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A legal analysis of the overlap between the F-gas Regulation, MAC Directive and the proposed universal PFAS restriction

Background

The universal PFAS restriction proposal includes fluorinated gases, a distinct subset of PFAS used in refrigeration, air conditioning, and industrial applications. Most fluorinated gases have high global warming potentials (GWPs), which have increasingly been substituted with fluorinated gases with low GWPs that are PFAS such as HFOs – contributing to long-term environmental PFAS pollution. According to RAC, fluorinated gases are the main source of emissions of PFAS, amounting to 60 000 t/y out of 70 000 t/y from all PFAS uses.[1] Several fluorinated gases, including HFC-134a, HFC-125 and HFO-1234yf, are major contributors to environmental emissions of the highly persistent PFAS trifluoroacetic acid (TFA).[2]

This legal analysis assesses the legal overlap for PFAS fluorinated gases between the universal PFAS restriction under REACH, the F-gas Regulation, and the MAC Directive. The aim is to provide a concrete way forward on how to address this overlap while ensuring that the universal PFAS restriction achieves a high level of environmental and health protection.

[1] RAC Opinion, p. 16.
[2] RAC Opinion, p. 23.

1. The instruments overlap but their material scope is different

The scope and the objectives of the three instruments are different. The F-gas Regulation and the MAC Directive have been adopted with a climate mitigation purpose: they seek to limit and/or prevent the emissions of certain fluorinated greenhouse gases with high GWP potential and implement at the EU level the international commitments under the Montreal Protocol and the Kigali Amendment.[3] The scope, objectives and measures set out therein only address climate impacts and not PFAS-specific concerns, such as environmental and health risks resulting from PFAS emissions.

Their scope covers a set list of F-gases in several applications, not addressing the full range of fluorinated gases which are PFAS and any PFAS developed in the future:

- The **F-gas Regulation** (EU) 2024/573 applies to the fluorinated gases listed in Annex I-III and products and equipment containing them,[4] which overlap to some extent with the current PFAS restriction development.[5]
- The **Mobile Air Conditioning (MAC) Directive** 2006/40/EC applies to emissions from a very specific set of uses which are mobile air-conditioning systems in passenger cars (category M1 vehicles) and light commercial vehicles (category N1, class 1 vehicles). More specifically, it bans the sale and use of F-gases with a GWP of more than 150 in new vehicle types introduced from 2011 and in all new vehicles produced from 2017.[6] Crucially some PFAS fall below the GWP limit, including the currently used HFO-1234yf with a GWP <1.

Compared to those two frameworks, the proposed REACH restriction has a broader scope and serves a different normative objective. The purpose of the restriction regime under REACH is to ensure a high level of protection for human health and the environment[7] The General Court of the EU made clear that a restriction under REACH is "*often the most effective measure*"[8] to deal the risks posed by persistent chemicals like PFAS which may not be remedied otherwise. The universal PFAS Restriction under REACH would aim to prevent all further emissions of PFAS, including of all PFAS-fluorinated gases, by cutting pollution at its source, as opposed to the F-gas Regulation and the MAC Directive controlling listed F-gases unevenly with the purpose to mitigate climate emissions.

The REACH restriction represents a significant added value. The proposed REACH restriction would restrict the production, placing on the market and use of the whole PFAS group and would therefore prevent releases across the life cycle of products containing PFAS, including fluorinated gases. Any fluorinated gas that meets the PFAS definition is included in the scope of the restriction, irrespective of its global warming potential or inclusion in other EU legal frameworks such as the F-gas Regulation. The proposal furthermore foresees time-limited derogations for certain applications of fluorinated gases which might need time to transition.

