F-GAS REGULATION REVISION: INDUSTRY WANTS MORE AMBITION

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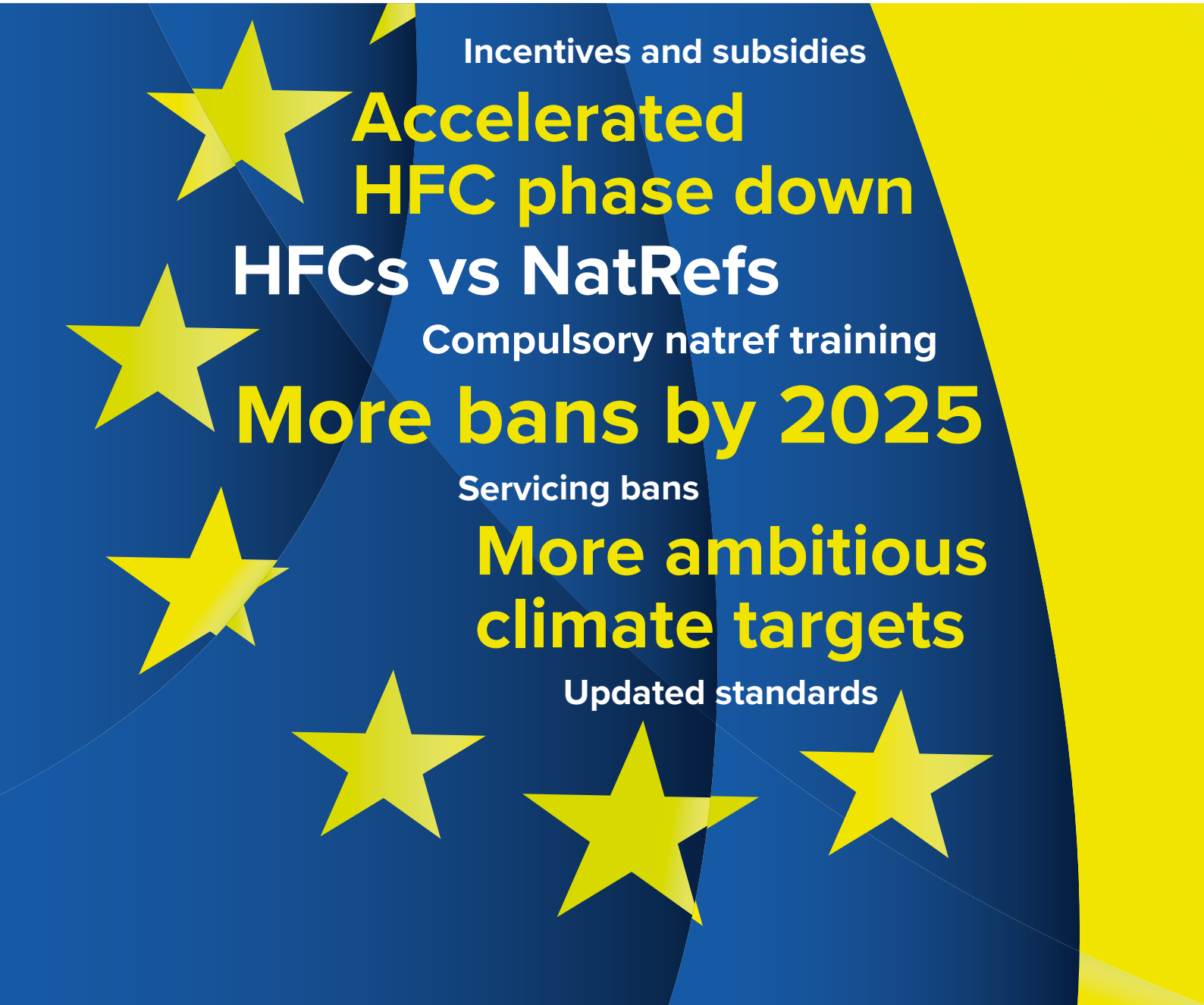

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Table of contents

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Introduction by shecco

The review of the current European Union (EU) F-Gas Regulation is now underway. With a view to furthering these discussions, shecco decided to conduct a detailed, extensive market study to collect expertise from European Heating, Ventilation, Air Conditioning and Refrigeration (HVAC&R) stakeholders.

By reaching out to top-level industry professionals, including (amongst others) engineers, contractors, manufacturers, academic institutions and end users active in the EU HVAC&R sector, we collected information on the opportunities and challenges related to being more ambitious in the new F-Gas Regulation revision. The results of this study can be found in this report.

The study includes inputs from 125 individuals from more than 80 companies active in the EU. It is important to note that the study was open to the entire industry, not just companies working with natural refrigerants. Inputs were collected predominantly from personal correspondence with stakeholders as well as an extremely comprehensive industry survey that featured more than 160 questions. This survey was shared globally through various marketing campaigns and social media outreach activities to ensure equal opportunity for all to participate. Inputs were accepted from around the world, with the only limitation being that the company should be actively doing business in the EU.

Spanning 12 sub-sectors of the HVAC&R industry, and also looking at topics such as training, incentive schemes, illegal trade and reclamation, this report dives into the details of the current F-Gas Regulation to highlight how it can be strengthened to close various loopholes to the advantage of the industry, the economy, and the climate as a whole.

The findings were overwhelmingly positive, showing a large number of companies are ready to push forward on stricter sectoral bans to make up for the time lost by not being ambitious enough in the previous F-Gas Regulation revision.

We hope that the findings of these results will give confidence to the European Commission that the European HVAC&R industry is ambitious and wants further progress in this direction to help play an active role in making Europe climate neutral by 2050.

We will be monitoring the market-readiness on an ongoing basis to help guide policymakers throughout the F-Gas revision.

Ilana Koegelenberg
Market Development Manager, shecco
Lead Author

Executive Summary

The EU's F-Gas Regulation is a landmark climate legislation for transitioning away from fluorinated gases such as hydrofluorocarbons (HFCs) towards more climate-friendly alternative solutions such as natural refrigerants. Five years after the implementation of the updated F-Gas Regulation, it is now being reviewed to advise on improvements for the next update. The first round of feedback on the roadmap concluded in September 2020, after which a public consultation was opened until 31 December 2020.

This study shows some of the key areas where the F-Gas Regulation has had the most prominent impact, while also sharing feedback from EU HVAC&R industry stakeholders regarding what is feasible in terms of a more ambitious F-Gas Regulation going forward. Although some of the industry sub-sectors are more advanced than others with market-ready, HFC-alternative products, such climate-friendly, natural refrigerant-based equipment does exist in every sector and this should not be used as an excuse to slow down the HFC phase-down.

Accelerating the HFC Phase-Down Schedule

Due to the phase-out of ozone-depleting substances (ODS) such as chlorofluorocarbons (CFCs) and hydrochlorofluorocarbons (HCFCs) under the Montreal Protocol on Substances that Deplete the Ozone Layer, the use of HFCs as main replacements has been increasing.

Increasing the ambition of the F-Gas Regulation through further bans, a more ambitious phase down, and strong measures to combat illegal trade should be an essential component of the EU's 2030 climate ambition strategy. Our market survey found that 87.2% of respondents agree with this statement (62.4% of which indicated they "strongly agree").

The survey respondents were also asked whether they think the current phase-down schedule could be accelerated, given the current state of development of natural-refrigerant alternative technologies. An overwhelming majority, 77% of respondents, were in favour of an accelerated phase down.

Our research also found that 80% of respondents think **the EU Green Deal should be updated to more prominently feature the regulation of fluorinated gases**.

Support for Placing on the Market (POM) Prohibitions Needed for all HVAC&R Sectors

Our extensive industry study showed overwhelming support for more ambitious sectoral bans for sub-sectors already mentioned in the F-Gas Regulation, as well as for the introduction of bans for sub-sectors previously not included. The majority of responses indicated readiness of the HVAC&R industry to switch over completely to natural refrigerants. **In 12 out of the 12 sub-sectors reviewed, the majority of survey respondents indicated support of a full ban on new HFC-based products by 2024 already.** Natural refrigerants were also shown to be the refrigerant of choice in 11 of the 12 sub-sectors surveyed.

In each of the sub-sectors covered in the survey, respondents were given a choice between HFOs, HFCs, ammonia, CO_2, hydrocarbons, or a non-defined "other" category. In every sub-sector, except centrifugal chillers, the highest percentage of votes went to a natural refrigerant.

