THE VOICE OF THE REFRIGERATION, AIR-CONDITIONING AND HEAT-PUMP INDUSTRY IN EUROPE

European Parliament arguments on F-gas Regulation revision lack substance

Pragmatism can achieve a workable regulation

Based on erroneous assumptions, the European Parliament's amendments on the F-Gas Regulation Revision would mean that only very limited types of installations will be available for RACHP users, and will not always be compatible with their needs. To be socially, economically, and politically feasible, the EU needs to maximise choice and demand for RACHP, rather than impose restrictions that rely on so-called natural (non-fluorinated) refrigerants. These restrictions do not provide universal solutions and would not serve the European economy.

EPEE, as the voice of Refrigeration, Air Conditioning and Heat Pump industry (RACHP), would like to highlight:

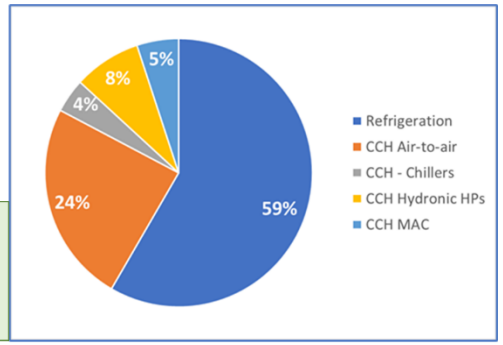
- Natural refrigerants can be a solution, but not in all cases. Natural refrigerants cannot provide the perfect refrigerant solution for all applications from energy efficiency and affordability point of view. Fluorinated refrigerants are needed as well to maximise demand for non-fossil fuel-based heating for homes and offices.
- Ill-considered bans will harm the European industry. It is not feasible to assume that non-fluorinated alternatives will already have a substantial market share by the end of this year and a 100% by 2025. These targets will only end in failure.
- The assumptions made by the European Parliament are not supported with detailed impact assessments, nor detailed studies for each application on the market.

The EP arguments used in Parliamentary discussions and debates, and detailed below, are based on narrow interests.

As such, please find below the detailed counterarguments from EPEE, which offer a wider, more sober assessment based on the realities of the market and the granularity of the RACHP industry.

Answer to the EP's arguments

Scope	Parliament proposal	Arguments	
		Parliament	**EPEE**
Stationary Refrigeration Annex IV (10a-14a)	Ban the use of fluorinated greenhouse gases in this sector	Stationary refrigeration, which includes domestic, commercial and industrial refrigeration applications, no longer requires the use of fluorinated greenhouse	Globalising domestic, commercial and industrial applications is a mistake based on a lack of understanding of the market. It is necessary to have a variety of applications. For example, in commercial refrigeration, a distinction needs to be made between supermarkets and hypermarkets, and small shops and retail (butchers, bakers, patisseries,

		gases with an abundance of natural refrigerant alternatives available	greengrocers, fishmongers, bars, restaurants, hotels, etc.), as well as the operating temperature (positive or negative cold). Process cooling/heating, another example, includes chiller applications. The majority of refrigeration equipment is assembled on site and installed indoors or partially indoors. Safety rules are very different from those of systems installed entirely outdoors.
		The preparatory study to the Impact Assessment modelled the market penetration rate of natural alternatives under different phase-down scenarios. Under IA option 3, the use of natural alternatives for all sub sectors was above 90% on average between 2024 and 2036.	The impact assessment shows a number of assumptions that lead to overestimating the speed of the refrigerant transition in the RACHP sector between 2024 and 2030. Contrary to the assertions of the study, individual sectors require much more than four years to transition to new refrigerants – from R&D development until the market reaches full production and mass deployment, installation and adoption by consumers.
		Even ultra-low temperatures can now be reached with refrigerators running with natural alternatives using air	Using air for ultra-low temperatures is still in development phase and in any case will not be suitable and affordable for all applications.
		HFC quotas for this sector are better used in other sectors where the transition away from F-gases is more difficult	Quota will also be needed for the servicing of existing refrigeration equipment. The HFC Outlook EU Model shows that 59% of the need for servicing existing equipment is dedicated to refrigeration. For servicing the existing RACHP bank, refrigeration applications are dominant 