Without a broader restriction in place, many of the fluorinated gases would fall between the regulatory cracks. While the F-gas Regulation and the MAC Directive regulate fluorinated gases in some way, they leave substantial gaps in the scope of control of PFAS emissions and do not pursue the same objective as the proposed REACH restriction. Like a REACH restriction, the F-gas Regulation and the

[3] Recital 6 MAC Directive, Recital 6 and Article 4 F-gas Regulation.
[4] Article 2 F-gas Regulation.
[5] Annex XV Restriction Report, p. 66.
[6] Article 5(5) MAC Directive.
[7] As enshrined in Article 55 and Recital 69 REACH.
[8] Case T-226/18, *Global Silicones Council*, Para. 170.

MAC Directive contain certain restrictions - but these restrictions only apply to certain fluorinated gases and certain products containing them, which are restricted based on their GWP potential rather than their PFAS emissions, leaving PFAS with low GWP potential without a restriction in place.[9]

In contrast, the PFAS restriction under REACH would be much more comprehensive (i.e. more F-gases and more applications included), and cover emissions from all fluorinated gases during the production phase and throughout the life cycle. The F-gas Regulation and the MAC Directive therefore cannot deliver the same level of protection for human health and the environment as a comprehensive PFAS restriction under REACH. In this respect, RAC agreed that a REACH restriction is the most appropriate measure to minimise the risks resulting from the widespread use of PFAS across sectors, and in particular in the applications of F-gases and in the transport sector where F-gases are used.[10]

2. The F-gas and MAC legislation leave significant regulatory gaps

To the extent that the F-gas Regulation and the MAC Directive regulate fluorinated gases that qualify as PFAS, the impact of the regulatory measures they set to control emissions of those PFAS is not equivalent to the impact of measures that would be adopted under the restriction proposal under REACH. While recognising that both the F-gas Regulation and MAC Directive already regulate F-gases, SEAC concludes that these frameworks do not fully address the significant concerns posed by PFAS.[11]

The reduction of PFAS emissions enabled by the F-gas Regulation is not sufficient to contain all emissions within scope of the PFAS restriction in several ways. The F-gas Regulation controls and restricts fluorinated gases through Annexes, but the control measures and restrictions do not apply to fluorinated gases across Annexes in a homologous way. Only HFCs listed in Annex I are subject to the phase-down under the quota system and equipment bans based on GWP limits.[12] However, for other fluorinated gases, there is no equivalent phase-down. In addition, the application-specific restrictions do not cover all applications, and only in a few cases they extend to all fluorinated gases that are still subject to conditions and exemptions as well as the fixed list in the Annexes. This leaves a patchwork situation where, even though some PFAS fluorinated gases are regulated through the Annexes, in many cases the F-gas Regulation does not prevent them from being used in the future other than in some limited situations.[13]

To provide an illustration, the quota system under Articles 16-17 of the F-gas Regulation, which impose a gradual phase-out of HFCs placed on the market each year based on CO2 equivalents, has significant limitations. First, it applies only to HFCs listed in Section 1 of Annex I, meaning that many fluorinated gases, also being PFAS, are not included at all. Second, the phase-out is solely based on CO2 equivalents, thus not covering low-GWP PFAS. For example, HFO-1234f, which is listed in Annex II and has a GWP of <1 falls outside the scope of the quota system, even if it is one of the most used F-gases in terms of tonnage and degrades fully into TFA. In addition, even with high-GWP PFAS, the quota system still permits quantities of PFAS in scope to be produced and placed on the market, with a full phaseout of consumption only by 2050, even while PFAS emissions and TFA accumulate in the environment. **Compliance with the HFC quota, therefore, not only does not address all PFAS specific substances and uses but also**

[9] Öko-Recherche (2026), p. 9f.
[10] RAC Opinion, p. 91.
[11] SEAC Opinion, p. 25
[12] Article 16(1) and Annex IV F-gas Regulation.
[13] Öko-Recherche (2026), p. 9f.

does not demonstrate that the PFAS-related risks associated with that substance or use falling within the quota system are adequately controlled.

