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EPEE

Online Meeting with DG ENER and DG CLIMA of the European Commission

The Interplay between the Ecodesign Lot 10, F-gas regulation and the PFAS



21 April
2023
16:00-17:00

General outline

- **Presentation of EPEE**
- **The F-gas Quota and BANS**
- **PFAS restrictions**
- **LOT 10 proposals & current requirements**
- **Setting the scene for current policies**
- **Review of the GLZ study**
- **Market considerations**

The voice of the RACHP sector in Europe

- Full Value Chain of Refrigeration, Air Conditioning and Heat Pump Industry
- Small – medium – large companies
- National and sectoral associations
- Over **200,000 direct employees**, over €30bn turnover in Europe

Corporate members

Association members



EPEE Members, representing 200K jobs in Europe, make the full product range of refrigeration, air conditioning and heat pump equipment, including ...



Residential Heat Pumps, e.g. hydronic



Air/Air Heat Pumps for residential and commercial use



Large AC and heat pumps (chillers, VRFs, rooftops, ...)



Commercial Refrigeration



Industrial Refrigeration



Transport refrigeration



District Heating and Cooling



... which requires a diversity of refrigerants – HFCs, HFOs and natural refrigerants.

This meeting focuses on the interplay between the F-gas regulation, the Reach-PFAS regulation and the Ecodesign Lot 10, all of which are under revision at the moment.

Scope of the Ecodesign Lot 10:

Split type air-to-air, water-to-air, ground-to-air equipment for comfort cooling and/or heating up to 12kW.

Note: the majority of the market is populated by air-to-air units.

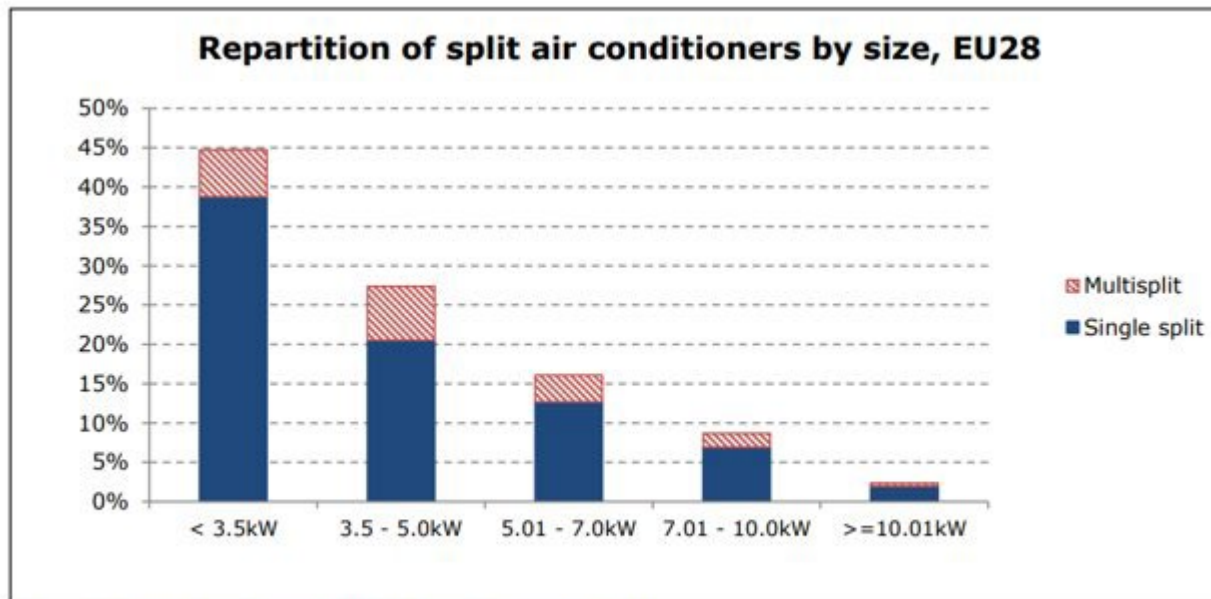


Figure 7: Split sales distribution by size, source BSRIA.

type	<7kW	>7kW&12kW
single split	70%	8%
multisplit	20%	2%



Note: multi split is a very appreciated technology in EU-27 as it is energy efficient, is easy to install, and is an affordable heat pump solution for housing without floor heating/radiators, and offering new combined services such as cooling/heating/domestic hot water with heat recovery, etc.