		A transition to natural alternatives protects SMEs from increasing servicing and maintenance obligations	This statement is not correct. More training and caution are required due to flammable (propane) and toxic (ammonia) refrigerants and the high pressure of CO_2.
		Different natural refrigerants compete against each other in this sector, palliating possible concerns related to competition law	So-called natural refrigerants are not used for all applications, which creates a competition law issue.
Transport Refrigeration Annex IV (15a)	A new ban for transport refrigeration which bans the use of fluorinated greenhouse gases in new vans and ships in 2027, in new trucks, trailers and reefer containers in 2029.	Transport refrigeration units typically have high leakage rates (up to a yearly 40% leakage rate), short lifetimes and poor end of life refrigerant recovery making this a key subsector for urgent action to address fluorinated gas emissions. For all these subsectors, F-gas free alternatives are already on the market, but uptake has been slow necessitating an Annex IV ban to motivate the market to shift.	Transport has seen a lot of improvements over the last 10 years and there is still a strong demand for servicing the existing fleets. The fleets cannot be retrofitted easily due to the ATP regulation. The Council's position on strengthening containment measures is addressing the issue of leakages in a better way compared to a ban.
		Vans: under the proposed proportionate action scenario this subsector would reach average penetration rate of 87.1% in new installations of natural alternatives in 2024-2036. This would be at a significant negative emission reduction cost of EUR -109/CO_2e. Natural alternatives (mainly CO2- and hydrocarbon-based systems) for transport refrigeration in vans are already available on the market. This sector is able to	We question the rationale that vans could transition quicker than trucks & trailers to natural refrigerants; our arguments below cover all segments of road transport refrigeration. Transport refrigeration is a very fragmented market with multiple applications (single temperature, multi temperature, fresh, frozen, high ambient, low ambient…) and multiple types of mounting on vehicles (roof top, roof cut, front mount, undermount...). Around 50+ different product models are needed to cover all those configurations. Existing natural alternatives (as mentioned by EP) only cover around 10% of all product models needed.

		transition quickly with the right signal. If left untouched, industry would only move from HFC-404a (around 4000 GWP) to HFC 452A (GWP 2000).	Moreover, to be viable solutions for end users, alternatives must comply with following criteria • Covering full scope of product range needed by business sector • Being available from more than one manufacturer (Avoid monopoly situation) • Ensuring necessary production capabilities to cover full market need • Having a proper aftermarket network in place (Technician training, spare parts availability, full geographical coverage) It is worth noting that road transport refrigeration remains a small consumer of refrigerants, accounting for about 2% of EU consumption. Since 2017, most new products for road transport refrigeration have already moved from HFC-404a (around 4000 GWP) to HFC-452A (GWP 2000). The alternative technologies proposed are still at the prototype stage and are not yet tested on a large scale or commercially available. R&D should not be confused with availability: for example, liquid nitrogen solutions are 100% emissions solutions that are only possible over very short transport times, provided there are no traffic jams.
		Trucks and trailers: under the proportionate action scenario, this subsector would reach average penetration rate of 82% natural alternatives for new installations between 2024-2036. This would be at a significant negative emission reduction cost of -EUR 285.5/CO2e. Given this high penetration rate and negative cost of transition as well as the abundance of fluorinated gas alternatives (including CO_2, cryogenic CO_2, cryogenic liquid nitrogen, CO_2 and propene, CO_2 plate freezers, dry ice and CO_2 as well as propane prototypes currently being tested) this sector is able to transition quickly with the right signal.	
		Ships: under the proportionate action scenario, this subsector would reach average penetration rate of 95.8% natural alternatives in new installations between 2024-2036. This would be at a negative emission reduction cost of -EUR 3.6/CO2e. Given this high penetration rate and negative cost of transition as well as the abundance of fluorinated gas alternatives	Marine classification (BV, DNV, etc.) societies currently don't allow flammable refrigerants. Putting a specific ban on ships will relocate new equipment installation and maintenance to less restrictive countries. This will have a major socio-economic impact on the European maritime sector. This could also drive away ships from sailing under European flags and would not result in any environmental benefits globally.

