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BY EMAIL

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Joint Position paper on Article 21(4) and new small single-split air-conditioning systems under the F-Gas Regulation (EU) 517/2014

1. Abstract

This joint position paper has been developed by APPLiA and Eurovent. Its purpose is to explain and substantiate the comments and track-change modifications we have provided to Oko-Recherche's Briefing paper called "*HFCs and HFC alternatives in split air conditioning systems*". Therefore, this document should be read in parallel to the Briefing paper as provided by the Consultant in March 2020.

Further, the reader will find, on the third section of this document, our general position on Article 21(4) with regards to small single-split air-conditioning systems under the F-Gas Regulation (EU) 517/2014.

2. Supportive section to explain our comments and modifications brought to the Briefing paper of Oko-Recherche

Comment 1

First of all, we would like to remind the Consultant that the scope of Article 21(4) of Regulation (EU) 517/2014 involves reversible air-to-air *heat pumps* that are directly cooling, but also heating. Reversible air-to-air heat pumps are increasingly used not only to cool, but also to heat on the EU market, thus, contributing to the decarbonisation of the heating sector.

Comment 2

The Ecodesign Directive implementing regulation for air-conditioners with a rated capacity of up to 12kW, is a dynamic piece of legislation. Typically, its energy-efficiency requirements are getting stricter with time, at each revision. Whenever talking about "real" alternatives, we believe that the Consultant should not only take into account the current, but also the future energy-efficiency improvements required, as a result of upcoming (stricter) Ecodesign requirements, as well as further improvement potentials. Indeed, the upcoming energy efficiency requirements for Air-condition will increase by as much as 30%.

Comment 3

We support the fact that equipment with alternatives must also comply with the efficiency requirements of the Ecodesign Directive, safeguarding that the positive climate impact of indirect emissions is also guaranteed. APPLiA and Eurovent would like to stress the importance of considering "energy-efficiency" as a first principle, it is a priority-criterion for all air-conditioning equipment, regardless the refrigerant used. As an example, equipment with alternatives should be energy-efficient by principle, even if the equipment is powered by low carbon electricity, e.g. via solar-PV panels. Therefore, this aspect should be taken into account when assessing whether a non-HFC alternative would be viable or not.

Comment 4

We would recommend editing the following statement to encompass the details of the IEC standard work: *"Work is being undertaken on the product standard IEC 60335-2-40, that is relevant for split A/C systems, ~~to establish a maximum charge size of 1 kg for A3 refrigerants~~".*

Indeed, the work undertaken under the revision of such standard relates to defining ways to reduce the minimum room area needed for the safe installation and use of equipment with a refrigerant charge within the limit of 1kg. Its current version already allows for a maximum charge of 1kg for R290, but its revision will allow for a wider scope of applications within that boundary, if additional safety precautions are taken.

Therefore, we would support for the next statement to be modified as such:

*"Work is being undertaken on the product standard IEC 60335-2-40, that is relevant for split A/C systems, **to expand the potential scope of applications within a boundary limit-value of 1kg for R290**".*

Comment 5

We would like to explain our views concerning the next statement, part of the Briefing paper:

"The average charge (kg) with this refrigerant depends on the typical average cooling capacity (kW) and would range between 0,25 kg/kW for single and multi-split systems with a cooling capacity < 7 kW and 0,34 kg/kW for multi-split systems with a cooling capacity < 17,5 kW (Uniclimate, 2019). We can consider therefore that single-split equipment containing charges of HFC refrigerant < 3 kg as specified by the existing prohibition Nr. 15 (Annex III) thus relates to cooling capacities of <12 kW."

According to us, drafting a conclusion regarding a maximum capacity range, solely based on an average charge value, is not accurate. Indeed, if the capacity range of a system is below 7 kW and has an average charge of 0,25 kg/kW, then this would equal to calculating 1,75 kg/7 kW (keeping in mind that the minimum charge can be lower, and maximum charge can be higher). Further, if the average charge would be of 0,34 kg/kW, then for a 3kg charged equipment, the average capacity would be of 8,57 kW (keeping in mind that the range of minimum capacity can be lower, and the maximum capacity can be higher). Therefore, depending on the type of indoor design model, the efficiency level, and the piping length of an equipment between indoors and outdoors, the maximum capacity range can vary a lot across Europe, with an estimated average charge value of around 8 kW.