➤ **Product bans: the joint industry proposal is a GWP150 limit for single split air-to-air up to 6kW.**

- Industries submitted comments that the GIZ report is not correct to claim that up to 12kW with propane would be feasible. The GIZ report did not analyze multi splits. ([joint industry proposal here](#))
- The Commission, the Parliament & the Council propose a 12kW limit (with different dates), including exemptions when needed to meet safety requirements (exemptions could apply in 30% to 40% of the cases).

➤ **Quota on virgin HFCs:**

- Supersedes any product ban and becomes more ambitious, especially after 2030 towards 2050.
- Industries submitted comments that required exemptions are not properly factored in the quota needs, and there is a risk of shortage, especially in the period up to 2032.
- The long-term phase down towards 2050 has to be further assessed in future review rounds.

➤ ***We see feasible a GWP150 limit for single split up to 6kW. It represents approximately 70% of the market.***



- PFAS restrictions review is at the early stages with final restrictions expected in 2024.
- The restriction will enter into force mid-2026.
- PFAS restrictions will likely target refrigerants and also Fluoro Polymers which are key to have efficient, tight and safe systems.
- Not all refrigerants are considered as PFAS. However, from **earliest mid-2026**, it will no longer be possible to use those considered under PFAS unless derogations are granted.

The list of single component refrigerants defined as PFAS are:

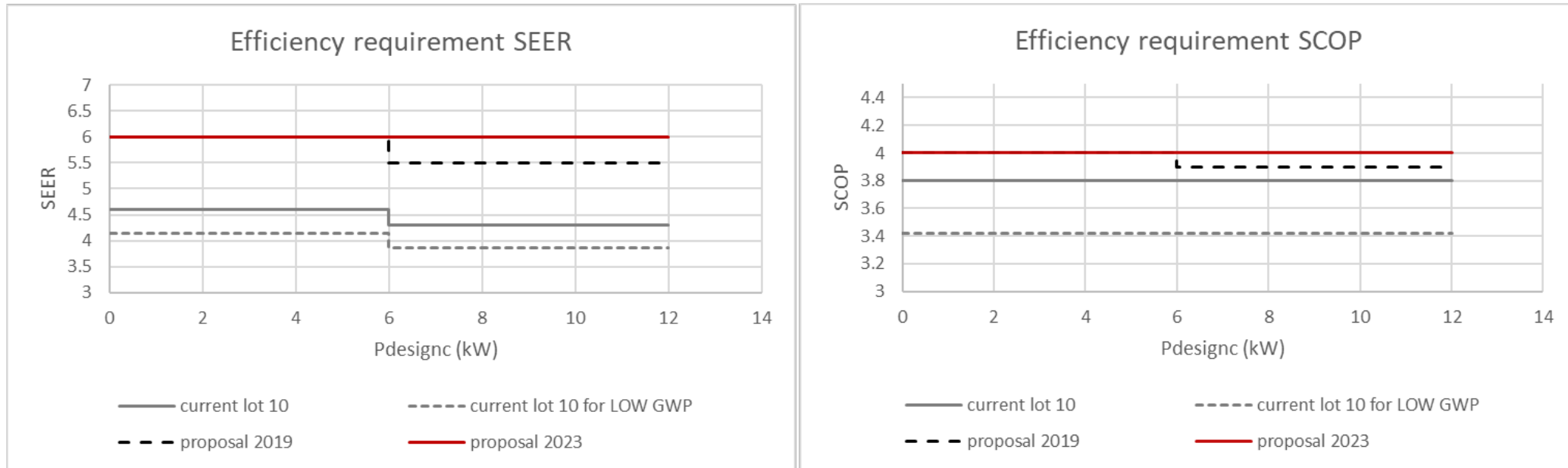
HFC125	HCFO1224yd
HFC134a	HCFO1233zd(E)
HFC143a	R254fa
HFO1234yf	R227ea
HFO1234ze(E)	R236fa
HFO1336mzz(E)	R124.
HFO1336mzz(Z)	