Similarly to the F-gas Regulation, the MAC Directive allows some fluorinated gases to fall through the regulatory cracks. Since 2011 and 2017 respectively, Article 5(4) and (5) MAC Directive obliges MS to refuse the registration and prohibit the sale and entry into service of new vehicles with air-conditioning system designed to contain fluorinated gases with a GWP higher than 150. However, the ban of fluorinated gases with a GWP above 150 under the MAC Directive still allows the use of low GWP gases that are PFAS. Since this prohibition came into place, the MAC Directive facilitated a transition to low-GWP gases such as HFO-1234yf, which is driving the increased atmospheric production of TFA.[14]

REACH addresses remaining PFAS uses and substances and fills a regulatory gap. The PFAS restriction does not displace sectoral legislation merely because the same substance or product is already regulated there. Various legal regimes can apply cumulatively to different risks and regulatory objectives for a same group of products – which is the case here. REACH provides a general framework that applies overall, and may fill in the gaps of incomplete sectoral regulation. The existence of a PFAS restriction consequently does not jeopardise the F-gas and the MAC frameworks. On the contrary, EU scientific experts confirm that complementary action under REACH is needed if we want to fully address the PFAS-related risks posed by fluorinated gases.[15]

The F-gas Regulation itself expressly anticipated its coexistence with a future PFAS restriction. Recital 7 recognises that some regulated F-gases are PFAS, or may degrade into PFAS, refers specifically to the universal PFAS restriction proposal covering fluorinated gases and, in light of the foreseen entry into force of the REACH restriction, urges that "*in line with the precautionary principle, undertakings should consider using alternatives, where available, which are less harmful for health, the environment and the climate."* The legislative text therefore does not support treating the F-gas Regulation as a carve out from the PFAS restriction.

3. Derogations under the REACH restriction may not be merely justified by alleged regulatory overlap

Any derogation under a REACH restriction must be thoroughly justified: it requires sufficient evidence for its necessity, not mere allegations of regulatory overlap. **The restriction should be the norm**, **and derogations the exception**. The General Court made clear that derogations to a regime protecting human health as a priority must be interpreted strictly. In light of the precautionary principle, they should remain limited to what is strictly necessary and legitimate given the objective pursued.[16]

Independently from the F-gas Regulation and the MAC Directive, derogations can always be made stricter under REACH. EU legislation addressing PFAS substances and uses within the scope of the REACH restriction needs to be adhered to independently from the proposed restriction. However, an alignment of the REACH restriction with the F-gas Regulation should not be automatic, but rather based on a case by-case assessment. Considering the Court's case law mentioned above, the fact that some exemptions exist under other legal frameworks handling fluorinated gases does not mean that the same derogations are justified for the specific purpose of a PFAS restriction. Where a derogation is proposed in a REACH restriction, the Commission should assess its justification, duration and conditions

[14] Behringer et al. UBA 2021, p. 66f.
[15] RAC Opinion, p. 91, SEAC Draft Opinion, p. 25.
[16] Case T-229/04, *Sweden v Commission*, paras. 160 and 170.

independently, taking into account the availability of suitable alternatives and the objectives of both frameworks.

4. The PFAS restriction is not a competing, but a synergetic action

The picture is clear - a REACH restriction is needed for PFAS fluorinated gases irrespective of any regulatory overlap. Even if the REACH restriction produces partial overlaps with the regulatory measures under the F-gas Regulation and the MAC Directive, both RAC and SEAC agree that compliance with these is not sufficient to achieve the objectives under the universal PFAS Restriction as many PFAS substances and uses are currently falling through the regulatory cracks.[17]

A broad restriction under REACH covering all PFAS as a group would:

- Limit as many uses as practically possible and thereby minimise emissions and human and environmental exposures to PFAS-containing fluorinated gases and their degradation products, such as TFA;
- Include currently unknown and future PFAS and PFAS uses; and
- Prevent regrettable substitution of restricted PFAS with other PFAS with similar concerns.