Therefore, we would recommend considering range values, rather than average values for future assessments.

Comment 6

We would like to, first, remind the lack of trainings for A3 refrigerants. Thorough training on *alternative R290* is not part of EU certification scheme with regards to installers and service companies, since the refrigerant does not fall under the requirements of Regulations (EU) 517/2014 and (EU) 2067/2015. As such, a considerable safety-risk exists when considering using R290 as a refrigerant in small split air-conditioning applications in the EU. Therefore, *"trainings on flammable refrigerant use for installers and service companies"* is an essential measure to implement, however, establishing an EU-wide qualification/verification program for such alternatives is equally as essential, i.e. R290 needs a certification scheme for installers and service companies at the EU-level, prior it is considered as being a "real" alternative by the Consultant and the Commission. This aspect was also recognised by the organisations GIZ and UNIDO. Safety of use, installation, servicing, maintenance of equipment using A3 cannot be guaranteed. Therefore, R290 cannot be considered as a viable alternative for splits air-conditioners.

Regarding the “*current-production capacity of split A/C*” column value stated for R290, i.e. 7 million of R290 split units per year in China, we would like to highlight that this figure provides an expected production-capacity value only, not an effective number of produced-units with R290. Hence, the figure is misleading, and we would recommend referring to the attached report from UNIDO¹, to understand better today’s reality of the use of R290. The source explains that China’s production capacity of split A/C with R290 can go up to 10 million units per year, however, the production number in China reflects that around 180,000 units (November 2019) are presently being used as part of government’s projects.

Hence, to our knowledge, no regular manufacturer is actually selling units/putting units with R290 on the Chinese market, rather, manufacturers are mostly selling units with R32 refrigerant. According to us, the Table and related data provided is misleadingly highlighting the theoretical production capacity of split A/C stemming from the current production-lines in China, not the installed-units with R290. This is only mentioned later in the Briefing paper, within the sentence “*The globally installed base is about 1 million units today, mainly in India and China*”. As the installed base according to UNIDO in India is around 800,000, this means that around 200,000 units are the ones relating to China and a few other countries.

APPLiA and Eurovent believe it would be more relevant, for the purpose of the upcoming study report, to look at the installed-units with R290, as this latter data would reflect a more representative figure.

The “*Market readiness*” column’s value “Yes” also raises some questions from our side. We do not fully understand why the Consultant is stating that R290’ market readiness in the EU would be existing, since, to our knowledge, no EU-legal entity is presently selling such equipment on the EU market. Not even the product that received a German ecolabel “Blue Angel” in 2018, is presently available in the Union, according to the Blue Angel website.

Therefore, we would like to understand the criteria and rationale used to determine the market readiness column, especially regarding R290.

Comment 7

We would like to reflect on that the trend of R32 imported through stationary refrigeration and A/C equipment into the EU is effectively increasing in time. However, the increase percentage of imported R32 would be even higher than the one shown in Figures 1 and 2 of the Briefing paper, if these would have encompassed data from imported units with a charge size below 3kg only. Indeed, as companies in Europe are reporting to the Commission, on a yearly basis, with details on the type of imported equipment, and as the charge size below (or greater) than 3kg is indicated, we believe it is possible to fine-tune and/or complement the Figures with such data. The latter complementary data would then result into showing an even higher share of R32 being imported into the EU.

Therefore, in order to provide more accurate Figures regarding R32 in imported equipment, and the related reduction in CO₂ equivalents per equipment, we recommend for the Consultant to liaise with the EEA to fine-tune and/or complement both Figures by including reference-data which reflects only the information regarding comfort cooling and heating equipment / direct systems (air-to-air, water-to-air) / units with a charge size below 3kg.

Lastly, it should be investigated whether it would be possible to include data from 2019 in the Figures. This latter is important to us, as we think that the imported R32 shares are higher than the ones encountered in 2018.

Comment 8

The following statement is not accurate in our view:

“The use of R32 in single-split systems also allows to reduce the refrigerant charge by about 20% to achieve the same cooling capacity. However, the current reduction of charge is only about 10% compared to R410A because of relevant Ecodesign requirements.”

¹ United Nations Industrial Development Organisation (UNIDO) – slides accompanying this position paper: “*The Italian HVACR Experience. An International overview of alternative and climate friendly solutions in the A/C sector*” (Ole Nielsen), side event MOP 31, 2019.