+ all blends containing those HFOs

- **Many components used in HVACR equipment are impacted, too, by PFAS under REACH.** Fluoropolymers are used in many critical parts due to their properties which support high energy efficiency and high reliability and longevity of equipment under a lot of duress due to temperature ranges from -50 to +120 °C and pressure up to 120bar.
- **The following properties are of utmost importance** and, so far, there has been no alternatives identified that can guarantee the same performance: low friction, good wear resistance, high and low temperature tolerance/performance/resistance, chemical inertness, conformability (elastic deformation for e.g. sealing), good material transfer property, and chemical inertness, high dielectric strength, refrigerant (solvent) and oil resistance, inherent flame retardance, protective chemical barrier, long term stability.



Lot 10 proposals and current requirements



- The current Lot 10 minimum efficiency requirements are compared with the proposed requirements (red line).
- The study considered that R32 would be the main refrigerant.
- The study revealed that efficiency requirements could be lifted, and the bonus could be removed based on the study.
- Today, we observe that the study could not have anticipated the current situation, and hence a new assessment will be required in view of changes in F-gas and PFAS.



- ✓ Refrigerant choices are restricted.
- ✓ Ecodesign did not study that effect.
- ✓ More study is needed to assess whether current MEPS are feasible or not.
- ✓ Up to 6kW, we see the requirements feasible for single splits.
- ✓ For the multisplit systems (0-12kW) and single split above 6 to 12kW, there is a conflict between the three legislations (F-gas, PFAS and Ecodesign Lot 10).
- ✓ Energy efficiency should prevail.
- ✓ EPEE re-emphasizes the joint industry proposal (with 14 others).