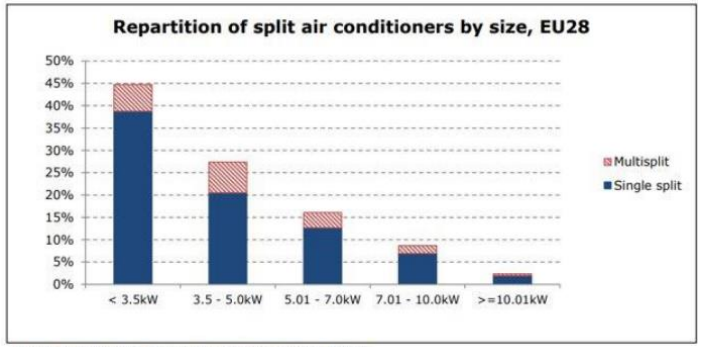
		(including CO_2 and ammonia as well as CO_2-ammonia cascade systems and CO_2 plate freezers) this sector is able to transition quickly with the right signal	
		Heat pump bans: For all heat pumps, especially those considered in Annex IV(16), (17), and (18 a-d), European universities, research and technical institutes support the transition towards natural refrigerants, especially hydrocarbons. The experts state that "the use of natural refrigerants leads to an overall sustainable operation of heat pumps. These working fluids are a clear decision for environmental protection but also provide the industry with a long-term reliable perspective, allowing the focus to lie on further optimization rather than on adopting systems to new refrigerants every few years.	Several manufacturers are launching or announcing propane residential self-contained hydronic HPs for outdoor installation. The availability of such products on the market will indeed grow. However, this is not representative of the full heat pump market and cannot simply be extrapolated to all heat pump solutions. A granular approach is needed.
Self-Contained AC and Heat Pumps Annex IV(17) and Council Annex IV(16)	Banning the use of fluorinated greenhouse gases in this subsector, while providing one more year to do so	Plug in room air conditioners and heat pumps have already by and large moved to the safe and efficient use of propane in the EU market. Self-contained air-conditioning and heat pump equipment (also referred to as monoblocs) producers are well underway with their conversions to propane with several dozens of models available on the European market. Moreover larger manufacturers have been announcing new	Certain heat pumps can indeed transition to flammable refrigerants (propane), including for residential hydronic monobloc heat pumps installed outdoor. And indeed, many announcements have been made in this sense recently by many manufacturers. However, such examples do not mean that all heat pumps can make this transition due to safety, installations, local obligations, consumer needs. Many heat pumps are installed (partially) indoor, and their safety rules are very different compared to systems fully installed outside. Taking into account existing and future safety standards, a self-contained hydronic HP containing a flammable refrigerant such as R-290 (propane) is limited to a maximum

		models and the intention to move to propane heat pumps this past year.	charge of 5kg in general access outdoor; it cannot be installed in the direct vicinity of the building or homes' openings (windows, doors, light walls, air inlet or outlet from ventilation) or near any ignition source. This is a safety issue, as in the event of a leak, it prevents a flammable refrigerant from entering the building. Going above this 5kg requires establishing a restricted access area around the heat pump/chiller, which is not possible in residential and light commercial application. This drastically reduces the installation options for R-290 chillers, thus leading to a limited capacity range where A3 equipment could be used. Large self-contained air conditioning systems (rooftops) are also widely used in commercial (supermarkets, cinemas, conference rooms ...) and IT application. The use of highly flammable refrigerant for this type of equipment is not possible from safety point of view (1kg limit in safety standard and prohibition in local regulation as these buildings are open to general public). Fluorinated and non-fluorinated low-GWP alternatives all have their place on a case-by-case basis. It is essential to select the most energy efficient, safe alternative. This was recognised partially in the F-gas Regulation and the revision proposal. In addition, the wording of the ban is unclear. What is meant with 'plug-in', and what is considered a 'monobloc' versus a 'self-contained' heat pump? A portable heat pump is plug-in, monobloc and self-contained. However, a small chiller is considered self-contained and monobloc but not plug-in. And a hydro-split heat pump is self-contained, but not plug-in or monobloc. To avoid this confusion, the joint industry position proposes to clarify the scope as follows: 17) Stationary self-contained air conditioning and heat pump equipment:

