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EHPA comments to the technical paper from Öko-Recherche

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"HFC alternatives in split air-conditioning systems"

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Introduction

EHPA would like to thank the European Commission and Öko-Recherche for the opportunity given to provide written comments on the Briefing paper "HFC alternatives in split air-conditioning systems".

Before entering the details of the paper, it is important for EHPA to highlight the contribution of heat pumps and its industry in the decarbonisation of the heating sector and further in achieving the EU climate neutrality ambition by 2050. The use of heat pumps (all types considered) to heat Europeans' homes allows to drastically reduce CO₂ emissions from heating compared to other technologies.

We will outline below why we recommend maintaining the 2025 ban¹ unchanged.

Scope

We believe it is important that the report does not only look at single-splits air-conditioners as a cooling equipment but as a reversible equipment that allows both for cooling and heating functions. The Ecodesign study for Lot 10 Task 2 final report (page 20) confirms that reversibility is an essential characteristic of AC sales today and that "cooling only units have almost extinguished" from the EU market, more than 99% of the market of splits are reversible units (page 48, same report). In practice, split air conditioners are increasingly used for heating purposes and even as the only heating source in homes in some cases. A recent survey made on 25,000 split type air conditioners installed in French homes and monitored by Internet shows that primary used function is heating (70% of functioning time)². Therefore, the heating dimension of splits is increasingly crucial on the EU heating market and its decarbonisation, compared to fossil fuel-based technologies.

Article 21.4 lists several important aspects when assessing potential alternative for the replacement of fluorinated greenhouse gases, such as: cost-effectiveness, technical feasibility, energy efficiency and reliability of the alternatives. Nevertheless, safety, even if not listed in Article 21.4 is a major criterion in such selection, to ensure the safety of users, workers and equipment as enshrined in the essential requirements of key European product legislation (LVD, Machinery). It is about safety throughout the whole lifecycle of a heat pump, from its design, its logistics/warehouses, transportation, installation and most importantly its use.

While EHPA notes the different categories of split air-conditioners outlined in the part 2 of the briefing paper, we would like to provide some further clarifications on the charge size, as indeed the charge is composed of the pre-charge amount of refrigerant but as well, in certain cases, the additional charge needed to top up the installation on site to connect indoor and outdoor units. This charge is not constant and depends among others on the installation, the design, the equipment, the different types of indoor units, the pipe length, the energy efficiency of the system, etc. Those parameters very much vary from one region to another. The total amount of actual refrigerant charge (pre-charged + possible charge on the field) should be taken into account in assessing the required charge volumes of the units. Furthermore, we think that the statements made in this paper are not valid for equipment being placed on the market with hermetically sealed or enhanced tightness/semi-hermetical refrigerant systems.

¹ See Regulation 517 / 2014 Annex III-15.

² Uniclimate 2020 study on air to air heat pumps functioning mode.

Finally, while we do see the importance of screening trends in other regions such as Asia, Middle East, results and trends cannot be extrapolated to the EU market without further analysis and consideration due to different climatic conditions, legislations and consumer's needs. Even if globalised, regional specificities remain on this market.

Relevance of alternatives

On energy efficiency:

Refrigerants amount have an important role for the efficiency of the whole air-conditioning system. Alternative refrigerants should not only be able to comply with the existing efficiency requirements defined by the Ecodesign legislation but the future ones as well. Ecodesign measures for this category of products are revised on a regular basis and minimum energy performance requirements consequently increased. The ErP Lot 10 (AC<12kW) is currently under revision. Therefore, it is essential for an alternative refrigerant to be able to meet not only existing but also future Ecodesign requirements.

On safety:

When it comes to safety, the current F-Gas regulation prescribes at national level safety and certification obligations for professionals servicing, installing, maintaining, repairing, as well as recovering the refrigerant of equipment containing F-Gases. However, only ATEX workplace directive defines a legal framework and obliges for competent personnel but there is no similar legal obligation set for installers of other types of refrigerants that are not F-Gases, like the A3 gases listed in the report. Especially for those types of gases (without any training and certification obligations for such operation, safe installation, servicing, etc.) safety is at stake and could be jeopardised. The absence of EU mandatory trainings and certification for installers and professionals handling A3 refrigerants is a barrier. It is therefore believed that also a formalised qualification, certification and registration structure scheme (QCR) would be required to make R290 a more viable alternative for single-splits air-conditioners³.

In addition, EHPA would like to provide further details regarding the IEC 60335-2-40:2018 standard. Work is currently undertaken to adapt the already published version into an EN standard. However, more time is needed as such a conversion typically includes harmonisation with the Low Voltage Directive and Machinery Directive. At constant charge, the ongoing revision of the IEC standard, if adopted, aims at allowing installation of the equipment in smaller rooms for A2L refrigerants. However, it does not provide for an increase of the maximum charge limit for A3 refrigerants. It will also still need to be adapted to an EN version and harmonized for EU product safety legislations after its international publication.