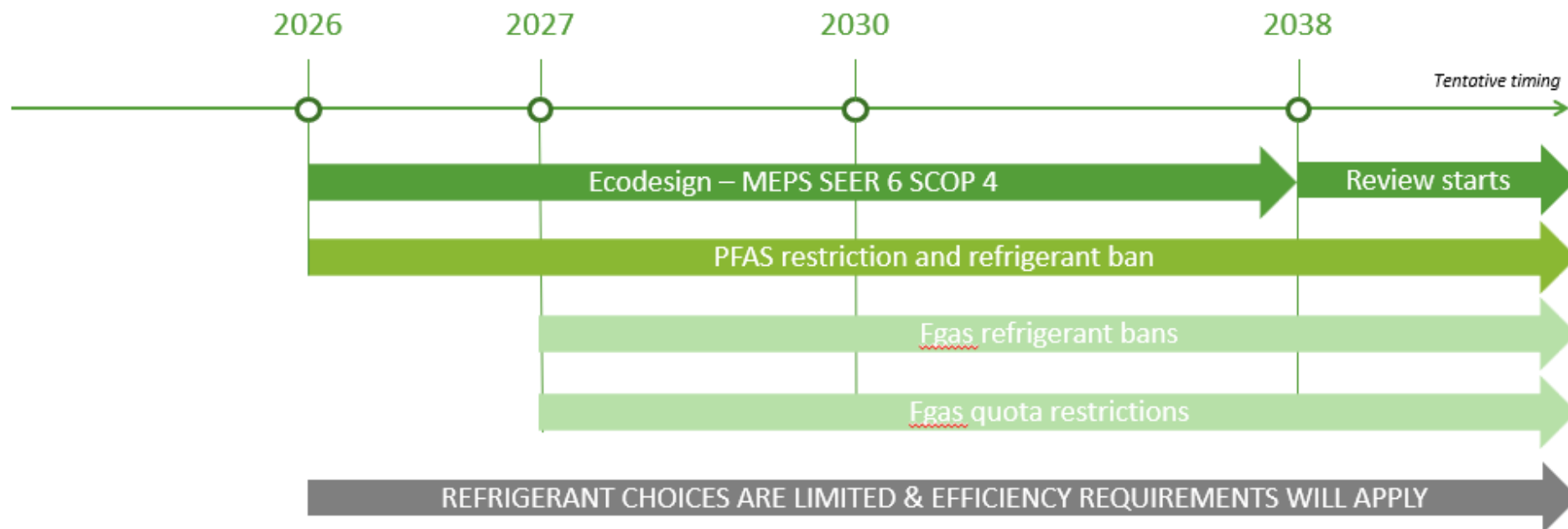


To consider the impacts of F-gas and PFAS restrictions on the energy efficiency.

- Important restrictions are expected on certain types of refrigerants.
- Due to restriction in refrigerant choices, the current MEPS may be difficult or even unfeasible to meet, depending on the type of product, which may lead to increased costs to achieve similar efficiencies or no solution possible anymore (e.g., due to sizing limits).
- Indeed, if we increase energy efficiency, the cost will increase in parallel. Units will be more expensive, or impossible to install, the cycle-cost will be disadvantageous for the end-user.
- A transition to alternative refrigerants may in turn lead to important efficiency losses by transitioning to alternative refrigerants.
- A ban on certain Fluoro Polymers, as PTFE, will increase internal friction and increase risk of leaks and material compatibility issues.
- If F-gas and PFAS are adopted as such, certain categories of products cannot make the transition – single splits above 6kW and any multi-splits, because the charge required for those systems are higher than allowed in safety standards (even latest ones ed7).