We believe that the allowed reduction of charge, as a result of using R32, is greater than 20% (in some models already up to 30%), very much depending on the system's design. Further, Ecodesign requirements have indeed an impact on the charge amount, with higher efficiencies typically needing more refrigerant. However, we would like to highlight that this latter statement applies to all refrigerants, not only to R32.

Also, we would like to highlight that material costs for R290 units are higher than for units running on R410A or R32. Indeed, R290 units need more copper, aluminium, and other metals to achieve the same capacity output as R32 units, for example, due to the chemical characteristics of R290.

Comment 9

Concerning the "Market readiness" of R32 in Europe, we would like to remind that the use of R32 and other flammable refrigerants (A2L and A3) is presently restricted for split, multi-split and VRF systems in some public and high-rise buildings in France. This latter situation is consequently preventing the installation of R32 units in those buildings.

Despite the Commission's comments on the draft French legislation through the TRIS procedure, the French final legislation was not modified yet and is not in line with the CE marking/harmonized approach. Therefore, in our view, it is important to highlight the French situation when discussing the "Market readiness" of R32 and other flammable refrigerants in the EU.

Comment 10

We propose to amend the wording herein below as following:

*"The range of products containing R32 is not limited to single split A/C systems, but has been expanded to multi-split and even **mini** VRF systems recently".*

Comment 11

The next statement is, in our view, not accurate. In particular the underlined part:

"From a technical point of view, the market potential of R32 is 100% for single-split A/C units in 2020. Nevertheless, several technical experts as well as service technicians believe that R32 represents only an interim solution because they consider its GWP is too high to allow meeting the 2030 HFC phase-down reduction target."

We would like to explain that there is a misunderstanding around the perception of the "average GWP" of refrigerants that would be required to meet the HFC phase-down reduction target of Regulation (EU) 517/2014 by 2030. It is important to remind that the "average GWP" value is neither to be taken as a maximum GWP value, nor as an average value per HFC-refrigerant.

This being said, if we look at the "average GWP" value of all HFC-refrigerants (in bulk and in pre-charged equipment) to meet the target, it would be equal to around 1300². Therefore, and as the GWP of R32 equals to 675, we can conclude that the refrigerant's GWP value is well below the average one to meet the reduction target. The R32 refrigerant is a well-suited solution and its use in new small single-split air conditioners remains key to achieve the 2030 HFC phase-down reduction target.

Moreover, we would also explain that we do not endorse the next part of the statement: *"From a technical point of view, the market potential of R32 is 100% for single-split A/C units in 2020"*. Indeed, as already explained under our "Comment 9", France has restricted the use of R32 in certain public and high-rise buildings. Thus, R32 would not be able to fulfil, in certain situations, all of the technical requirements and conditions-of-use legally wise, safety wise, energy-efficient wise, etc.

² JARN Article accompanying this position paper: "Modeling the EU HFC Phase-down" (Gluckman Consulting), 2019.

Comment 12

Regarding our views on R290, please refer to "Comment 6" of this position paper. As stated already, we believe that more perspective should be given into this section of the Briefing paper. Indeed, in China, only around 180,000 units with R290 are currently in-use (situation November 2019), solely as part of government's projects (i.e. extremely small-share of the overall Chinese market). Whereas in India, the manufacturer that is selling units with R290 is also selling units with R32 refrigerant, whereby the R290 models are restricted to a limited network of own certified installers³.

Once again, we would like to stress that the lack of an EU certification scheme for installers and service companies with regards to R290 is a critical issue for the consideration of R290 as a viable alternative. We would recommend the Consultant to include and reflect this aspect in its upcoming study report to the Commission. It is essential to take into account this problem, before considering R290 as a "real" alternative refrigerant in new small single-split air conditioners.

Further, using R290 needs specific technical and legal requirements to be fulfilled, such as safety-classified stores (i.e. warehouses) to stock the charged units with the refrigerant, strict transport-measures, etc. These latter should not be put aside and need to be taken into account whenever discussing R290 as an alternative to R32 for small single-split air conditioners, for instance.

Comment 13

We would like to explain our views regarding the next statement:

"Energy efficiency levels of R290 split units are very similar compared to R32 units and perform well under high ambient temperature conditions."