The survey results highlighted how a lack of sectoral bans (or in some sectors: rather a lack of *more ambitious* sectoral bans) has had a negative impact on the sector developing alternative, climate-friendly solutions. The majority of respondents also said the lack of bans negatively impacted the uptake of these alternative solutions, as well as the price competitiveness thereof.

Closing the Loopholes

During the previous F-Gas Regulation revision, certification programmes established under Article 10 did not include **mandatory training on natural refrigerants and technologies**. This has caused various barriers to the uptake of natural-refrigerant technologies. During our market study, 44% of respondents indicated that the lack of mandatory training on natural-refrigerant technologies in the certification programmes established by Member States created barriers to the uptake of their product. Seventy-five percent of respondents said that their business would positively benefit from mandatory training on natural-refrigerant technologies.

Illegal trade of HFCs undermines the F-Gas Regulation, results in additional HFC emissions that fuel global warming, and significantly reduces government income as well as the profits of legitimate businesses. Our market research found that an overwhelming majority of companies who participated were in favour of stricter regulation relating to illegal trade.

Ninety-five percent of survey participants support EU-wide minimum penalties for HFC and HFC-equipment smuggling, while 92% support changing annual reporting on HFC imports and exports to real time quota tracking. Seventy-five percent also support having the names of all HFC quota holders be made available to interested parties and stakeholders.

Incentive schemes and subsidies support the development and uptake of alternative, climate-friendly technologies. Their absence is often cited as one of the main barriers for the uptake of more sustainable solutions.

Although there are some incentives available in select Member States, more are needed to help with the transition away from fluorinated gases. Seventy-nine percent of respondents answered that their product does not currently benefit from an incentive scheme in a Member State. Eighty-six percent of respondents are in favour of EU institutions and national governments imposing Global Warming Potential (GWP) thresholds to their Green Public Procurement processes when purchasing HVAC&R equipment.

While some Member States do offer to incentivise the installation and use of heat pumps, the GWP of the refrigerant used is not taken into account. When asked whether linking a GWP 150 threshold to government incentives schemes would improve the uptake of climate friendly alternatives, 83% of respondents said, "yes."

Recovery and reclamation are key for the life cycle management of refrigerants and minimising the harmful impact of refrigerants on the environment through direct emissions. Our survey showed that the majority (68% total) believed the F-Gas Regulation has increased the recovery and reclamation rates of refrigerants.

As of this year (2020), the use of HFCs with a GWP of 2,500 or more, to service or maintain commercial refrigeration equipment with a charge size of 40 tonnes of CO_2 equivalent or more, shall be prohibited. This has not been stipulated for any other of the HVAC&R industry sectors. When asked whether similar high-GWP servicing bans should be introduced in other HVAC&R sectors, a 74% majority were in favour.

Methodology

Quantitative and Qualitative Analysis

shecco recently undertook research to investigate the effects of the current EU F-Gas Regulation on the HVAC&R industry as well as the market readiness for progressing beyond fluorinated gases for the next revision of the regulation – now in progress. The research sought to collect both quantitative and qualitative data to help inform policymakers on the needs and challenges of industry.

Information was collected from an extremely detailed and comprehensive industry survey, as well as direct correspondence with relevant industry stakeholders.

The questions were based on the current F-Gas Regulation and tried to cover as much ground as possible in terms of aligning the questions to the content of the regulation.

To get comparable responses that allow for quantitative data analysis for the report, questions were structured as multiple choice while open-ended questions were added to obtain qualitative results as well.

Industry Survey

To reflect the European HVAC&R industry's views on the impacts of the F-Gas Regulation in the EU and and its effects on European businesses, shecco conducted an online survey that collected responses from 125 industry representatives, representing more than 80 different companies. The survey was open to all HVAC&R stakeholders without bias as to the refrigerant with which they work, allowing equal opportunity for companies working with HFCs, HFOs, and natural refrigerants. This survey contained 168 questions and generated 269 pages of data from the responses received.

The survey was shared worldwide but was open only to those with business in the EU. Responses were collected from manufacturers, engineers, contractors, academics, and end-users, representing various key HVAC&R industry stakeholders throughout the value chain. It is important to note that the survey was completed by companies who work with natural refrigerants as well as those who do not, allowing for even industry representation.

Sub-Sectors Reviewed

The following HVAC&R sub-sectors were assessed individually to correspond with the sub-sectors defined in the current edition of the F-Gas Regulation. Survey participants could select one or multiple sub-sectors. Responses were received in all sub-sectors, although respondents were more active in the commercial and industrial refrigeration markets.

Table A: Sub-Sectors Reviewed in Survey

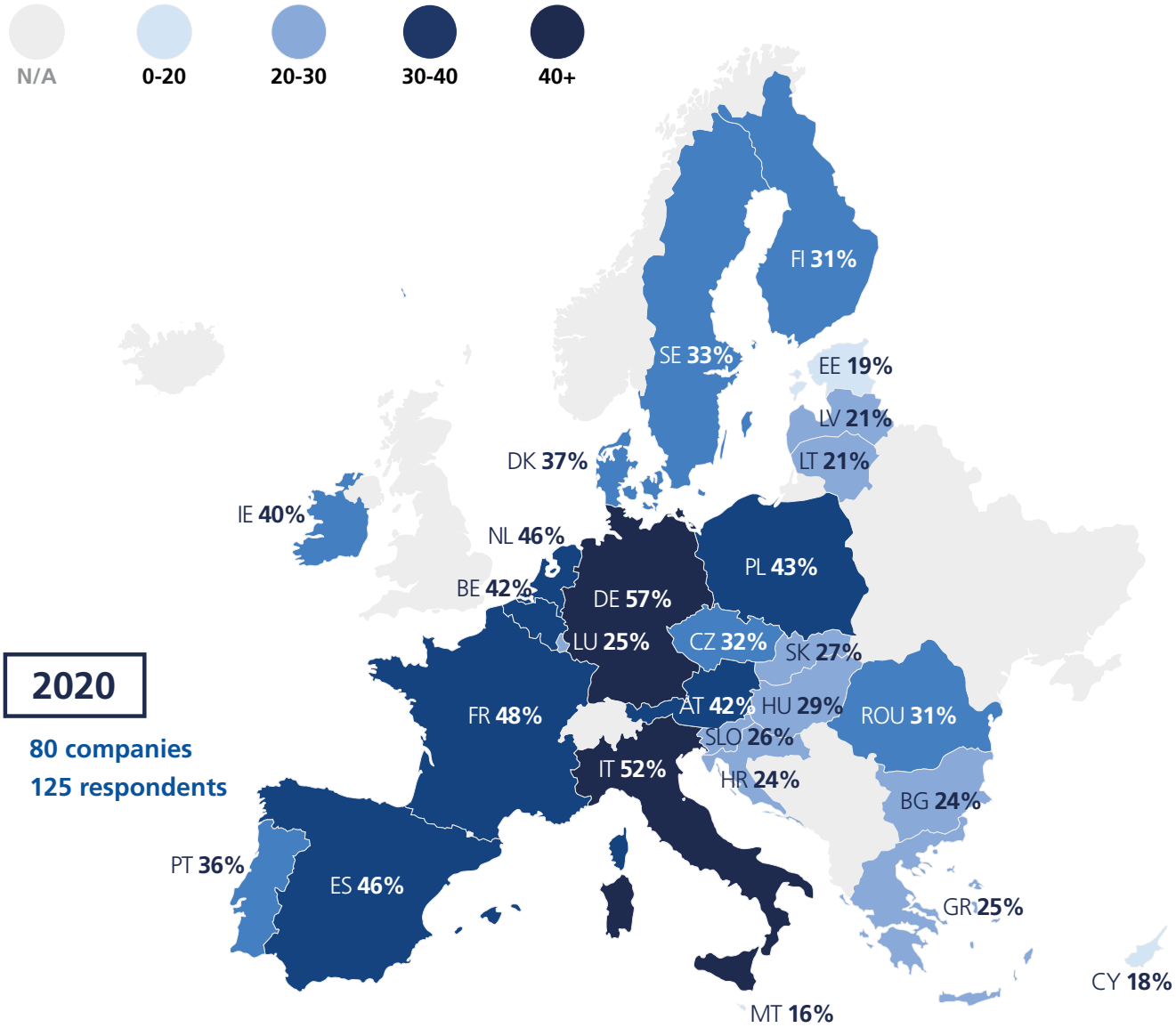
(% of total survey participants who answered each section)

Commercial Refrigeration (multipack centralised systems)	**54.6%**
Commercial Refrigeration (condensing units)	**56.3%**
Transport Refrigeration	**26.1%**
Industrial Refrigeration	**64.7%**
Single-split air-conditioning systems	**26.9%**
Multi-split / VRF systems	**22.7%**
Rooftop HVAC systems	**31.1%**
Chillers (displacement)	**47.9%**
Centrifugal chillers	**16.8%**
Domestic heat pumps	**35.3%**
Commercial heat pumps	**38.7%**
Industrial heat pumps	**39.5%**
Mobile air-conditioning for buses and/or trains	**18.5%**

Geographically Evenly Represented

Survey respondents were asked in which regions within the EU their companies are active in, and results showed widespread representation from various countries within the EU. Germany, Italy, and France were the most represented.