- Substitution by other systems will be either much more expensive (hydronic) or less efficient (portable AC or direct elec. heating).
- RAC are key technologies in Europe and should not be jeopardised.



Setting the scene for current policies



- Everything is happening at the same time.
- Efficiency requirements are expected to be maintained until 2038.
- Efficiency requirements are set and due to refrigerant bans and quota restrictions, there will be a very limited choice of refrigerants to choose from.
- This transition will result in higher costs of products or the impossibility to install, impairing the affordability & applicability.
- We must avoid a shift to alternative products with lower efficiency. (e.g. shift air to air to air to water).



Not all refrigerants can be used due to safety.

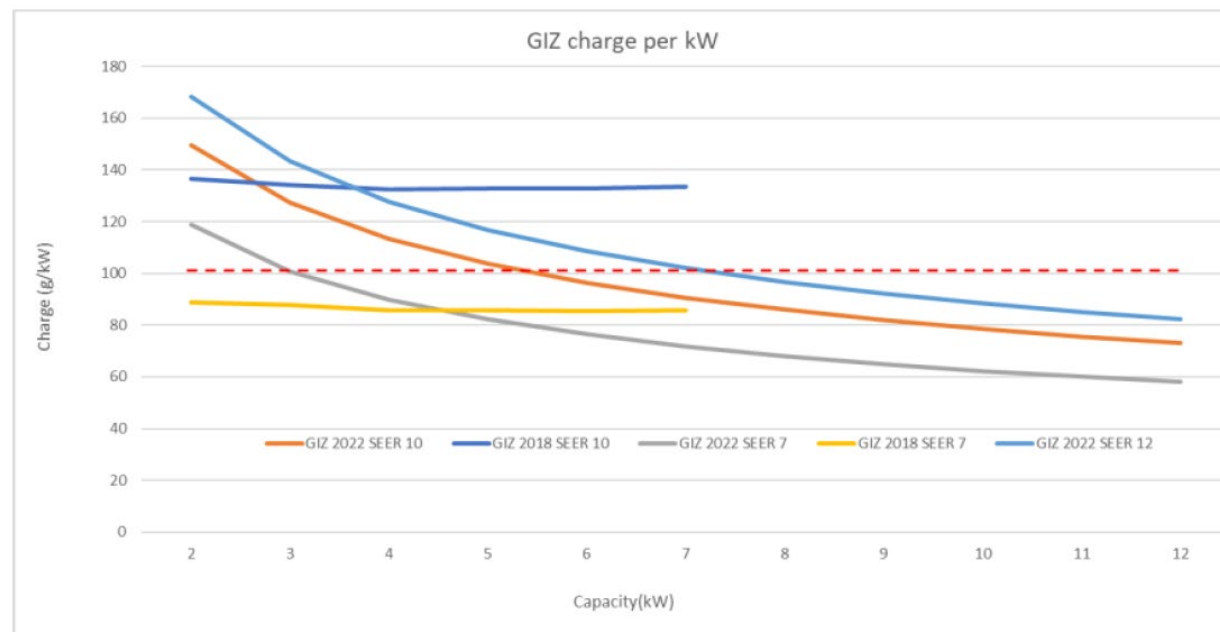
THE REPORT CANNOT CONCLUDE THAT HYDROCARBONS CAN BE USED IN ALL SPLIT SYSTEMS UP TILL 12 KW.