We recommend for the analyses to be carried out on the units that are needed within the EU market, based on Ecodesign methodologies, EU temperature conditions, and taking into account the whole range of equipment existing: different types of indoor units (not only wall-mounted, but also floor-standing and cassette types), cooling and heating mode, with long piping lengths and taking into account stand by and off-mode losses. Since A3 refrigerants (such as R290) are more limited in potential refrigerant charge size, compared to A2L refrigerants (like R32), their scope regarding energy efficiency improvements is also more limited.

Comment 14

We would like to highlight that, according to us, this following statement is not accurate:

"Manufacturers have published a schedule for increased production numbers from 2018³⁰, aiming at the European market (source [here](#))."

Indeed, the web-source quoted in the statement above refers to the production in China's domestic market. It does not mention that the increased production was aiming to be brought on the European market. Moreover, UNIDO also confirms that the 180,000 models produced until November 2019 in China were sold on the Chinese market with their government support, and that there were no commercial sales of these products on the Chinese market. Therefore, we would recommend for this statement to be modified in the upcoming study report, by reflecting what we highlight above.

Comment 15

We believe that drawing a comparison, or an analogy, between Double-Duct (DD) and single splits air-conditioning systems is not appropriate, because both equipment are based on different technologies. Therefore, we do not recommend pursuing such analogy further:

"The EU funded research project LIFE ZEROGWP (2018-2021) intends to demonstrate the technical feasibility, full safety and commercial viability of an innovative residential A/C system based on Double Duct (DD) technology".

Also, we believe it is important to remind that A/C systems based on DD technology are not part of the scope of Article 21(4) of the Regulation.

³ Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, R290 Split Air Conditioners Resource Guide – Version 1.0, 2019 ([here](#)).

Comment 16 (A and B)

Regarding R290, please kindly refer to our views and recommendations found in "Comments 6 and 12" of this position paper. Moreover, APPLiA and Eurovent would like to provide their views regarding the next statement, found in the Briefing paper:

"On the basis of the above, it seems technically possible to avoid F-gases today in new single split A/C with a cooling capacity below 7 kW by using the refrigerant R-290, unless where national legislation or codes prohibit its use, at good energy efficiency and at a very modest price increase that would likely disappear due to economies of scale if used at large scale."

Since the Briefing paper did not study all the related and existing models that are necessary for the EU market, such statement should not be provided by the Consultant at this point. To strive for such a conclusion, an assessment including cooling and heating, all different types of indoor units, long piping lengths, future energy efficiency MEPS levels, and additional potential energy improvements (MEPS is not sufficient, consumers are encouraged to go for higher energy labels than the minimum), should be undertaken first.

The choice of a refrigerant for a manufacturer relies on several aspects, such as (i) technical feasibility, (ii) safety, (iii) energy-efficiency (and further improvements potential of such refrigerant), (iv) costs effectiveness, etc. Therefore, considering and identifying a refrigerant as a "real" alternative for new small single-split air conditioners should not be solely based on the fact that it would be technically possible to use such gas in such equipment. This latter concept should be further included in the upcoming study report from the Consultant.

Regarding the next statement as provided by the Consultant:

"Furthermore, taking into account that a number of new blends with low GWP are in the pipeline, it is likely that further alternatives will become market ready in the foreseeable future. A further significant reduction of GWP of the alternatives to e.g. below 150 may be possible in all small single split systems in the medium term."

We would like to restate and explain that the HFC phase down reduction is the "target" of the Regulation, hence, that the total consumption value of HFCs in CO₂ equivalents is reduced by 2030. The reduction target is not the GWP of refrigerants *per se*, thus, we should not misinterpret the target to be solely based in aiming to lower the GWP of refrigerants. Reducing the CO₂ equivalents charge of virgin refrigerants can also be obtained by reducing the quantity charged in the system, leakage avoidance, and by increasing recovery and reuse of refrigerants for example, the latter being an important aspect in view of the EU path towards a circular economy.

This being explained, this next part of the statement-above *"...A further significant reduction of GWP of the alternatives to e.g. below 150 may be possible in all small single split systems in the medium term."* is not acceptable to our Associations and respective members, as the 2030 HFC reduction target of Regulation (EU) 517/2014 is not interpreted and understood in an accurate manner. Also, as explained above already, no analyses in the report taking into account the full range of models needed for the EU market, including the requirement for cooling and heating, for many different types of indoor units, a wide variety of capacities, future energy efficiency requirements, long piping lengths, and safety conditions including certification programmes, were undertaken by the Consultant.