Figure A: Regions*
(*Respondents could select more than one country to show activity throughout the EU.)



CHAPTER 1

THE F-GAS REGULATION TODAY

The Impact of Cooling and the Need for Regulation

"The Cooling Imperative: Forecasting the size and source of future cooling demand" was commissioned by the Kigali Cooling Efficiency Program (K-CEP)[1], created by the Economist Intelligence Unit, and published at the end of 2019.

According to the report, urgent steps must be taken by businesses and policymakers to embrace efficient, climate-friendly cooling.

It estimates that 4.8 billion new air conditioning and refrigeration units will be sold globally between 2019 and 2030 and that annual sales will hit 460 million units, up from 336 million units in 2018. According to the report, the total market value could reach almost US$170bn in 2030, up from $135bn in 2018.

These cooling technologies, and broader cooling use, are a substantial and growing contributor to climate change. The report highlights the urgent steps that must be taken to avoid the need for cooling, shift to cooling with lower emissions, improve cooling efficiency and protect those most vulnerable to a lack of cooling.

It calls for action to reduce the need for cooling through better building design, behaviour change, a shift to lower emissions (e.g. replacing HFCs with climate-friendly alternatives), and improvements in efficiency, among others.

Figure 1.1:
Key Elements of the F-Gas Regulation

[1] Economist Intelligence Unit. 2019. The Cooling Imperative: Forecasting the size and source of future cooling demand. Available online at: http://www.eiu.com/graphics/marketing/pdf/TheCoolingImperative2019.pdf

What is the EU F-Gas Regulation?

The first F-Gas Regulation, adopted in 2006, stabilised f-gas emissions in the EU at 2010 levels.[2] This was replaced by the current EU F-gas Regulation N517/2014, aimed at strengthening already-existing measures and introducing new changes with the goal of cutting f-gas emissions by two-thirds (of 2014 levels) by 2030.

The current Regulation limits the sale of f-gases, bans their use in new equipment when alternatives are available (see Figure 2.1), and requires equipment checks to prevent their leakage during use and at end-of-life. The legislation also stimulates innovation and green growth and jobs by encouraging the use of green technologies based on less climate-harmful alternatives.[2]

The EU ratified the Kigali Amendment on 27 September 2018, which added HFCs to the Montreal Protocol's list of controlled substances, beginning a global phase-down of HFCs. Now, individual Member States are responsible for ratifying it individually.

Revision in Progress

The European Commission, the executive branch of the EU, has started the process of updating the F-Gas Regulation. As such, the "Review of EU rules on fluorinated greenhouse gases" initiative was published on 29 June 2020; it was first outlined in the European Commission's "Inception Impact Assessment" document.[3]

Comment was due on 7 September 2020, looking at "to what extent the F-Gas Regulation is working well, the need to review it, the choice of policy options and expected impacts." The purpose of the feedback will be for "further development and fine tuning of the initiative," according to the European Commission.[3]

The review is part of a "roadmap", the process by which the European Commission describes the problem to be tackled and objectives to be met, explains why EU action is needed, outlines policy options and describes the main features of the consultation strategy.

As a next step, the European Commission is undertaking a public consultation (15 September 2020 to 31 December 2020).[3]

[2] European Commission. Fluorinated greenhouse gases. Available online at: https://ec.europa.eu/clima/policies/f-gas_en#tab-0-0

[3] European Commission. 2020. Combined Evaluation Roadmap/ Inception Impact Assessment. Available online at: https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12479-Review-of-EU-rules-on-fluorinated-greenhouse-gases

Impact of Current F-Gas Regulation

The F-Gas Regulation has pushed European businesses to switch to HFC-free technologies. This trend is expected to intensify as the limits on HFCs become more stringent for other sectors which did not previously have sectoral bans imposed. With more suppliers competing in the market, technologies become optimised and therefore become increasingly efficient/available to the end user.

It is worth noting the influence the EU's F-Gas Regulation has had on industy outside of Europe, impacting national and regional legistlative frameworks as well as international discussions aimed at addressing HFCs globally. Following the adoption of the EU Regulation, several non-EU national and regional governments referenced this regulation when designing their own rules regulating the use and emissions of HFCs.

As part of its research, shecco asked industry stakeholders about the effects the current F-Gas Regulation has had on their business. **Feedback showed that most respondents believed the regulation had a "positive" effect on their business.** Comments stated that the regulation had improved manufacturers' range of products, as well as the quality of training, and that moving away from climate-damaging refrigerants is positive for the environment.

What does industry say:

What has the effect of the F-Gas Regulation been?

It has driven the adoption of CO_2 refrigeration systems which by their nature have improved the quality of the plant and engineers servicing it.

– Max Bellfield, National Refrigeration Manager, Aldi

Positive. It accelerated development of equipment with alternatives to high-GWP refrigerants.

– Jonna Byskata,
Director Goverment Relations Europe, Carrier

Positive, as it encouraged us to be more competitive and further explore areas with more added value, i.e. CO_2.

– Joao Paulo Pinto Managing Director, RACE

Positive. We see an opportunity to get an advantage over other world regions if we force our industry to push the topic. The technology is ready, the biggest issue is liability and safety regulations which are not clear, or very old and outdated, or not in place.

– Timo Methler, Engineer, Fraunhofer ISE

Positive, but it should be accelerated.

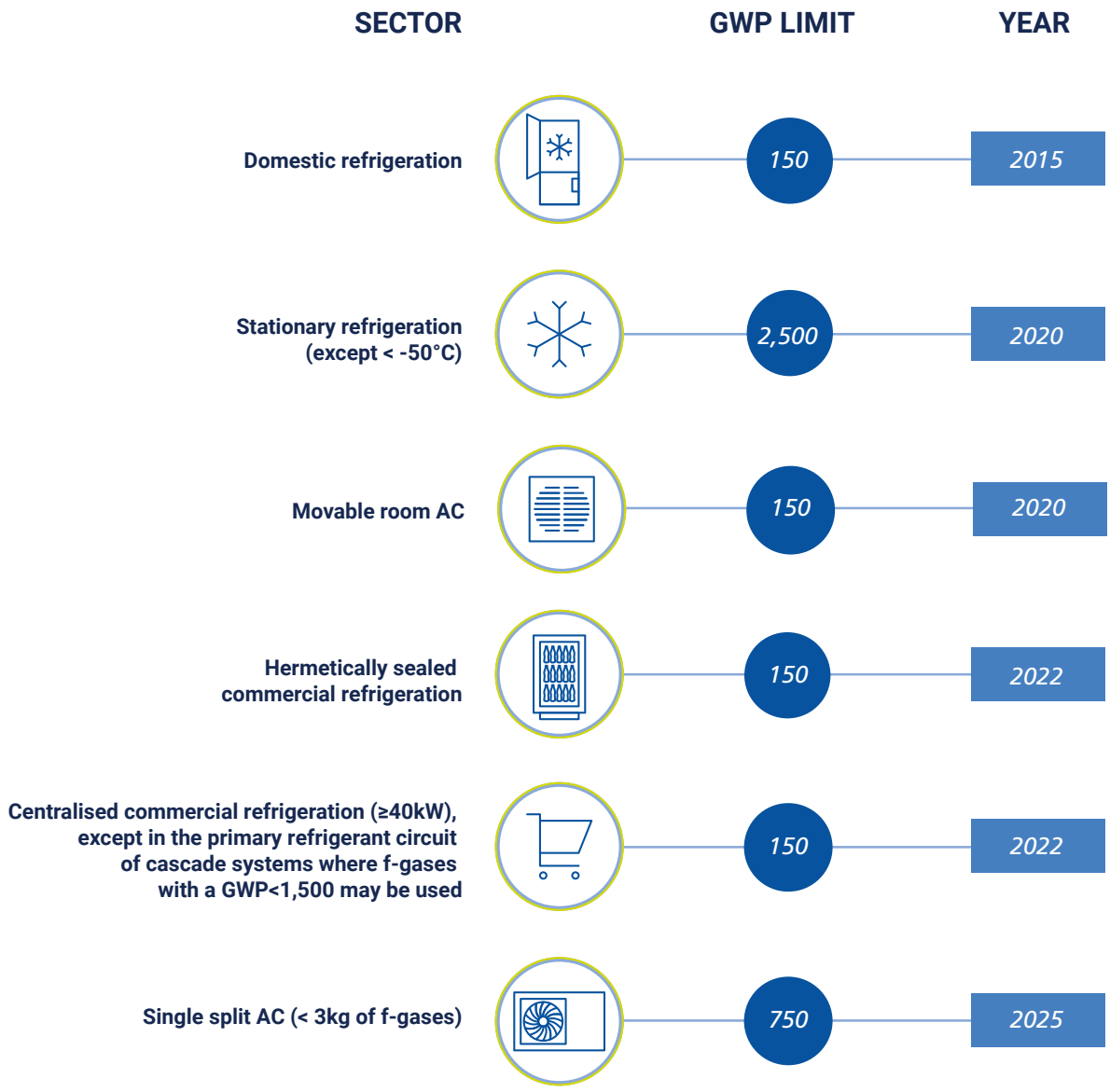
– Julia Romero, Marketing, Efficient Energy GmbH