1. Heating capacity and efficiency are not properly analyzed – Ecodesign is not considered at all, underestimating the charges.

The report looks at heating capacity at +7° C, while in Europe the heating load is considered at much lower temperatures (-10° C for average climate, -22° C for colder). Air to air heat pumps aim to be able to maintain capacity at -10° C, or even at -20° C.

2. Refrigerant charges are underestimated – the estimations are based on minimum charges (defined by the 1kg upper limit) and therefore do not represent the reality of the product accordingly. The EU Commission report on Split AC below 7 kW was based on refrigerant charges which are not sufficient for models with a high energy efficiency.

For high efficiency and higher capacity units, the formula provided in the study results in extremely low charges (below 100g/kW for high efficiency SEER >10) compared to values available in literatures or conversions from existing products with R-410A/R-32 (around 190 g/kW for an EER 6 according to Ecodesign Lot 10 study assuming 50% conversion ratio for R-290) and as shown in the graph below.



3. Cost additional safety measures are underestimated – there is an oversimplified assumptions of cost and considering technologies are not proven to be effective, yet, which underestimates the complexity of the product range.

It is not conceivable to ensure consumer safety, especially at the early stage of an introduction of highly flammable refrigerants, to use ultrasonic detection instead of calibrated gas sensors and EEV for refrigerant leakage limitation instead of SSOV just to minimize the costs.

For more complex installation, beside the indoor unit, safety measures could also be needed for the piping, thus the cost impact is quite high for larger capacities and more complex systems.

Table 12: Summary of cost implication associated with safety measures

Safety measure	Cost implication	Cost for 5 kW RACS using A3 [€]
Refrigerant quantity limits	None	€0
Charge minimisation	Negative – usually leads to lower refrigerant and material cost	€0
Limited releasable charge	Negligible up to cost of sensors and valve(s)	€0 (high efficiency, reversible) to €20 (cooling only)
Integral airflow	Negligible up to cost of sensors	€0
Leak detection	Sensors, controller	€2
No ignition sources	Variable, but usually negligible for RACS	€0
Enhanced tightness	Negligible, if production numbers are > 10,000's	€1
Marking and instructions	Negligible	€0

4. Cost of piping size are underestimated as well

The GIZ study assumes that the refrigerant piping thickness can be lower compared to units using R-32 or R-410A, thus outweighing that R-290 needs larger piping diameters.

Reducing thickness of piping must be balanced with processing aspects such as bending or flaring.



5. Service cost to repair leaks is underestimated due to overestimated leakage rates.

The GIZ study overestimates related emissions of split air conditioners with an annual leakage rate of 5% and EOL (end of life) emissions of 80%, while the Commission indicates an annual leakage rate of 3.5% and EOL of 40% for such equipment. This difference influences the cost effectiveness calculations (servicing cost).