That being said, even with a restriction in place, the F-gas and the MAC Directive will continue to add value to the regulation of fluorinated gases overall. Both legal frameworks are crucial to support minimising PFAS releases into the environment and related exposure until the applications of fluorinated gases and transport have transitioned to safer alternatives. Under the F-gas Regulation, the future Commission report envisaged for July 2027 on the availability of alternatives in mobile refrigeration and air conditioning with proposal for additional equipment bans where relevant,[18] would be a timely opportunity for the Commission to align the equipment bans with the PFAS restriction (where the PFAS fluorinated gases fall within the scope of the F-gas Regulation).

In light of these findings, the Commission should not exempt these sectors merely because F-gas/MAC legislation exists. While prioritizing environmental and health protection, the Commission should take the most stringent regulatory action under REACH, taking into account RAC and SEAC's opinions.

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[17] RAC Opinion, p. 91, SEAC Draft Opinion, p. 41.
[18] See reports and reviews required under Article 35 of the F-gas Regulation.

Recommendations and suggested legal route for combining the legal frameworks

Scenarios for overlap	Suggested legal route
A. Quantitative controls and production restrictions	
The HFC quota system under Articles 16–17 and Annexes VII-VIII of the F-gas Regulation progressively restricts the quantities of certain HFCs placed on the market, but does not cover all PFAS fluorinated gases or address their PFAS-specific risks. The system applies to HFCs listed in Section 1 of Annex I, and operates on the basis of CO2 equivalents.	The proposed REACH restriction would apply independently of the HFC quota system. PFAS fluorinated gases falling within the scope of both frameworks would need to comply with both sets of requirements, while PFAS fluorinated gases outside the quota system would be subject to REACH only. Compliance with the quota system, would not, in itself, demonstrate that PFAS-related risks are adequately controlled or justify a derogation under REACH. This is consistent with SEAC's general conclusion that the F-gas Regulation does not fully address the concerns underlying the proposed PFAS restriction.[19]
Article 16(4) of the F-gas Regulation allows the Commission to grant temporary exemptions from HFC quota requirements for specified applications, products or equipment, while the proposed REACH restriction may prohibit the relevant PFAS use.	An exemption from the HFC quota requirement would not exempt the relevant substance or use from the proposed REACH restriction. Both frameworks would need to be complied with independently. Where a temporary derogation in the REACH restriction is proposed, the Commission should assess its justification, duration and conditions independently, taking into account the availability of suitable alternatives and the objectives of both frameworks.
Articles 14-15 and Annex V of the F-gas Regulation limit the production of HFCs through the allocation of production rights by the Commission, while the proposed REACH restriction may prohibit the production of relevant PFAS fluorinated gases.	The proposed REACH restriction should address PFAS-related risks that remain outside the scope of the HFC production restrictions. Production rights granted under the F-gas Regulation would not exempt an undertaking from the applicable REACH restriction, as the allocation of production rights are only partially informed by technical and economic feasibility.
B. Placing-on-the-market prohibitions and use restrictions	
An application will be prohibited under Article 11(1) and Annex IV of the F-gas Regulation under the F-gas Regulation, while the proposed REACH restriction would prohibit it before that date.	Both frameworks would need to be complied with independently. SEAC recommends considering specific temporary derogations under REACH to align with future F-gas prohibitions, where those prohibitions already address the identified risk. [20] However, alignment should not be automatic, but rather based on a case-by-case assessment. Compliance with the F-gas Regulation would not, in itself, demonstrate that PFAS-related risks are adequately controlled or justify a time-limited derogation under REACH. Where a temporary derogation in the REACH restriction is proposed, the Commission should assess its justification, duration and conditions independently, taking into account the availability of suitable alternatives.

[19] SEAC Draft Opinion, p. 25.
[20] SEAC, Draft Evaluation - Applications of fluorinated gases, p. 64.