CHAPTER 2

THE NEED TO BE MORE AMBITIOUS

Figure 2.1:
Current Sectoral Bans Included in the F-Gas Regulation Related to Cooling

Thus far, only limited sectoral bans on HFC-equipment have been included in the F-Gas Regulation, failing to address the remainder of the HVAC&R sectors.



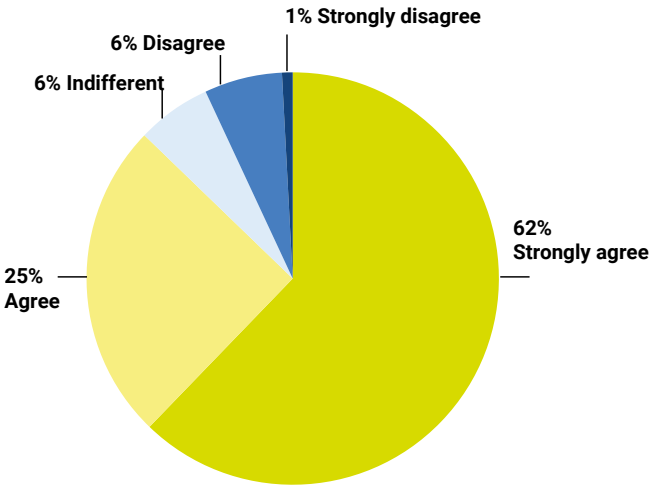
Sectoral Bans Key to Driving Sustainability

Findings from this study indicate that Placing on the Market (POM) prohibitions (or "bans") are one of the most effective measures for driving the industry towards long-term, sustainable technologies, avoiding costly and unnecessary intermediary steps.

To assess the situation today, a significant part of the 2020 shecco study focussed on the various HVAC&R sub-sectors and their individual market-readiness to move away from fluorinated gases. **The results showed widespread support for more ambitious sectoral bans for sub-sectors already mentioned in the F-Gas Regulation, as well as for the introduction of bans for sub-sectors previously not included.** (More about specific sectors in Chapter 3.)

Figure 2.2
To what extent do you agree with this statement? Increasing the ambition of the F-Gas Regulation through further bans, a more ambitious phase down, and strong measures to combat illegal trade should be an essential component of the EU's 2030 climate ambition strategy.

101 Responses



Accelerated Phase-Down Needed

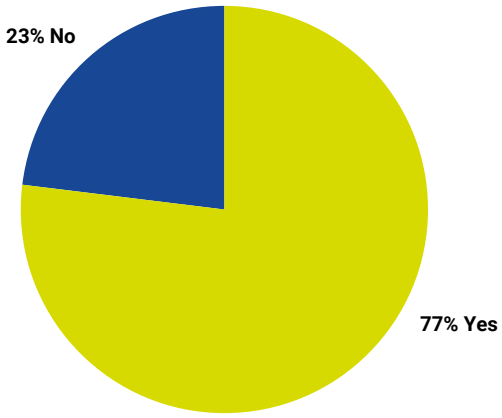
The current HFC phase-down schedule requires reductions to 21% of the baseline by 2030, with further reductions of 45% in 2021; 31% in 2024; and 24% in 2027. However, these targets can be more ambitious.

Following the adoption of the Kigali Amendment in 2018, the EU's HFC phase-down schedule has to be adjusted to meet the specified targets. The current phase-down schedule also does not take into account the inevitable demand reduction resulting from the January 2020 service ban that prohibits the use of fluorinated greenhouse gases with a global warming potential of 2,500 or more to service or maintain refrigeration equipment with a charge size of 40 tons of CO_2 equivalent or more.

The survey respondents were asked whether they think the current phase-down schedule could be accelerated, given the current state of development of natural-refrigerant alternative technologies? **The majority of 77% of respondents agreed that the phase-down schedule could be accelerated.**

Figure 2.3
Do you think the phase-down schedule could be accelerated, given the current state of development of natural-refrigerant alternative technologies?

100 Responses

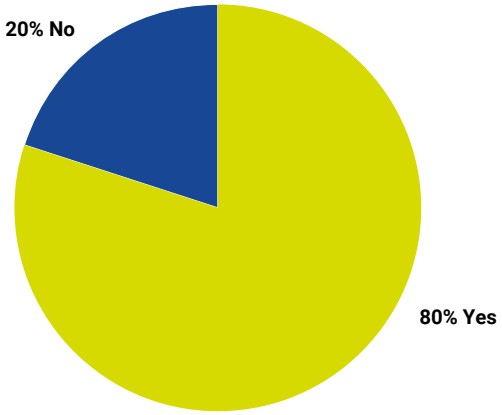


European Green Deal Should Speak to F-Gases

The research also looked at whether the European Green Deal should be updated to more prominently, and more ambitiously, include the regulation of fluorinated gases. A total of **80% of survey respondents agreed that the European Green Deal should speak more to the regulation of fluorinated gases as well.**

Figure 2.4
Should the European Green Deal be updated to more prominently (and more ambitiously) include the regulation of fluorinated gases?

99 responses



What does industry say:

Why should the European Green Deal put more emphasis on f-gases?

To my understanding, the European Green Deal does not explicitly mention the application "refrigeration" or the working fluids being used, such as f-gases. It may seem to be a detail, but it has implications in several (or all) policy areas (Sustainable Industry, Building and Renovation, etc.). Having that said, I think the impact of refrigerants in Industry, Buildings, Transport, etc. deserves to be pointed out as far as the heavy importance of f-gases on the total CO_2 footprint.

– Jörgen Rogstam,
Managing Director, EKA - Energi & Kylanalys

There should be a better communication of the necessity to move to greener solutions.

– Dimitrios Dalavouras,
Mechanical Engineer, General Refrigeration SA

We need a definitive and clear path to follow in order to protect environment and economy.

– Umberto Di Barbora,
Global Product Manager, Modine

Natural refrigerant alternatives are available for every industry and application. It will be impossible for EU to become climate neutral without strictly regulating HFCs.

– Vladyslav Tsyplakov,
Development Director, Mirai Intex

The regulation of f-gases can only make the Green Deal better.

– Andy Boatwright,
Sales Manager, Grasso, GEA Group

European Manufacturers can take the world leading position by going along with an ambitious European Green Deal. We can all see that climate change is happening.