Technical feasibility

A wrong mathematical assumption is made that the range of products relates to cooling capacities below 12 kW based on "average" values. There is a wide variety of capacity ranges for units with a charge below 3 kg. Our analysis shows that the range of models in EU varies between 0.22 kg/kW and 0.63 kg/kW with an average of 0.35 kg/kW, which means a range span of 4.8 kW up to 13.6 kW with an average of 8.6 kW. Again, as noted earlier, these units do not only have cooling but also heating functions, which typically require more refrigerant per kW. We believe it is more appropriate to refer to ranges than a single average value.

Please find below some comments on the table on feasible refrigerants in split systems on page 4 of the report:

Comment on column GWP:

Refrigerants should be compared on their required CO₂eq charge (GWP x quantity) needed for the same equipment capacity and efficiency, and not on GWP only, because GWP is not a sufficient parameter to assess the potential contribution to the F-Gas phase down targets.

Comment on column "market readiness":

Equipment is market-ready when all the market conditions are fulfilled. For equipment with refrigerant systems that are not hermetically sealed or without enhanced tightness/semi-hermetical when being placed on the market such as split A/C, this includes the availability of qualified installers and service technicians, and the compliance with – where existing – EU legislation (energy, safety, end of life, ATEX...), and with state-of-the-art standards. There is no evidence shown in the report that the market readiness is already at a "yes" stage for R290 Split A/C on the EU market. CEN TC 182 is looking into this aspect under Mandate M/555. For example, there is no EU certification scheme for R290 installers. This box should be changed to "No".

³ GIZ, "R290 Split Air Conditioners Resource Guide Version 1.0", page 50.

Comment on column production capacity:

Actual production amounts are more relevant to compare than theoretical production capacities.

For example:

UNIDO presentation (MOP Rome 2019, slide 8) mentions that production capacities in China for R290 Split A/C are 6 mio units/year currently, with a future additional capacity of 6 mio units/year. However actual production does not yet take place in the same magnitude. Total Sales in China with subsidy of FEEO is 180,000 units (UNIDO, slide 8). Global total stock of R290A/C is 1 mio units and of R32 Split A/C 80 mio units (UNIDO, slide 6).

In theory, production capacity is available for R290. But production capacity is not the appropriate indicator here. Aggregated sales or stock would be a better criterion to consider.

Comment on mentioning of "High ambient regions":

This is relevant for the Middle East but not for a report that covers the needs of the EU market.

Comment on Energy efficiency:

As the report itself mentions, the theoretical COP of a refrigerant is only one side of the coin. The comparison should be made on equipment energy efficiency, based on a proper comparison on a same capacity benchmark, and taking into account the sizing of the components and the equipment materials needed to achieve a certain energy efficiency. This report did not do such an analysis, and therefore this column is misleading.

Market overview and trends

Figures 1 and 2 show stationary "refrigeration and A/C" equipment, which is a wider scope than the scope of this report. Since importers of equipment have to report in detail about the type of equipment imported, it could be useful to ask the EEA for specific data on the category "11A5 Stationary equipment for comfort cooling/heating, direct design: single split units charged with less than 3 kilograms of refrigerant". Since data have recently been uploaded on the F-Gas portal about 2019 results, the graph must be updated to also include 2019 data.

Page 6: R32 currently only applies to small capacity VRF. Higher capacities of VRF using R32 are not available on the market. Their use is very much limited by the technical standard EN378 or by some national regulations (cf. p. 6 paragraph mentioning France).

Conclusions

EHPA does not agree with the conclusions of the report. The report did not study all the related models that are necessary for the EU market. There should be an assessment that includes cooling and heating, all type of indoor units, long piping lengths, future energy efficiency MEPS levels and additional potential energy improvements (MEPS is not sufficient as consumers are encouraged to go for higher energy labels than the minimum).

Also, the report seems to underestimate the need for a mandatory qualification and certification programme for R290 installers, although recommended by GIZ as the experience in India has shown that this is necessary.

In addition, the circular economy aspects and efficient use of natural resources should also be taken into account.

For equipment with refrigerant systems that are not hermetically sealed or without enhanced tightness/semi-hermetical when being placed on the market such as split A/C, there is no certainty yet to what extent a level below 150 will be possible in a "medium" term considering all the aspects of technical feasibility, safety, energy efficiency and circular economy. Although research on refrigerants and standardisation is ongoing, it will still take time for a refrigerant to be recognised under ASHRAE, ISO and EN standards and for products and component to be developed using such refrigerants.

For all the reasons outlined above in this paper, we recommend maintaining the 2025 ban unchanged.