			(a) Plug in self-contained air conditioning & heat pump equipment moveable between rooms by the end user that contain fluorinated greenhouse gases with GWP of 150 or more; Date of prohibition: 1 January 2025 (b) Stationary self-contained hydronic air conditioning and stationary self-contained hydronic heat pump equipment designed for outdoor installations below or equal to 12 kW* that contain fluorinated greenhouse gases with GWP of 150 or more except when needed to meet safety requirements; Date of prohibition: 1 January 2029 * *rated capacity as defined in the relevant Ecodesign regulations* (c) Other stationary self-contained air conditioning and heat pump equipment that contain fluorinated greenhouse gases with GWP of 750 or more, except when needed to meet safety requirements. Date of prohibition: 1 January 2030
		There are no technological boundaries for the transition to propane heat pumps. Propane heat pumps have a very high energy efficiency, with even sufficient technological room to move to the highest energy labels in the market.	Technical feasibility is not the only factor to look at while introducing a product ban. Affordability, energy efficiency and the scope of application in respect to safety standards and building codes/regulations are equally important. Safety standards and building codes and regulations restrict the number of buildings, particularly existing buildings, in which installation of propane heat pumps is possible on the ground/in the field.
		Compared to HFC-based heat pumps, any cost increase is marginal at current prices for heat pumps. Moreover, natural refrigerants are much cheaper than F-gases as they cannot be patented and thus reduce servicing and maintenance costs	This is too generic considering the variety of heat pumps applications (residential, monobloc, chillers, rooftops, etc.).
		Currently, many companies use HFCs but there is also a new growing generation of	We often hear the argument that banning all F-gases and weakening the Annex IV will favour the EU manufacturers to provide those technologies to the above sectors. But this

		chemical blends mixed with HFOs. These blends are mostly PFAS substances, produced by Chinese, American and Japanese fluorochemical companies. With the upcoming PFAS ban, we should not encourage the use of these F-gases in heat pumps	argument disregards the global market environment where today supply chains are global. Companies claiming full transition actually cover a small part of the market needs; they fail to consider the broader picture while focusing on the sole equipment they produce. All global players are investing in Europe to deliver on REPowerEU and the NZIA. EU and non-EU manufacturers also announced large investments in Europe over the years. A coalition of 15 industry associations, including EU manufacturers, SMEs and others, have warned against a 'one-size fits all solution', the need for an ambitious but realistic phase down, and granular bans to ensure a successful review. The revision of the F-Gas Regulation is not the time to discuss PFAS as the consultation from ECHA is still ongoing. EPEE will provide data to ECHA regarding the PFAS dossier. The Commission's impact assessment considered all types of refrigerants, not only non-fluorinated.
Split AC and Heat Pumps Annex 18(a)-(d) and Council Annex 18(a)-(d)	Ban small split systems below 12kW and district heating systems (by making a distinction between below and above 200kW) using fluorinated greenhouse gases, while providing one more year to make this transition. Medium split systems can still use F-gases with a GWP below 750	The transition is underway. The market is shifting towards non-HFC alternatives for AC and heat pumps for 12 kW and below and above 200 kW – we need to prevent backsliding with a different signal coming from the proposed bans.	Today, there is no split unit available on the EU market using R-290, neither single splits nor multi-splits, therefore, it cannot be assumed the transition is underway. The GIZ study is not a reference to evaluate the possibility to move to R-290 in systems up to 12kW, because even the GIZ study limits its study of propane at 10kW, and multi-split systems were not at all considered. We found several flaws in the GIZ study: • Heating capacity and efficiency are not properly analysed • Refrigerant charges are underestimated • Costs for additional safety measures are underestimated • Cost of piping diameters and resulting product size are underestimated • Servicing cost for repairing leakages are overestimated • No analysis was done for the growing share of multi-split systems

			As a result, we believe the report cannot conclude that hydrocarbons can be used in all split systems up to 12 kW in a manner as presented in this study.
		Single split: Given the recent adoption of standard IEC-60335-2-40, which was updated after the COM proposal, the proposed ban in split systems under paragraph 18 (up to 12 KW) can be met with propane. Though technically and economically feasible, this might take a bit more time, due to the lower market penetration of these models. Although the market can clearly move in that direction, looking at recent announcements. This is why the parliament provided an extra year	We note that the Parliament considers that ban 18b covers only single splits and that for this product groups use of natural refrigerant could be an option. However, it is to be noted that as currently phrased proposal 18b covers any split system below 12kW (single splits, multi-splits, split heat pumps, multi-functional splits). As such, 15 industry associations proposed to limit ban 18b to single splits 6kW and ban 18c with a GWP750 for other split systems. The IEC 60335-2-40 ed 7.0 is indeed adopted, but this does not mean all splits up to 12kW can use propane. The standard increases the total charge of the system allowed in a given indoor area if specific mitigation measures are applied (capped to 1kg). While the amount of charge required for the operation of the system depends on the total capacity, efficiency in both heating and cooling of the system and the total piping required for installation, the allowed charge depends on the dimension of the smallest room served by an indoor unit. Which significantly reduces the possibility to install these systems, especially higher efficiency and capacity range, even when making use of all of the mitigation measures allowed by the safety standard. In addition, the standard is still at IEC level, and not yet transposed at EN level and it will take years before such transposition is completed. Although **multi-split systems** are included in the scope of ban 18(b) as it is currently written, neither the Commission's Impact Assessment or the GIZ study assessed the impact of such a ban on these systems. With multi-split systems, the outdoor unit is connected to several indoor units, with several refrigerant pipes connected on-site. These systems are highly efficient, offer the possibility to connect to a variety of indoor unit types including domestic hot water production thanks to heat recovery. They can be needed in essential applications (small clinics, nursing homes, medical and health sectors). They are