– Andreas Meier,
Managing Director, TEKO Refrigeration

CHAPTER 3

MARKET READINESS PER SECTOR

3.1 Commercial Refrigeration

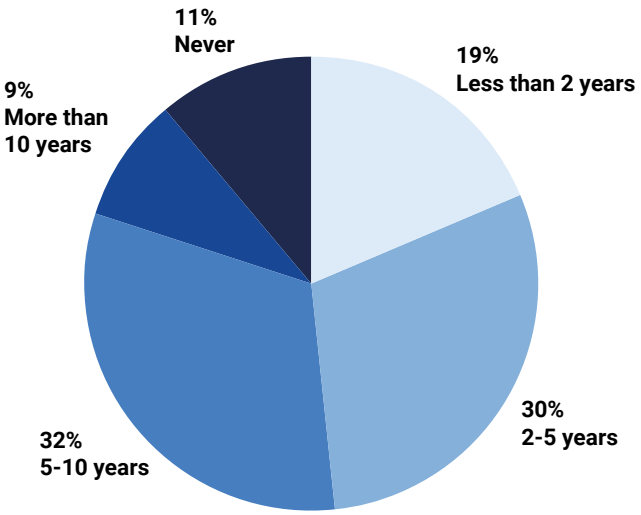
The existing F-Gas Regulation includes a provision that introduces a ban, coming into effect in January 2022, on the use of HFCs with a GWP higher than 150 in "multipack centralised refrigeration systems for commercial use with a rated capacity of 40kW…except in a primary refrigerant circuit of cascade systems where fluorinated greenhouse gases with a GWP of less than 1,500 may be used". The European Commission introduced the HFC prohibition following a thorough evaluation, which found that energy-efficient, cost-effective and technically viable alternatives to high-GWP HFCs in this sector are available.[4]

Survey respondents showed clear ambition in terms of sectoral bans in the commercial refrigeration market. If hypothetically the F-Gas Regulation update was to ban the use of all fluorinated refrigerants, respondents were asked to estimate by when natural-refrigerant technology providers would to be able to support the entire commercial refrigeration market in the EU (single-choice answer).

Responses were varied, with 19% stating that this could be achieved in under two years, and another combined 62% estimating a two- to 10-year timeline. Only 11% believed the answer to be "never".

Figure 3.1.1
In your opinion, if the F-Gas Regulation update was to ban the use of ALL fluorinated refrigerants, by when, do you think, would natural-refrigerant technology providers be able to support the entire commercial refrigeration market in the EU? (select one)

47 responses



[4] See Preparatory Study; *European Commission, Impact Assessment: Review of Regulation (EC) No 842/2006 on certain fluorinated greenhouse gases* (Commission Staff Working Paper), SWD(2012)0364 (hereinafter "Impact Assessment"), available at https://ec.europa.eu/clima/sites/clima/files/f-gas/legislation/docs/swd_2012_364_en.pdf.

What does industry say:

By when can natural-refrigerant technology support the entire commercial refrigeration market in the EU if the use of all fluorinated gases were banned?

This can already be done today. Natural-refrigerant solutions are available for all necessary functions in commercial refrigeration.

– Collin Bootsveld, Project Engineer, Colruyt Group

Everything is already available. It's just a matter of cost for some applications. Other applications are already at cost parity between naturals and chemicals.

– Giacomo Pisano, Sales Manager, Dorin

Natural refrigeration systems are today available in multiple formats. I see no issues with an immediate HFC ban for new plants. However, the cost of renovation of old plants is too high. Subsidies are needed to switch the entire sector.

– Biagio Lamanna, HVAC/R Knowledge Center Manager, Carel Industries Spa

Technology and the supply chain are already in place, just need to scale up.

– Fredrik Strengbohm, Technical Manager, Huurre Sweden AB

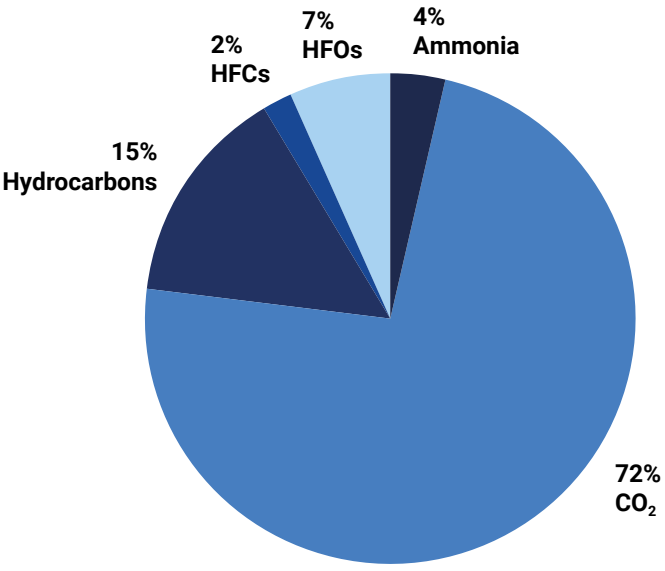
3.1.1 CO_2 the Refrigerant of Choice

Industry representatives were also asked about their refrigerant of choice in commercial refrigeration applications. **The overwhelming majority of survey respondents believed CO_2 to be the best choice (72%).** Hydrocarbons came in second with 15% and 2% prefer HFCs.

Reasons for the overwhelmingly positive response to CO_2 included its efficiency, availability and its favourable environmental impact.

Figure 3.1.2
What is your preferred refrigerant for use in commercial refrigeration applications?

46 responses



3.1.2 Centralised Systems

From January 2022 onwards, the use of HFCs with a GWP of 150 or more will be banned in multipack centralised refrigeration systems for commercial use with a rated capacity of 40kW or more (except in the primary refrigerant circuit of cascade systems, where HFCs with a GWP of less than 1,500 may be used).

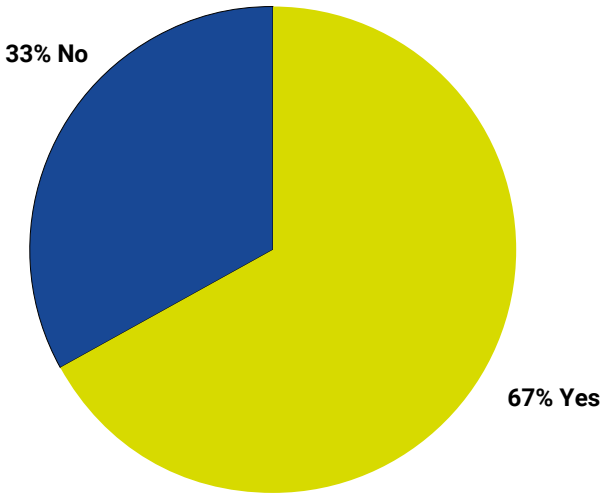
Stakeholders were asked how influential this market prohibition has been in 1) increasing the uptake of climate-friendly alternative technologies; 2) increasing the development of climate-friendly alternative technologies; and 3) increasing the price competitiveness of climate-friendly alternative technologies.

For all three questions, **a large majority confirmed that the market prohibition has had positive effects.** When asked about its effects in relation to climate-friendly, alternative technologies, 74% believe that it had increased their uptake, 87% said it also increased their development, and 61% believe it increased their price competitiveness.

When asked whether they support a full ban on new HFC-based equipment in this sector, 67% of respondents answered positively.

Figure 3.1.3
Do you support a full ban on new HFC-based equipment in the commercial refrigeration centralised system sector by 2024?

46 responses



What does industry say:

Why do you support a full ban on new HFC-based centralised commercial refrigeration equipment?

There are no technical reasons not to do so.

– Holger Guss, Head of Technical Engineering, Metro AG

Any further postponement of HFC bans will inevitably and irreversibly have a negative impact to global warming, climate change and all its negative consequences. Europe needs to play the pioneer's role here and others will follow.

– Helmut Greiner, Director Global Household Application Engineering, Secop Austria Gmb

We need to make the change as quickly as possible to prevent irreversible damage to the climate.

– Max Bellfield, National Refrigeration Manager, Aldi

Only in this way industry can address its investments and provide cost parity on all applications between naturals and chemicals.

– Giacomo Pisano, Sales Manager, Dorin

When there are windows in laws, they usually get exploited. What is really important too is that the current legislation speaks about 40kW rated capacity but doesn't state at what temperature is this capacity referred. Also, allowing systems up to 40kW to work, they will push the market to go on to more small systems to avoid the ban, but still use HFC refrigerants, so it does not meet the purpose.

