F-Gas Regulation Briefing Note – Industrial Refrigeration

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Industrial refrigeration can be HFC-free by 2020

This fact sheet provides information on phasing out hydrofluorocarbons (HFCs) in industrial refrigeration in the European Union. It is intended to inform revisions to the F-Gas Regulation, which are currently under consideration. The term “industrial refrigeration” covers several applications such as chemical, plastics and oil facilities, food production and processing, and cold-stores.

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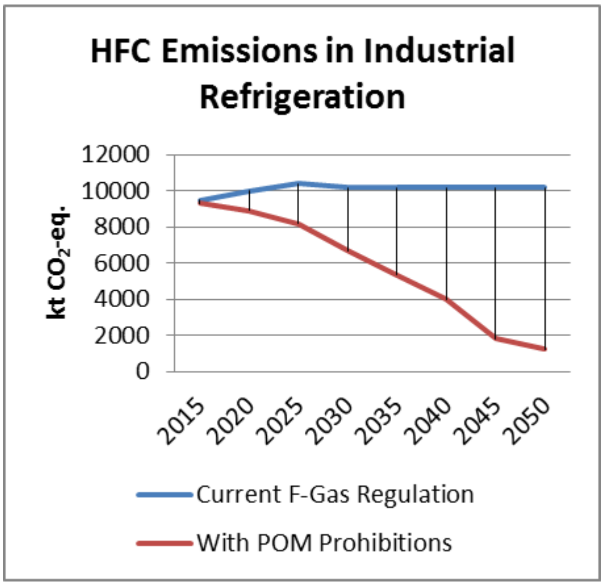
Emission trends and alternatives

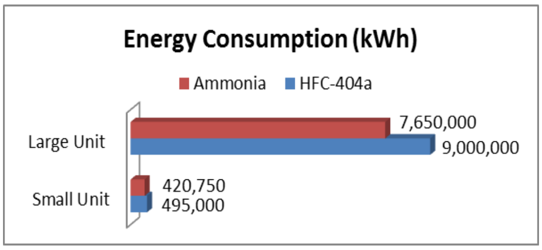
HFC emissions from industrial refrigeration will continue to undermine climate objectives unless action is taken soon. Assuming full implementation of the F-Gas Regulation, HFC emissions from industrial refrigeration will remain at unacceptably high levels without additional measures.[1] With an average lifetime of 30 years, there is a need to prevent new HFC-based equipment from being placed on the market to prevent these emissions from being locked in for decades and impacting 2050 climate targets.[2]

Technically feasible and safe alternatives are already widely used in the European Union.[3] The main alternative technology uses ammonia as the refrigerant although some installations incorporate combined ammonia-CO_2 cascade systems.[4] A recent European Commission-funded study analyzed the market penetration of alternatives and determined that additional measures such as bans on HFC use would prevent over 156 Mt/CO_2-eq. emissions by 2050,[5] resulting in significant reductions of HFC emissions on a timescale responsive to climate science.



Energy efficiency

Alternatives like ammonia are 15% more energy efficient than HFC-based equipment.[6] This is particularly relevant in light of the EU Energy Efficiency Plan, which sets out a 2020 target of 20% reduction in energy consumption compared to projections.[7] Increased energy efficiency decreases reliance on fossil fuels and reduces running costs for consumers.



Cost effectiveness

Switching to HFC-free alternatives is cost-effective under any metric. On a CO_2-equivalent basis, banning the use of HFCs in this sector with placing on the market (POM) prohibitions would achieve significant GHG reductions at much lower costs than containment and recovery measures, as demonstrated in Table 1.[8]

* The Environmental Investigation Agency (EIA) is an independent campaigning organisation committed to bringing about change that protects the natural world from environmental crime and abuse. For more information, contact ukinfo@eia-international.org.