			also seen as the most energy efficient option to replace electrical heaters or gas convectors in dwellings with no hydronic distribution network, incl. in renovation. According to the Ecodesign Lot 10 study, they represented around 15-20% of the split heat pump market.  *Figure 7: Split sales distribution by size, source BSRIA.* For **single split systems,** the GIZ study did not accurately assess the heating capacity and efficiency (the report looked at +7°C, while products in EU are designed to deliver heating capacity at much lower temperatures, thus requiring more charge). It is therefore not just a matter of providing more time. With the currently proposed ban 18(b), the safety exemption would need to be used in 30 – 40% of the cases, in some countries even in 50%. Industry therefore suggests clarifying the scope as follows to reduce the amount of exemptions that would be needed: <u>Joint industry proposal:</u> (18) Stationary split air-conditioning and split heat pump equipment:

			(a) **Stationary** single split **air to air** systems **and fixed double duct appliances** containing less than 3kg of fluorinated greenhouse gases listed in Annex I, that contains, or whose functioning relies upon, fluorinated greenhouse gases listed in Annex I with GWP of 750 or more; Date of prohibition: 1 January 2025 (b) **Stationary single** split **air to air** systems of a rated capacity up to and including ~~12~~ **6** kW* **and fixed double duct appliances of a rated capacity up to and including 3.5 kW*** containing, or whose functioning relies upon, fluorinated greenhouse gases with GWP of 150 or more, except when needed to meet safety ~~standards~~ **requirements**; Date of prohibition: 1 January ~~2027~~ **2030** ** rated capacity as defined in the relevant Ecodesign regulations* (c) **Other stationary** split systems ~~of a rated capacity of more than 12 kW~~ containing, or whose functioning relies upon, fluorinated greenhouse gases with GWP of 750 or more, except when needed to meet safety ~~standards~~ **requirements**. Date of prohibition: 1 January ~~2027~~ **2029**
		District heating: these can play a pivotal role in the decarbonising of heating and can greatly minimize emissions. However, fluorinated gas equipment with high GWP is being installed despite the availability of natural alternatives, namely ammonia and CO2. Under the maximum feasibility phase down, this subsector would reach an average penetration rate of 97.8% of	Splits are not used for district heating and district heating cannot replace splits systems in home: not all houses can be connected to district heating grid infrastructure, district heating do not always deliver cooling, district heating requires water pipes installations in buildings, and not all building are adapted.

		natural alternatives in new installations between 2024-2036 (70% in proportionate action, the difference being a shift to HFOs). This would be at a significant negative emission reduction cost of -EUR 389.9/CO2e.	
		The bans proposed by parliament would unlock investments in clean alternatives and European production lines, as we already see happening with monoblock heat pumps	Bans would not incentivize investments in Europe due to the short timing.
		Medium Split Systems: small and large split systems are ready to convert to non-HFC alternatives, with only medium split systems requiring more time. This is mainly due to the safety standards not being ready in this segment, and the lack of systems' optimisation.	We note that Parliament proposed in 18c to rightfully maintain a GWP of 750 for the refrigerant used in those systems. This is supported by industry. Indeed, for larger splits (above 7kW), even the Commission study did not recognize the possibility to use propane in medium and larger splits and recommended to set a GWP750 limit for those systems. The charge of flammable refrigerants required for medium and large systems is higher than the charge allowed in the latest IEC standards ed 7.0. So those systems, based on flammable natural refrigerants, could not be even compliant on the EU market according to latest standards. For this reason, we recommend for splits above 6kW to allow refrigerant with a GWP of 750 or less. It is important as well to note that those systems cannot be replaced by other indirect systems, due to installations conditions, consumer needs, building types etc.
Mobile Air-Conditioning Annex IV(23a)	Ban of mobile air conditioning in passenger and cargo ships, buses, trams, and trains that contain, or whose functioning	Natural alternatives to HFCs and HFOs are available and market ready or already on the market, depending on the subsector. In general, putting a ban into place for mobile AC is important, because while the technological feasibility is clear, these sub	Marine classification (BV, DNV, etc) societies currently don't allow flammable or toxic refrigerants. Putting a specific ban on ships will relocate new equipment installation and maintenance to less restrictive countries. This will have a major socio-economic impact on the European maritime sector. Moreover, the leakage rate of mobile unit is not higher than the leakage rate of other equipment.