– Dimitrios Dalavouras, Mechanical Engineer, General Refrigeration SA

3.1.3 Condensing Units

In 2014, during the last revision of the F-Gas Regulation, no ban on new HFC-based equipment was introduced in the commercial refrigeration condensing unit sector.

Stakeholders were asked how this lack of a market prohibition has affected the sector in terms of 1) increasing the uptake of climate-friendly alternative technologies; 2) increasing the development of climate-friendly alternative technologies; and 3) increasing the price competitiveness of climate-friendly alternative technologies.

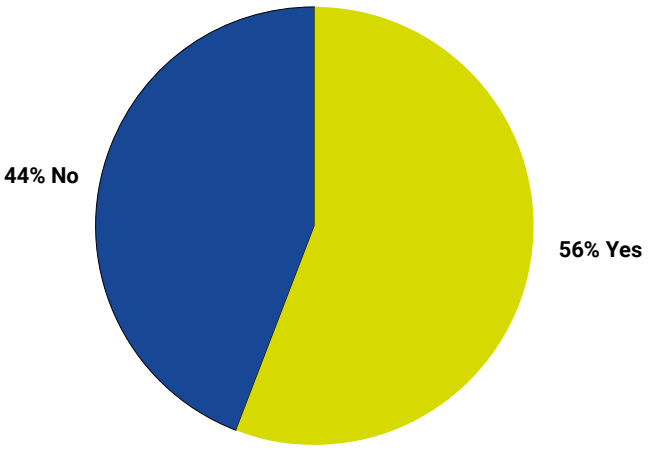
Stakeholders confirmed that **this lack of a ban has negatively impacted the uptake, development and price competitiveness of climate-friendly alternative technologies with 63% saying it slowed their uptake and 59% confirming that it slowed the impact of development.** Price competitiveness of climate-friendly alternatives were believed to be slowed by 56% because of failing to include a sectoral ban for condensing units in the previous F-Gas Regulation update.

When asked whether they support a full ban in this sector by 2024 in terms of HFC-based equipment, responses were mixed with the majority (56%) saying "yes."

Those who responded with "no," were asked when the earliest possible date for a ban could be. Of these respondents, 81% said such a ban would be possible by 1 January 2030.

Figure 3.1.4
Do you support a full ban on new HFC-based equipment in the commercial condensing unit sector by 2024?

48 responses



3.2 Transport Refrigeration

There is currently no ban included in the F-Gas Regulation's Annex III that regulates new, HFC-based transport refrigeration equipment.

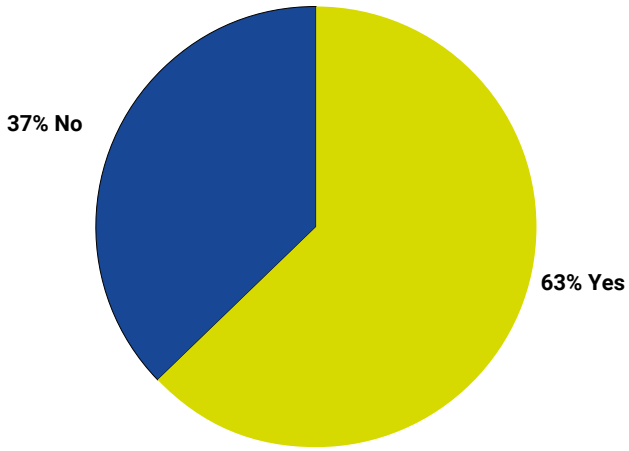
Stakeholders were asked how this lack of a market prohibition has affected the sector in terms of 1) increasing the uptake of climate-friendly alternative technologies; 2) increasing the development of climate-friendly alternative technologies; and 3) increasing the price competitiveness of climate-friendly alternative technologies.

Seventy-nine percent of survey respondents said that the lack of ban slowed the uptake of climate-friendly alternative technologies, while 68% said it also slowed the development of such technologies. The same percentage (68%) believed that it negatively impacted the price competitiveness of alternative technologies.

When asked whether they support a full ban on HFC-based equipment in transport refrigeration by 2024, 63% said they did.

Figure 3.2.1
Do you support a full ban on new HFC-based equipment in the transport refrigeration sector by 2024?

19 responses



3.3 Industrial Refrigeration

No ban on new HFC-based industrial refrigeration equipment was included in the previous F-Gas Regulation update. Yet despite this fact, this is one of the most mature HVAC&R sectors in terms of climate-friendly alternative solutions. Ammonia has been used in this application since the 1800s and there is an increasing trend towards large transcritical CO_2 refrigeration systems too in the industrial refrigeration sector.

Stakeholders were asked how this lack of a market prohibition has affected the sector in terms of 1) increasing the uptake of climate-friendly alternative technologies; 2) increasing the development of climate-friendly alternative technologies; and 3) increasing the price competitiveness of climate-friendly alternative technologies.

Answers highlighted the negative impact this lack of prohibition has had on the sector developing alternative solutions. Sixty percent of survey respondents said that not having a ban slowed the uptake of climate-friendly alternative technologies in the industrial refrigeration sector, and 53% said it also slowed the development of such technologies. With regards to increasing the price competitiveness of climate-friendly alternative technologies, 53% of respondents believed that there was no impact, suggesting another lost opportunity.

Respondents were asked if they thought this sector would have fully converted to natural refrigerants by now had a sectoral ban been included for 2020. The majority (78%) were positive that this would have happened by 2020.

When asked whether they support a full ban on HFC-based equipment in industrial refrigeration by 2024, 72% said they did. Those who did not support it by this timeline were asked by when they thought such a ban could take effect in this sector. The result was evenly split across a five-year timeline between 1 January 2025 and 1 January 2030.

Respondents were also asked about their refrigerant of choice for industrial refrigeration applications and half (50%) selected CO_2, with ammonia taking 33% of the votes. Reasons listed included that these refrigerants offered great efficiency, reduced cost, a favourable environmental impact, and ease of maintenance.

Figure 3.3.1
Do you support a full ban on new HFC-based equipment in the industrial refrigeration sector by 2024?

18 total respondents

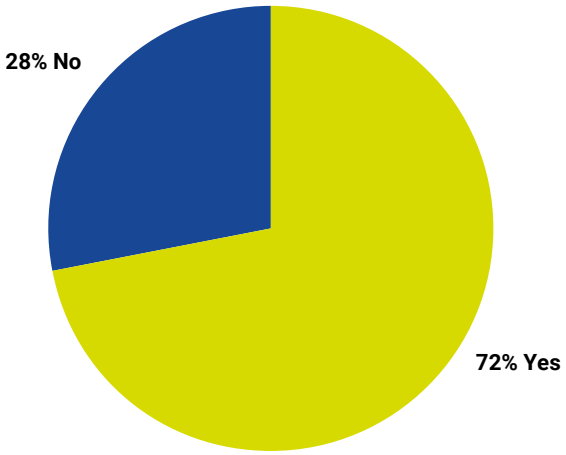
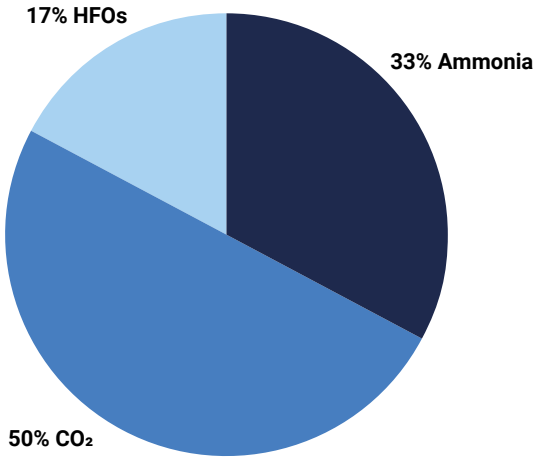


Figure 3.3.2
What is your preferred refrigerant for use in industrial refrigeration applications?

18 responses



3.4 Single-Split Air Conditioning

By 2050, around two-thirds of the world's households could have an air conditioner with the global stock of room air conditioners tripling to 5.6 billion units (China, India and Indonesia will together account for half of the total number)[5].

Switching domestic air conditioners from climate-damaging refrigerants to propane (a natural refrigerant) could (by 2050) prevent harmful emissions equal to 1,400 coal-fired power stations running for a year. This equates to avoiding 5.6 billion metric tons of CO_2e emissions.[6] This is an opportunity for stricter sectoral bans to make a difference.