Electronic logbooks in several Member States show that the annual leakage rate is less than 1.5%.

6. No analysis has been done for multi-split units:

serving multiple rooms increases the charge and this is limited by smallest room.

The GIZ study only focuses on single split systems and fails to address multi-split units which represent around 15% of the EU split market below 12 kW.

In 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, are needed in essential applications, and are also seen as the most energy efficient option to replace electrical heaters or gas convectors

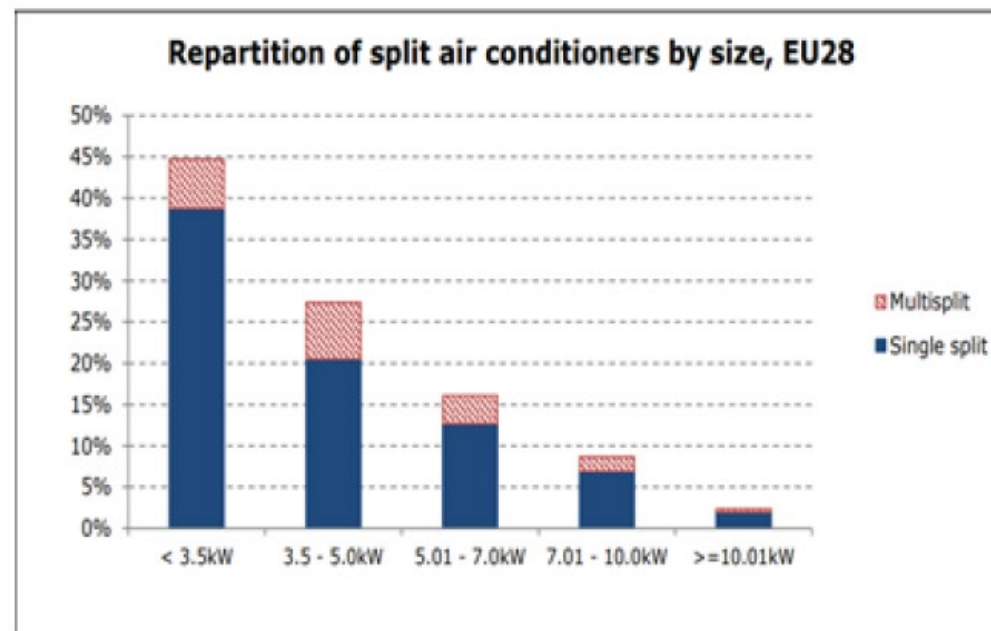


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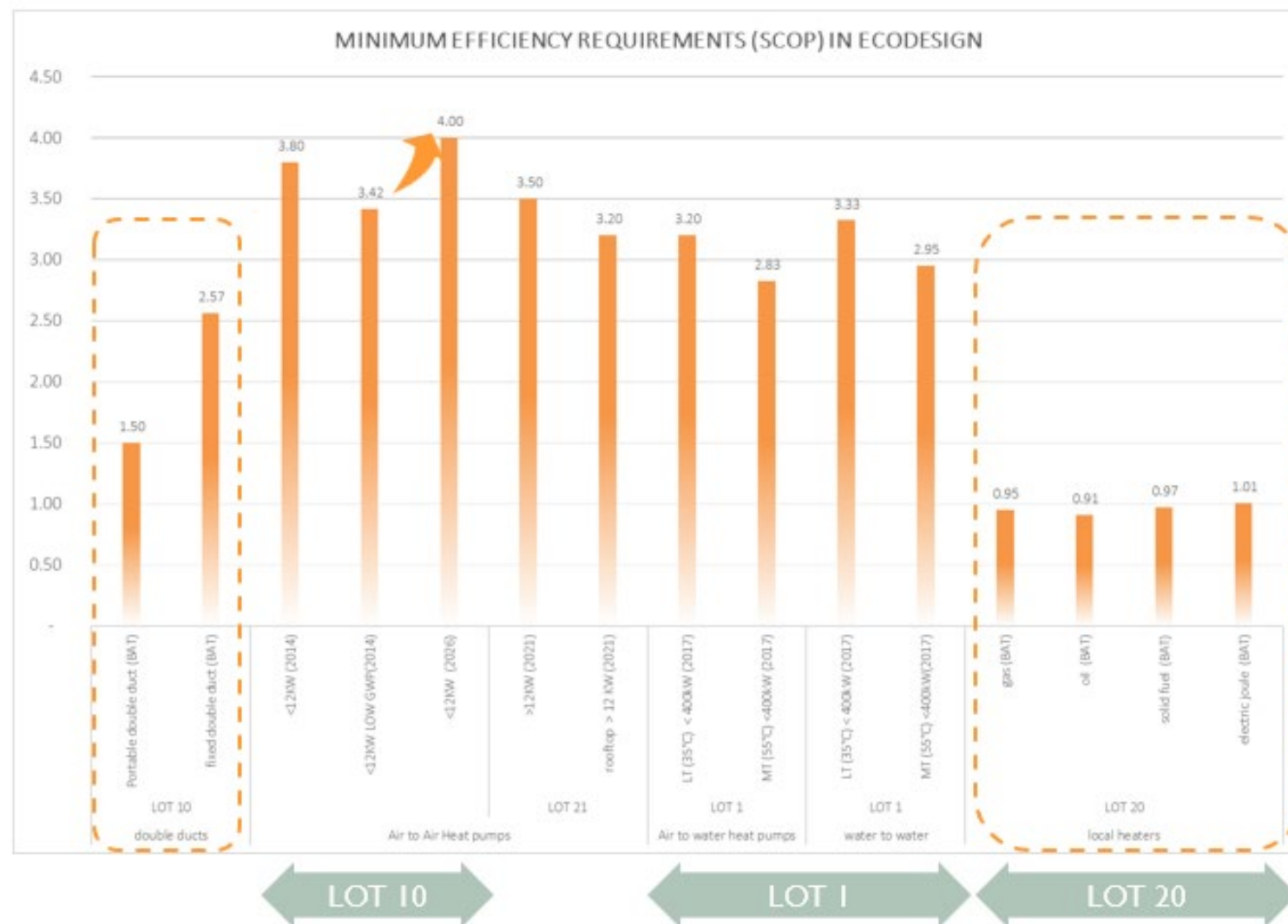


For flammable refrigerants, the allowed charge is limited by the smallest room area where a pipe or a unit is installed. Highly flammable refrigerants for these systems cannot be used because of longer and more complex piping (required for several indoor units), increasing the top-on charge amount.

Market considerations

HEATING - Air to Air heat pumps & Air conditioners are the most efficient products in the market in their application.