	relies upon, fluorinated greenhouse gases by 2029.	sectors might move into HFOs (PFAS) alternatives to HFCs if they do not get a strong regulatory signal. In addition, being set up on moving systems, their leakage rates are higher than stationary systems	
		Cargo ships: the 2012 Preparatory study included a feasible ban date for the subsector of cargo ships in 2020. This was not included in the 2014 Regulation and consequently this subsector is still consuming high volumes of fluorinated gases. Under the maximum feasibility action scenario this subsector would reach average penetration rates of 90.8% of natural alternatives in new installations between 2024-2036. This would be at a significant negative emission reduction cost of EUR -89.2/CO2e. Alternatives are already available including ammonia/brine systems. **Passenger ships:** cruise liners typically have extremely large AC systems using centrifugal chillers with up to 10,000 tonnes of HFC-134a. Under the maximum feasibility action scenario this subsector would reach average penetration rates of 98.5% natural refrigerants in new installations between 2024-2036. This	Marine classification (BV, DNV, etc) societies currently don't allow flammable or toxic refrigerants. Putting a specific ban on ships will relocate new equipment installation and maintenance to less restrictive countries. This will have a major socio-economic impact on the European maritime sector. This could also drive away ships from having European flags, and hence would not result in any environmental benefits globally.

		would be at a negative emission reduction cost of EUR -98.8/CO2e. Alternatives are already available including water or air.	
Chillers Annex IV(23b)	Ban of mini, displacement and centrifugal chillers that contain, or whose functioning relies upon, fluorinated greenhouse gases by 2027.	Alternatives using natural refrigerants are available on the market, by European companies, using water or hydrocarbons	The proposal from the Parliament shows confusion on the scope of the different bans proposed by the European Commission. Chillers can be used for human comfort (hotels, offices,…), refrigeration (labs, cold storage warehouses, data centers) or process cooling / heating (food processing, nuclear power plants,…) and are, depending on their intended use, already covered under ban 16 for self-contained heat pump equipment or under ban 12 for self-contained refrigeration equipment. As such, the purpose and scope of this additional ban proposed by the EU parliament is unclear. Several chiller applications, such as for example data centers and nuclear plants, don't accept flammable refrigerants. Using water is not a viable option given the costs and the limited application range (only possible for positive temperatures). In addition, it is not clear what is meant by mini chillers, to which capacity is the Parliament referring too? To which functionalities?
		Proven cost-effectiveness with further cost reductions expected through economies of scale.	The most cost-effective solution today for bigger capacities (DHC, for ex) is centrifugal chillers using HFOs.
		On mini chillers, they require very little refrigerant charge and can rely on propane according to the 2021 preparatory study to the IA. A clear market signal avoids the market penetration and use of mid-GWP HFCs, HFOs and HFC blends.	Taking into account existing and future safety standard, an outdoor unit from a chiller containing a flammable refrigerant such as R-290 (propane) is limited to a maximum charge of 5kg in general access outdoor, it cannot be installed in the direct vicinity of the building or homes' openings (windows, doors, light walls, air inlet or outlet from ventilation) to prevent in case of leak highly flammable refrigerant to enter the building and should be away from any ignition source. Going above this 5kg requires establishing a restricted access area around the heat pump/chiller which is not possible in residential and light commercial application. This drastically reduces the installation options for R-290 chillers, thus, leading to a limited capacity range where A3 equipment could be used

		On displacement and centrifugal chillers, displacement (both small and large) and centrifugal chillers currently have multiple natural refrigerant alternatives that are expected to dominate the market going forward. The use of F-gases in these sectors unnecessarily consumes HFC quotas and contributes to illegal HFC trade.	Ammonia or propane chillers are not suitable for all buildings / situations, considering safety, efficiency, building codes, and more. The assumptions made by the European Parliament are based on incorrect information and without sufficient knowledge of market and installation requirements for chillers.