of implementing a phase down measure (set quantitative limits for placing F-gases on the market in the EU-27) at EU-27 level.

It is our understanding that any such approach will probably have to be accompanied by further measures as was done in the case of ODS. This approach has proved to be very successful. We consider further measures necessary to avoid unintentionally cutting the supply of certain F-gases to essential uses like MDIs where no alternatives can substitute 100% of the current F-gas containing products.

We suggest revising Regulation (EC) No. 842/2006 in such a way that it will appropriately allocate the amount of F-gases allowed to be placed on the market. This could possibly be done by amending Annex II, Article 8 and Article 9 of the Regulation.

We further suggest

- modifying certain definitions and/or wordings to overcome minor obstacles in the existing Regulation as partly described in the preparatory study (2),
- including fluorinated greenhouse gases that have been placed on the market but are not covered by Regulation (EC) No. 842/2006 in the reporting or in Annex I as proposed in the preparatory study (2),
- employing the GWP values of the 4$^{th}$ IPCC Assessment Report,
- including a general obligation to minimize F-gas emissions regardless of the emission source (including R22 production),
- extending the scope of Article 3 (1) to include mobile refrigeration and ORC units,
- introducing at the same time an efficient reporting system (preferably including an electronic system covering producers, importers/exporters, distributers, users, and destruction facilities) for F-gases both in bulk and in products,
- extending the scope of Article 7 (2) to include all products and equipment,
- concretising Article 4 as proposed in the preparatory study (2) and making its provisions mandatory for all relevant applications, and
- addressing PFCs and $SF_6$ appropriately since these substances will not be covered by an international and/or EU phase down approach.

Proposals related to the most relevant emission sources are presented below, as we see an urgent need for action in these areas. This is focussed on Articles 8 and 9 as well as Annex II of the Regulation rather than proposing detailed changes to existing obligations. All proposals are based on our recent evaluation of technical options to avoid fluorinated greenhouse gases (1) and are therefore not justified in detail in this paper.

## 3. Options for amending Annex II

### 3.1 Refrigeration and stationary air-conditioning

The refrigeration and stationary air-conditioning (R+SAC) sector constitutes the sector with the highest consumption and emissions of HFCs in the European Union (EU). Projections (business as usual (BAU) scenario) for the SAC sector predict a doubling of today's consumption by 2030. Looking at all sectors SAC will account for the highest HFC emissions in 2030, followed by the refrigeration sector. At the same time both sectors show high emission reduction potentials (2). Therefore, these sectors should be a focus of future efforts to reduce F-gas emissions.

Being aware of both, the necessity to phase out CFCs and HCFCs and the global warming potential of HFCs and PFCs, HFCs can be seen as useful ODS substitutes in existing equipment as long as emissions will be limited. In very few cases (e.g. lower TEWI) their use in new equipment might also be warranted, but in most cases halogen-free alternatives show the better climate performance and should be preferred. Due to e.g. national safety regulations we consider a general ban on HFCs and PFCs at the European level as not yet enforceable.

For new equipment alternatives are already available and widely used, as shown in our report "Avoiding fluorinated Greenhouse Gases – Prospects for Phasing Out. They have been proven to be technically and economically feasible. They also show negative or low abatement costs, where assessed (2). The German UBA considers it appropriate to

include these applications into Annex II of Regulation (EC) No. 842/2006. Commercially available products to be added are

- domestic fridges/freezers,
- small commercial refrigeration systems (stand-alone equipment),
- direct-evaporation heat pumps,
- commercial refrigeration systems [containing more than [20] kg of refrigerant],
- refrigeration equipment containing less than [150] g of refrigerant,
- refrigeration equipment for cold storage depots exceeding a capacity of [450] kW, and
- industrial refrigeration systems exceeding a capacity of [100] kW.

Additionally, anyone intending to install a new refrigeration or stationary air-conditioning system whose refrigerant charge exceeds a specified amount of HFCs (or of $CO_2$ equivalents) could be required to prove that the use of halogen-free alternatives is not feasible from a technical, ecological or economic (administrative discretion, investment/running costs) perspective. To keep the associated assessment costs within reasonable limits, both an appropriate instrument and feasible boundary conditions need to be chosen.

It should be noted that besides compression techniques, heat driven air conditioning systems (absorption or adsorption chillers) may be chosen not only when waste heat is available. Especially for Southern European countries operating HFC free sorption chillers driven by solar heat is an energy efficient option which should be taken into account. Since sorption chillers consume little electricity, they contribute to grid security during summer by helping to avoid peaks in electricity demand which often lead to blackouts.