An application is covered by a GWP-based prohibition under Article 11(1) and Annex IV of the F-gas Regulation, but the prohibition does not cover all relevant PFAS fluorinated gases. For example, a prohibition applying to fluorinated greenhouse gases above a specified GWP threshold, leaving lower-GWP PFAS fluorinated gases permitted.	The proposed REACH restriction should address PFAS fluorinated gases that remain permitted under the F-gas Regulation. PFAS fluorinated gases falling within the scope of both frameworks would need to comply with both restrictions independently. In line with SEAC recommendations, a ban of lower-GWP PFAS fluorinated gases would be complementary to the existing prohibitions in Annex IV of the F-gas Regulation.[21] The Commission should avoid extending REACH derogations to fluorinated gases that remain permitted solely because their GWP falls below the relevant threshold.
An application is covered by an Annex IV prohibition targeting specific categories of fluorinated gases, such as Annex I gases or HFCs, but other relevant PFAS fluorinated gases remain permitted.	The proposed REACH restriction should address PFAS fluorinated gases that remain permitted because they fall outside the substance categories covered by the Annex IV prohibition. Where both frameworks apply, their requirements would need to be satisfied independently. Consistent with SEAC's recommendations, any derogation under REACH should distinguish substances already covered by an effective F-gas prohibition from those whose PFAS-related risks remain unaddressed.[22] The fact that a PFAS fluorinated gas falls outside a prohibition targeting Annex I gases or HFCs would not prevent its restriction under REACH.
An application is covered by an Annex IV prohibition but the proposed REACH restriction provides for a derogation.	A derogation under REACH would not override an existing prohibition under the F-gas Regulation. The F-gas prohibition would continue to apply to fluorinated greenhouse gases within its scope, while PFAS fluorinated gases outside the scope of that prohibition could benefit from the REACH derogation, subject to its conditions.
Article 13 of the F-gas Regulation prohibits specified uses of fluorinated greenhouse gases, including certain servicing and maintenance uses, but other PFAS fluorinated gases or applications remain permitted.	The proposed REACH restriction should address PFAS fluorinated gases and uses that remain permitted under Article 13. Where both frameworks apply, operators would need to comply with both restrictions independently. SEAC specifically recommends aligning proposed REACH derogations for maintenance and refilling of existing HVACR equipment with Article 13(3)–(5) of the F-gas Regulation.[23] Additional PFAS-specific emission minimisation measures should be considered where necessary.
The MAC Directive prohibits fluorinated greenhouse gases with a GWP above 150 in specified mobile air-conditioning systems, but lower-GWP PFAS fluorinated gases remain permitted.	The proposed REACH restriction should address PFAS fluorinated gases that remain permitted under the MAC Directive, including those with a GWP of 150 or below. PFAS fluorinated gases falling within the scope of both frameworks would need to comply with both restrictions

[21] SEAC, Draft Evaluation - Applications of fluorinated gases, p. 68-69.
[22] SEAC Draft Evaluation - Applications of fluorinated gases, p. 7-8.
[23] SEAC, Draft Evaluation – Applications of fluorinated gases, p. 78.

	independently. A derogation under REACH would not override the existing MAC restrictions, while compliance with the MAC Directive would not, in itself, demonstrate that PFAS-related risks are adequately controlled. In line with SEAC's recommendations, REACH remains the most appropriate measure to address PFAS-related risks in mobile air conditioning.[24] While SEAC recognises low substitution potential for PFAS refrigerants in mobile air-conditioning and heat-pump systems it crucially cannot conclude whether the proposed derogations are justified, particularly in view of the substantial additional emissions identified by RAC.[25] Where a temporary derogation in the REACH restriction is proposed, the Commission should assess its justification, duration and conditions independently, taking into account the availability of suitable alternatives.
An application or PFAS fluorinated gas is not subject to a specific prohibition under the F-gas Regulation or MAC Directive, but would be prohibited under the proposed REACH restriction.	The proposed REACH restriction would address the existing regulatory gap by prohibiting the relevant PFAS fluorinated gases or uses that remain permitted under the F-gas Regulation / MAC Directive, subject to any applicable derogations. The absence of a prohibition under the F-gas Regulation or MAC Directive would not, in itself, justify a derogation under REACH.
C. Exceptions and exemptions	
An application benefits from a safety-related exception expressly provided for in Annex IV of the F-gas Regulation, but the proposed REACH restriction would prohibit the relevant PFAS use.	An exemption under the F-gas Regulation would not automatically exempt the relevant substance or use from the REACH restriction as the F-gas Regulation does not foresee a complete phase-out of the substances covered by this exemption. In this regard, SEAC recommends the Commission to consider the addition of a time limit to these time-unlimited exemptions, "as otherwise emissions would continue indefinitely".[26] Setting a time-limit either in the REACH restriction and/or the F-gas Regulation would be complementary to the provisions in the F-gas Regulation. However, any time limit should be assessed in light of the specific application and the availability of alternatives and should be proportionate.
An application benefits from another application-specific exception under Annex IV, such as an exception concerning certain low-temperature refrigeration, cascade systems or medical applications, while the proposed REACH restriction would prohibit the relevant PFAS use.	An application-specific exception under Annex IV would not override an applicable prohibition under REACH. The Commission should assess whether a corresponding REACH derogation is justified in light of the particular technical or functional requirements of the application and the availability of suitable alternatives. Where the F-gas exception has no fixed expiry date, the Commission should consider whether any REACH