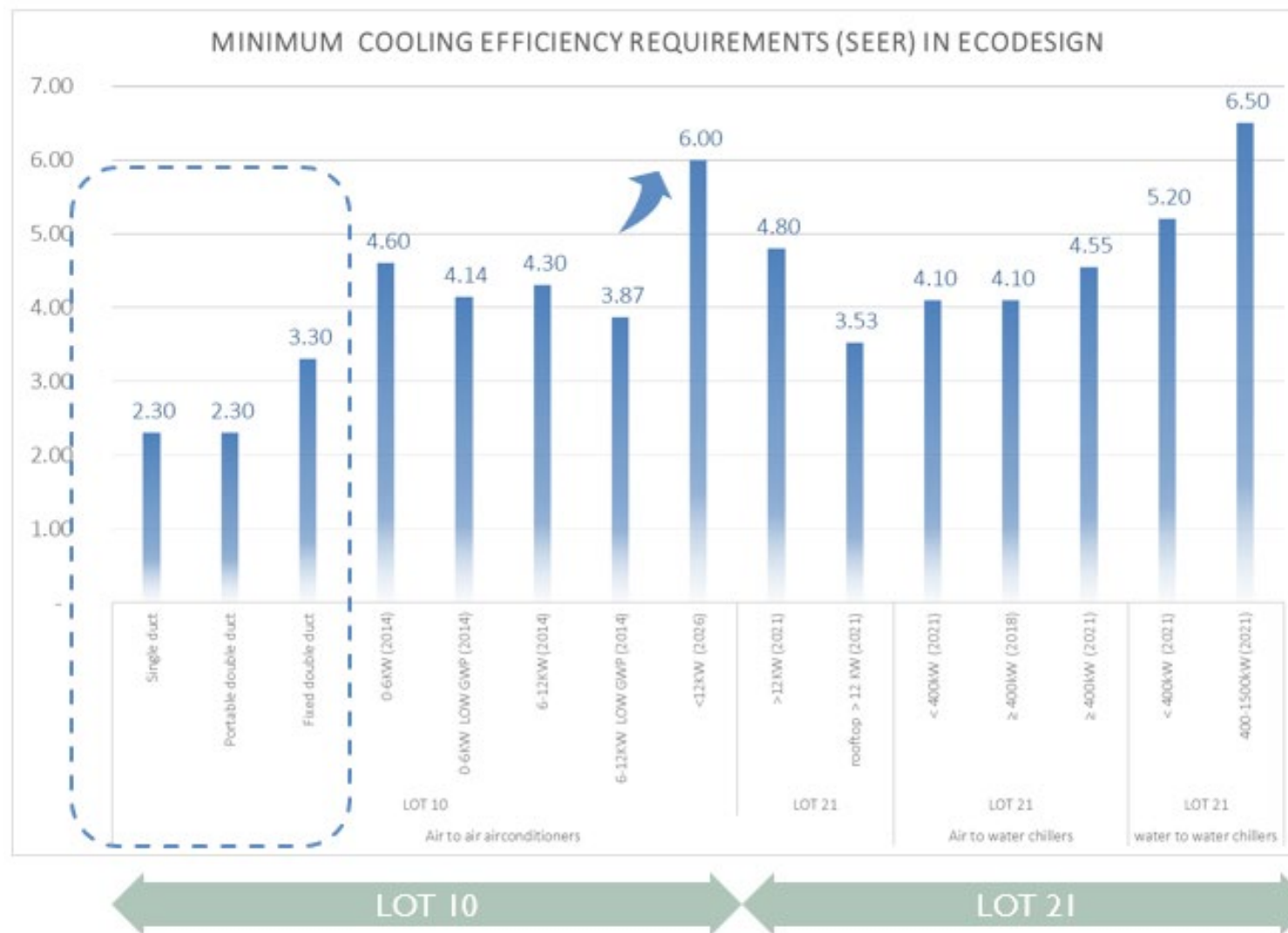
- LOW GWP requirements currently set at 3,42, while new requirements are set at 4.
- Lot 20 sets low efficiency requirements. In Lot 10, low requirements are set for SD, DD.
- Thus, a shift to these products is realistic as well.



Market considerations

COOLING – Air-to-air heat pumps and air conditioners are most efficient products in the market in their application.

- LOW GWP requirements currently set at 3,87, requiring a steep increase in efficiency.
- MEPS for rooftops, single ducts and double ducts are very low.
- Thus, a shift to these products is realistic as well.



To conclude

- ✓ Refrigerant choices are restricted.
- ✓ Ecodesign did not study that effect.
- ✓ More study is needed to assess whether current MEPS are feasible or not.
- ✓ Up to 6kW, we see the requirements feasible for single splits.
- ✓ For the multisplit systems (0-12kW) and single split above 6 to 12kW, there is a conflict between the three legislations (F-gas, PFAS and Ecodesign Lot 10).
- ✓ Energy efficiency should prevail.
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**Thank you for your attention and your
consideration.**

EPEE – European Partnership for Energy and the Environment

The Voice of the Refrigeration, Air Conditioning and Heat Pump Industry in Europe

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