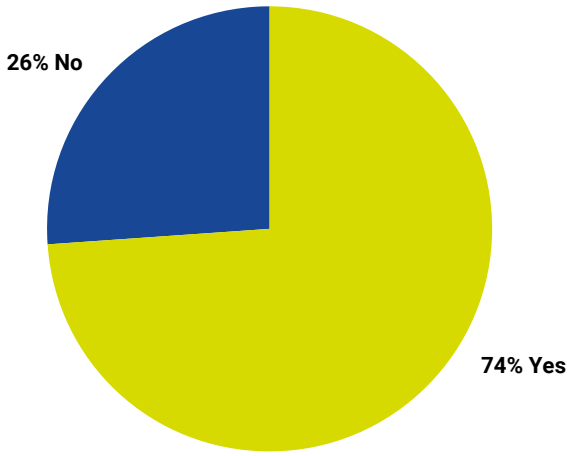
The use of HFCs with GWP of 750 or more will be banned in single-split air-conditioning systems containing less than 3kg of HFCs, in the EU starting January 2015. However, there is room to be more ambitious.

The current ban of GWP > 750 allows for refrigerants such as R32 with a GWP100 of 675, which has a staggering GWP20 of 2,330[7]. This 20-year number is more representative of the harmful effect of this refrigerant on the atmosphere as it has been found to break down over 21.7 years, making the 100-year GWP metric an unsuitable measurement.[7]

Seventy-four percent of survey respondents who answered this section indicated that they were in support of lowering the allowable GWP limit in single-split-air-conditioning systems to 150 from 2025 onwards (See Figure 3.4.1).

Figure 3.4.1
Do you support lowering the allowable GWP limit in the ban on single-split-air conditioning systems to 150 from 2025?

19 respondents



Respondents were asked to rank what they believed to be the most important barriers preventing the sale of R290 (propane) single-split air-conditioning systems on the EU market. **The biggest barriers were a lack of a complete ban in this sector and the lack of training.**

When asked about their refrigerant of choice, the survey highlighted that 32% of respondents prefer hydrocarbons (such as R290), while HFCs and HFOs have an equal preference of 26% (See Figure 3.4.3). In the "other" category, R718 (water) was highlighted as a preferred option as well. **Reasons for favouring hydrocarbons, included the fact that it is a future-proof refrigerant, highly efficient, and natural.**

The survey also asked industry players what would enable them to prioritise selling R290-based split air conditioners. The most common answers included regulation, specific training, incentives, and updated standards.

[5] International Energy Agency. 2018. The Future of Cooling. Available online at: https://www.iea.org/futureofcooling/

[6] Öko-Recherche. 2020. Explanatory Note on modelling of climate benefits of charge size changes for air conditioning equipment in relation to the revision of the product standard IEC 60335-2-40

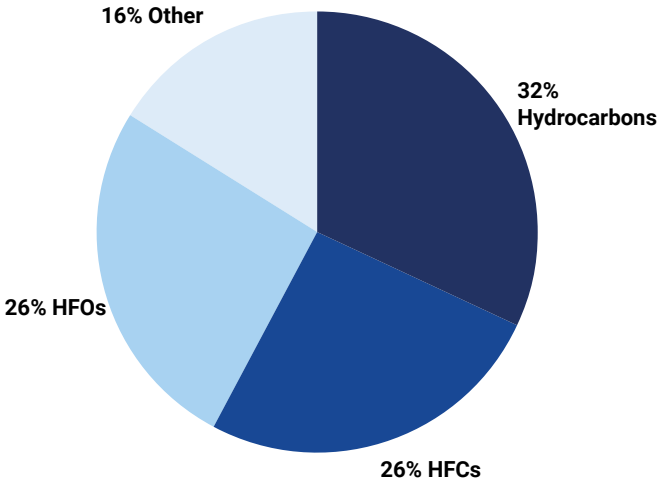
[7] Kanter, D., Mate, J. 2012. The Benefits of Basing Short Term Climate Protection Policies on the 20 Year GWP of HFCs. Frankfurt, Öko-Recherche GmbH.

Figure 3.4.2
What do you think are the most important barriers preventing the sale of R290 (propane) single-split systems on EU markets? (Please rank from 1 to 5, while 1 being the least important and 5 being the most important)

Lack of training and certified personnel	★★★★☆
Lack of a complete ban in this sector (e.g on HFCs 150 or above)	★★★★☆
Outdated standards for A3 refrigerants	★★★½☆
Monopolistic practices or pressure by fluorochemical producers	★★★½☆
Free grandfathering of HFC quotas instead of an auction	★★★☆☆
Lack of financial incentives and other market incentives	★★★☆☆

Figure 3.4.3
What is your preferred refrigerant for use in single-split air-conditioning applications?

19 respondents



3.5 Multi-Split Air Conditioning

There is currently no ban on new HFC-based multi-split HVAC equipment entering the market. Stakeholders were asked how this lack of a market prohibition has affected the sector in terms of 1) increasing the uptake of climate-friendly alternative technologies; 2) increasing the development of climate-friendly alternative technologies; and 3) increasing the price competitiveness of climate-friendly alternative technologies.

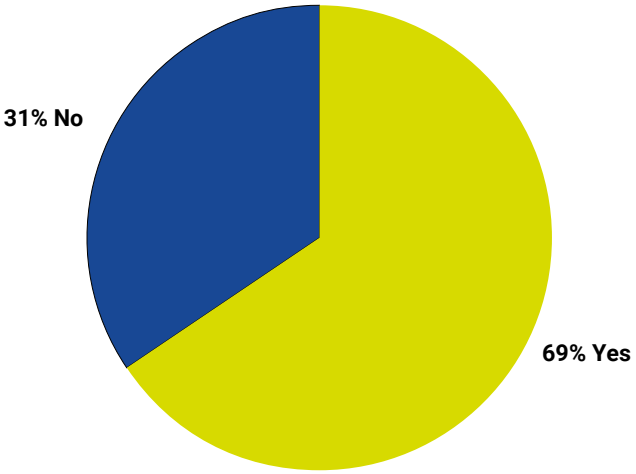
The majority reflected that this lack of a ban has negatively affected the market in terms of alternatives. **Seventy-one percent of survey respondents said it slowed the uptake of climate-friendly alternative technologies,** while 47% said it also slowed the development of such technologies (41% selected "no impact"). The same percentage (47%) believed that it negatively impacted the price competitiveness of alternative technology.

Respondents were asked if they thought this sector would have fully converted to natural refrigerants by now had a sectoral ban been included for 2020. The majority (56%) were positive that this would have happened by this year already.

When asked whether they support a full ban on HFC-based equipment in multi-split air-conditioning by 2024, a 69% majority confirmed that they did.

Figure 3.5.1
Do you support a full ban on new HFC-based equipment in the multi-split air-conditioning sector by 2024?

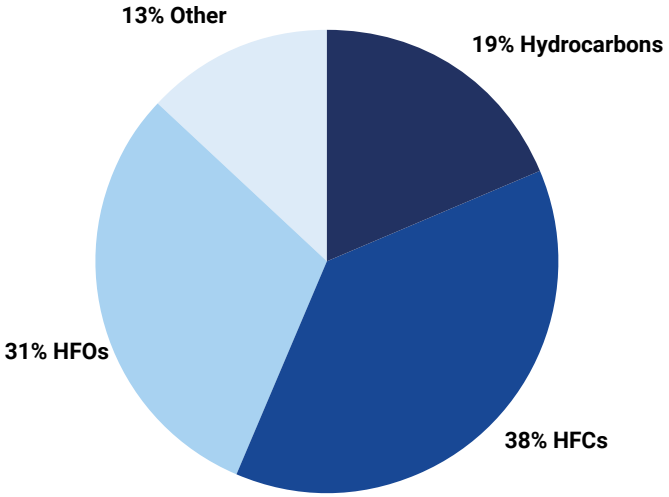
16 responses



When asked about their preferred refrigerant for use in multi-split/VRF applications, a different picture was painted – still favouring HFCs (38%) and showing a clear need for stricter policy and the introduction of bans to develop this HVAC&R market sector in a more climate-friendly way. When asked “why” they chose these refrigerants, answers included “for simplicity”, and “it’s all I’ve been taught” – once again highlighting the need for training. “Availability” was also raised on more than one occasion.