### 3.2 Foam sector

Better insulation can contribute significantly to reducing overall greenhouse gas emissions. Foams provide better insulation performance than mineral wool, and HFC blown foams in some cases offer slightly better insulation performance than HCs and $CO_2$. Some argue, therefore, that restrictions on HFC use could thus lead to higher overall GHG emissions. As described in our report "Avoiding fluorinated Greenhouse Gases – Prospects for Phasing Out", this drawback in using halogen-free blowing agents can be overcome, in most cases, by increasing the thickness of the foam product or, in other cases, by using alternatives not relying on blowing agents. Industry has already been moving away from fluorocarbons in many applications in favour of non-fluorocarbon blowing agents (HCs in PU foams and $CO_2$ in XPS). Abatement costs are far below 10 €/tonne $CO_2$-equivalent (2).

The German UBA considers it appropriate to include these applications into Annex II of Regulation (EC) No. 842/2006 since these prohibitions would not lead to higher overall GHG emissions. Commercially available products to be added are XPS foams, PU foams (construction sector, excluding spray foams) and PU canned foams (except products used in the mining industry, see (3)).

### 3.3 Aerosols

Our report "Avoiding fluorinated Greenhouse Gases – Prospects for Phasing Out" covers a description of almost all aerosol applications and shows that manufacturers are already producing both HFC-free and HFC-containing products depending on the market they are produced for. This is true in particular for technical aerosols or canned foams (please refer to 1.3.2). In other cases, like signal horns, alternative products not containing any gas exist. For these applications the German UBA considers an inclusion into Annex II of Regulation (EC) No. 842/2006 as appropriate. We propose including aerosols in general and to consider certain exemptions (MDIs).

For MDIs a complete substitution of HFCs has not yet been possible until now. As this sector is very complex due to specific medical/medicinal requirements and given the effect of higher costs of alternatives on the public health system, we believe that this application should be excluded from any ban.

### 3.4 Fire extinguishing agents

The German UBA proposes a placing on the market prohibition of fire protection systems and fire extinguishers containing HFC23 as already in force for perfluorocarbons. There are enough alternatives commercially available (1) and the abatement costs are very low(2).

In 2006, the German industry association bvfa (Bundesverband Technischer Brandschutz e.V.) attempted to contract a voluntary agreement between all relevant industry stakeholders in Germany not to use HFC23 as fire extinguishing agent. However, two problems arose and led to a failure of this initiative. First, several companies are not members of the relevant associations. Second, companies which did not agree to the voluntary approach stated it to be a barrier to trade.

## 4. Possible adjustments of Articles 8 and 9

### 4.1 Article 8 Control of use

The German UBA considers it appropriate to delete the 850 kg threshold for magnesium die casting(1) (4).

### 4.2 Article 9 Placing on the market

Taking into account safety requirements the German UBA suggests that products and equipment used in the mining industry should be excluded from the placing on the market prohibitions on products and equipment listed in Annex II.

Annex II

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|---|---|---|
| HFC 23 | fire protection systems and fire extinguishers | 01.01.2015 |
| Fluorinated greenhouse gases | household and laboratory refrigerating/freezing appliances | 01.01.2015 |
| Fluorinated greenhouse gases | Stand-alone equipment in commercial refrigeration | 01.01.2015 |
| Fluorinated greenhouse gases | commercial refrigeration systems [containing more than [20] kg of refrigerant] | 01.01.2020 |
| Fluorinated greenhouse gases | refrigeration equipment containing less than [150] g of refrigerant | 01.01.2020 |
| Fluorinated greenhouse gases | industrial refrigeration systems exceeding a capacity of [100] kW | 01.01.2020 |
| Fluorinated greenhouse gases | refrigeration equipment for cold storage depots exceeding a capacity of [450] kW | 01.01.2020 |
| Fluorinated greenhouse gases | aerosols, except MDIs | 01.01.2015 |
| Fluorinated greenhouse gases | direct-evaporation heat pumps | 01.01.2015 |
| Fluorinated greenhouse gases | signal horns | 01.01.2015 |
| Fluorinated greenhouse gases | XPS foams, except PU [spray] foams | 01.01.2020 |
| Fluorinated greenhouse gases | PU construction foams (except spray foams) | 01.01.2020 |
| Fluorinated greenhouse gases | pressure compensation vessels in heating systems | 01.01.2015 |
| Fluorinated greenhouse gases | PU-canned foams | 01.01.2015 |

## References


1. **German Federal Environment Agency.** *Avoiding fluorinated greenhouse gases - prospects for phasing out.* Dessau-Roβlau : German Federal Environment Agency, 2011.

2. *Preparatory study for a review of Regulation (EC) No 842/2006 on certain fluorinated greenhouse gases - final report.* Brussels : European Commission, 2011.

3. **Schwarz, Winfried.** *HFC-containing Propellants in Canned PU Foam (OCF).* Dessau : German Federal Environment Agency (UBA), 2009.

4. **Schwarz, Winfried und Reissner, Agnes.** *Fachgespräche zur Verordnung(EG) Nr. 842/2006 über bestimmte fluorierte Treibhausgase zu den Themen Qualifikation und Zertifizierung von Unternehmen und Personal (Kälte-Klimabranche) und Verwendung von Schwefelhexafluorid in der NE NEMetallindustrie.* Dessau : German Federal Environment Agency (UBA), 2008.