Table 1: Effectiveness of Placing HFC-Based Equipment and Alternatives on the Market

Industrial Refrigeration	Containment and Recovery		POM Prohibition	
	GHG Emissions Abated	Abatement Cost (t/CO_2-eq.)	GHG Emissions Abated	Abatement Cost (t/CO_2-eq.)
Small Unit	39%	€ 6.4	100%	- € 0.9
Large Unit	39%	€ 1.7	100%	- € 21.6

From an end-user perspective, consumers can expect to save substantial money over the lifetime of HFC-free alternatives. Because HFC-based equipment has achieved significant economies of scale, upfront investment costs are lower. But HFC-based equipment has much higher annual running costs due to increased energy consumption, costs of refills and regulatory compliance, as demonstrated in Table 2.[9]

Table 2: Costs to End Users of HFC-Based Equipment and HFC-Free Alternatives

	Refrigerant	Upfront Costs	Annual Costs	Lifetime Costs	Cost Differential
Small Unit	**HFC-404a**	**€ 434,750**	**€ 70,983**	**€ 2,564,249**	---
	Ammonia	€ 621,418	€ 60,035	€ 2,422,468	- € 141,781
Large Unit	**HFC-404a**	**€ 6,060,000**	**€ 1,264,843**	**€ 44,005,299**	---
	Ammonia	€ 8,972,000	€ 1,073,800	€ 41,186,000	- € 2,819,299

For small units, the payback period is about 17 years. For large units, the payback period is about 15 years. In short, HFC-free alternatives more than make up the additional investment costs during their 30-year lifetime, resulting in significant end-user cost savings. Nevertheless, to overcome barriers to adoption by small-and medium-sized enterprises (SMEs), Member States can design support schemes to minimize upfront investment costs and promote taxes on HFC use.

Policy recommendations

Policymakers should revise Annex II of the F-Gas Regulation to include POM prohibitions on HFCs in industrial refrigeration starting in 2020:

Fluorinated Greenhouse Gases	Products and Equipment	Date of Prohibition
Fluorinated Greenhouse Gases	Small Industrial Refrigeration	1 January 2020
Fluorinated Greenhouse Gases	Large Industrial Refrigeration	1 January 2020

The European Commission should also undertake additional review and public consultation on the need for clearly defined exemptions for some discrete applications in this sector and, if appropriate, adopt them prior to the POM prohibition date. In addition, in the years before the POM prohibition takes effect, the European Union should consider a gradual phase-down of HFC-based equipment through quantitative limits on new units placed on the market. This will promote the progressive uptake of alternatives in advance of the POM prohibition, providing certainty of investment and preventing market disruptions.

Environmental Investigation Agency
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[1] Öko-Recherche *et al.*, *Preparatory Study for a Review of Regulation (EC) No 842/2006 on Certain Fluorinated Greenhouse Gases, Final Report* (September 2011) [hereinafter "Öko-Recherche Study"], Annex VI, pp. 290-296 (chart produced from data provided by Öko-Recherche).

[2] Öko-Recherche Study, Annex V, pp 248-249; *see also* European Commission, *Commission Staff Working Document – Impact Assessment – Accompanying Document to the Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: A Roadmap for Moving to a Competitive Low Carbon Economy in 2050*, Sec(2011) 289 final (8 March 2011).

[3] *See e.g.* Öko-Recherche Study; Umweltbundesamt, *Avoiding Fluorinated Greenhouse Gases: Prospects for Phasing Out* (June 2011, English Version); European Commission, *Report from the Commission on the Application, Effects and Adequacy of the Regulation on Certain Fluorinated Greenhouse Gases (Regulation (EC) No 842/2006)* (September 2011).

[4] Öko-Recherche Study, Annex VI, pp. 290-296.

[5] *See generally* Öko-Recherche Study, Annex V, pp. 248-249 and Annex VI, pp. 290-296 (figure derived from data provided by Öko-Recherche).

[6] Öko-Recherche, Study, Annex V, pp. 248-249 (chart produced from Öko-Recherche data).

[7] European Commission, *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Energy Efficiency Plan 2011* (8 March 2011), SEC (2011) 280 final, p. 2.

[8] Öko-Recherche Study, p. 213 and Annex V, pp. 248-249 (abatement cost of containment and recovery determined by dividing the additional annual cost of containment and recovery measures by the GHG reductions achieved from those measures; cost of POM prohibitions already outlined for each subsector).

[9] Öko-Recherche Study, Annex V, pp. 248-249 (upfront costs represent the sum of the initial cost of the hardware and cost of first fill).