[24] SEAC, Draft Evaluation – Transport, p. 7.
[25] SEAC, Draft Evaluation – Transport, pp. 8-9.
[26] SEAC, Draft Evaluation - Applications of fluorinated gases, p. 64.

	derogation should be time-limited, taking into account SEAC's recommendations where relevant.
An application benefits from a temporary exemption authorised by the Commission under Article 11(5) of the F-gas Regulation, while the proposed REACH restriction would prohibit the relevant PFAS use or provide for a time-limited derogation.	An exemption granted under Article 11(5) would not override a prohibition under REACH. Where both frameworks permit the use temporarily, operators would need to comply with the conditions and deadlines established under each. The Commission should consider alignment where justified, but the scope and duration of any REACH derogation should be assessed independently.
An application benefits from the eco-design exemption under Article 11(2) of the F-gas Regulation, but the proposed REACH restriction would prohibit the relevant PFAS use or provide for a time-limited derogation.	The eco-design exemption under the F-gas Regulation would not automatically exempt the relevant PFAS fluorinated gases from the REACH restriction. Where REACH provides for a time-limited derogation, its conditions and duration would need to be satisfied independently. The Commission should consider whether continued PFAS use is justified under REACH, taking into account the objectives of both frameworks and the availability of alternatives.
D. Emission prevention, recovery and other risk management measures	
The F-gas Regulation imposes emission prevention and containment obligations under Article 4 and leak-checking and detection requirements under Articles 5–6, while the proposed REACH restriction would introduce additional PFAS-specific emission minimisation measures.	Risk management measures under both frameworks may be valuable, depending on the risks they aim to minimise. However, compliance with the emission prevention and leak-checking obligations under the F-gas Regulation would not, in itself, demonstrate that PFAS-related risks are adequately controlled. For the PFAS restriction, RAC advises implementing several new measures to minimise PFAS-specific emissions.[27] To overcome future complexities in compliance, where measures address similar risks, coordination should be considered to avoid unnecessary duplication without weakening environmental protection. After the PFAS restriction is adopted, guidance will be needed to clarify the requirements applicable to operators across frameworks.
Articles 8-9 of the F-gas Regulation imposes recovery and destruction obligations for fluorinated greenhouse gases in specified equipment, while the proposed REACH restriction may impose additional PFAS-specific requirements.	Recovery and destruction obligations under the F-gas Regulation would not, in themselves, demonstrate that PFAS-related risks are adequately controlled, particularly where releases occur before recovery or where recovery is incomplete. [28] For the PFAS restriction, RAC advises implementing several new risk management measures to minimise PFAS-specific emissions. Where obligations overlap, guidance will be needed to clarify the requirements applicable to operators across frameworks.

[27] RAC Opinion, p. 91, 104.
[28] RAC Opinion, p. 59.

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