Lastly, there is no certainty yet that a GWP level below 150 will be possible in the "medium" term, considering all the aspects of technical feasibility, safety, energy efficiency and circular economy. Even when R&D on refrigerants is ongoing, it will still take many years for a refrigerant to be recognised under ASHRAE, ISO and EN standards, and for products to be developed using such refrigerants.

We would kindly recommend the Consultant to address our comment and to rectify this part of the "Conclusions" section of the Briefing paper in its upcoming study report.

Comment 17

According to our views, the "chillers" example is an "out of the scope" finding of the Briefing paper. We suggest keeping the conclusions of the upcoming study report solely within the scope of Article 21(4), i.e. avoid discussing/providing examples on multi-split equipment, chillers, etc.

3. Article 21(4) and small single-split air conditioners (prohibition 15 Annex III)

APPLiA, the trade Association representing EU manufacturers of home-appliances, and Eurovent, Europe's Industry Association for indoor climate (HVAC), process cooling, and food cold chain technologies, would like to provide the European Commission, the Consultant and other competent authorities, with some comments regarding Article 21(4) of the F-Gas Regulation (EU) 517/2014. This latter, however, specifically concerning new small single-split air conditioners.

Article 21(4) of the Regulation provides a mandate to the Commission to publish a report, by July 2020, which evaluates whether cost-effective, technically feasible, energy-efficient and reliable alternatives exist for the replacement of fluorinated greenhouse gases (i.e. HFCs) in new small single-split air-conditioning systems. If appropriate, the Commission shall further submit a legislative proposal to amend the list set out in Annex III (i.e. prohibition number 15).

We would like to first state that such alternatives to the use of HFCs in single-split air-conditioning systems are not available on the EU-market to fully support their proper and safe functioning throughout their whole lifecycle. Further, these equipment need appropriate refrigerants which will not only fulfill their technical attributes and stringent safety requirements for consumers, but also consider energy efficiency aspects and costs considerations.

It should also be noted that relevant industrial actors manufacturing and putting new small single-split air-conditioning systems on the Union market have already shifted, to a fair extent, to lower GWP HFCs, such as R32. This latter refrigerant has proven not only to be a lower GWP solution that sustains efficiency and reduces charge equipment, but also safety-wise, as it still delivers a mild flammability rating alternative for the secure-installation and use of such equipment.

Lastly, and as described by the European Environment Agency (EEA) in its Report No 20/2019⁴, Figure 5.1 on the "Progress of the EU HFC phase-down", the placing on the market (POM) of HFCs (in Mt of CO_{2e}) max-thresholds have been pursued, i.e. POM limit-levels have never been trespassed across time. In fact, not only the HFC phase-down drives already the market, including manufacturers of single-split air conditioners towards the use of lower GWP refrigerants (i.e. reduction of CO₂ emissions from the sector), but also Figure 5.1 findings prove that the process has been successful so far for the European Union to comply with the Regulation's current and upcoming objectives.

Therefore, through this position paper, we recommend the European Commission and competent authorities to maintain the prohibition number 15 as presently found under Annex III of the F-Gas Regulation unchanged. We would like to reiterate our commitment towards the European Commission in providing expertise regarding this matter, as such, we remain at your disposal to discuss the points we have raised and welcome any further exchange.

APPLiA - Home Appliance Europe represents home appliance manufacturers from across Europe. By promoting innovative, sustainable policies and solutions for EU homes, APPLiA has helped build the sector into an economic powerhouse, with an annual turnover of EUR 50 billion, investing over EUR 1.4 billion in R&D activities and creating nearly 1 million jobs.

Eurovent is Europe's Industry Association for Indoor Climate (HVAC), Process Cooling, and Food Cold Chain Technologies. Its members from throughout Europe represent more than 1.000 organisations, the majority small and medium-sized manufacturers. Based on objective and verifiable data, these account for a combined annual turnover of more than 30bn Euros, employing around 150.000 people within the association's geographic area. This makes Eurovent one of the largest cross-regional industry committees of its kind. The organisation's activities are based on highly valued democratic decision-making principles, ensuring a level playing field for the entire industry independent from organisation sizes or membership fees.

⁴ [EEA Report No 20/2019](#) – Data reported by companies on the production, import, export, destruction and feedstock use of fluorinated gases in the European Union, 2007-2018, Figure 5.1 in page 27.