Figure 3.5.2
What is your preferred refrigerant for use in multi-split/VRF applications?

Responses 16



3.6 Domestic Heat Pumps

European heat pump sales grew by 17.7% in 2019 with 1.49 million units sold across Europe. The current European heat pump stock is roughly 13.27 million units.[8] There is currently no ban on new HFC-based domestic heat pump equipment.

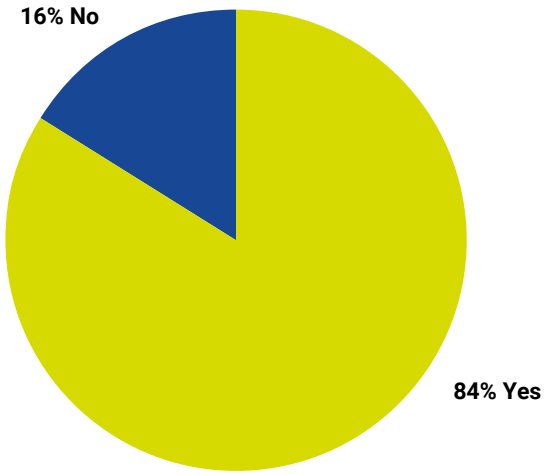
Stakeholders were asked how this lack of a market prohibition has affected the sector in terms of 1) increasing the uptake of climate-friendly alternative technologies; 2) increasing the development of climate-friendly alternative technologies; and 3) increasing the price competitiveness of climate-friendly alternative technologies.

Sixty-eight percent of survey respondents said the lack of a ban had slowed the uptake of climate-friendly alternative technologies, while 64% said it also slowed the development of such technologies. Sixty percent believed that it negatively impacted the price competitiveness of alternative technology.

When asked whether they support a full ban on HFC-based equipment in domestic heat pumps by 2024, 84% said they did.

Figure 3.6.1
Do you support a full ban on new HFC-based equipment in the domestic heat pumps sector by 2024?

25 responses



What does industry say:

What would enable you to prioritise selling natural-refrigerant heat pump systems over comparable R32 units?

Updated standards for A3 refrigerants.

– Miriam Solana Cipres, HVAC/R Engineer, Carel

Bans, bans, bans.

– Alexander Pachai, Senior Product Specialist, Johnson Controls Denmark

Better standards to develop A3 refrigerant units, financial incentives.

– Tobias Lingk, Innovation Engineer, Vaillant GmbH

R290 heat pumps have become competitive in terms of price. No need to wait. Just do it.

– Collin Bootsveld, Project Engineer, Colruyt Group

Maggiore carica di refrigerante (higher refrigerant charge).

– Alberto Cavatorta, Ingegnere, Refco Sas

[8] EPHA. 2020. European Heat Pump Market and Statistics. Available online: https://www.ehpa.org/market-data/

Respondents were also asked what they thought the most important barriers were preventing the sale of natural-refrigerant heat pump systems on EU markets. The biggest barrier highlighted was building and safety codes.

Figure 3.6.2
What do you think are the most important barriers preventing the sale of natural-refrigerant heat pump systems on EU markets? (Please rank from 1 to 5, with 1 being the least important and 5 being the most important.)

3.7 Commercial Heat Pumps

There is currently no ban on new HFC-based commercial heat pump equipment. As such, survey respondents were asked how this lack of a market prohibition has affected the sector in terms of 1) increasing the uptake of climate-friendly alternative technologies; 2) increasing the development of climate-friendly alternative technologies; and 3) increasing the price competitiveness of climate-friendly alternative technologies.

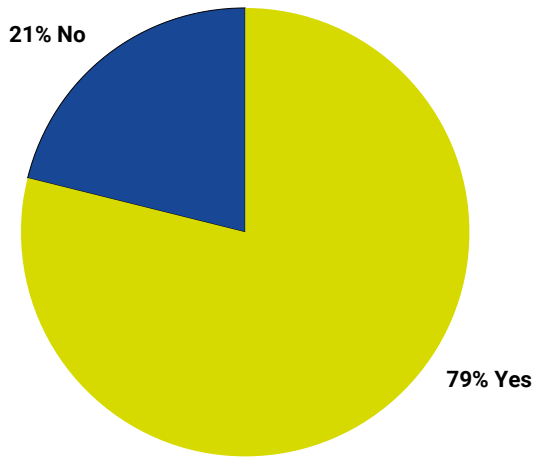
Sixty-seven percent of survey respondents said it slowed the uptake of climate-friendly alternative technologies as well as slowed the development of such technologies (also 67%). Seventy percent believed that it negatively impacted the price competitiveness of alternative technology.

Respondents were asked if they thought this sector would have fully converted to natural refrigerants by now had a sectoral ban been included for 2020. The majority (64%) were positive that this would have happened by 2020.

When asked whether they support a full ban on HFC-based equipment in the commercial heat pump sector by 2024, a 79% majority said they did.

Figure 3.7.1
Do you support a full ban on new HFC-based equipment in commercial heat pump sector by 2024?

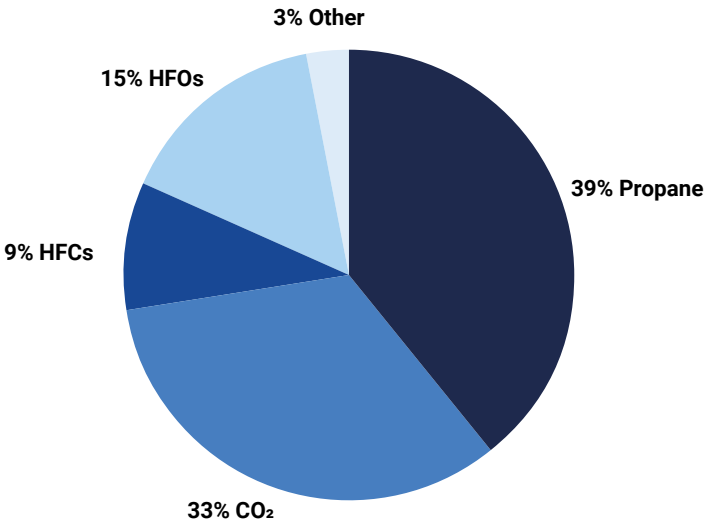
33 responses



Regarding refrigerant of choice for this sector, natural refrigerants were shown as the preferred choice, with 39% opting for propane and 33% choosing CO_2. Reasons included the fact that these refrigerants are natural and not harmful to the environment (sustainable; and the fact that it also offers high efficiency/good performance).

Figure 3.7.2
What is your preferred refrigerant for use in commercial heat pump applications?

33 responses



3.8 Industrial Heat Pumps

The current F-Gas Regulation does not include any Placing on the Market (POM) prohibitions (or bans) on new HFC-based industrial heat pump equipment.

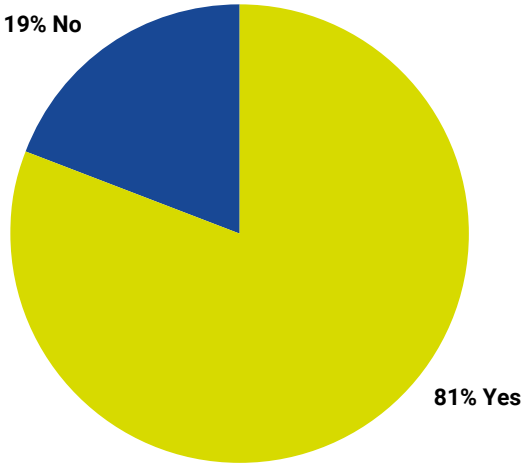
In the survey, industry stakeholders were asked how this lack of a market prohibition has affected the sector in terms of 1) increasing the uptake of climate-friendly alternative technologies; 2) increasing the development of climate-friendly alternative technologies; and 3) increasing the price competitiveness of climate-friendly alternative technologies.

Sixty-two percent of survey respondents said it slowed the uptake of climate-friendly alternative technologies, while 64% added that it also slowed the development of such technologies. Fifty-seven percent believed that it negatively impacted the price competitiveness of alternative technology.

Respondents were asked if they thought this sector would have fully converted to natural refrigerants by now had a sectoral ban been included for 2020. The majority (65%) were positive that this would have happened by 2020.

Figure 3.8.1
Do you support a full ban on new HFC-based equipment in the industrial heat pumps sector by 2024?

37 responses

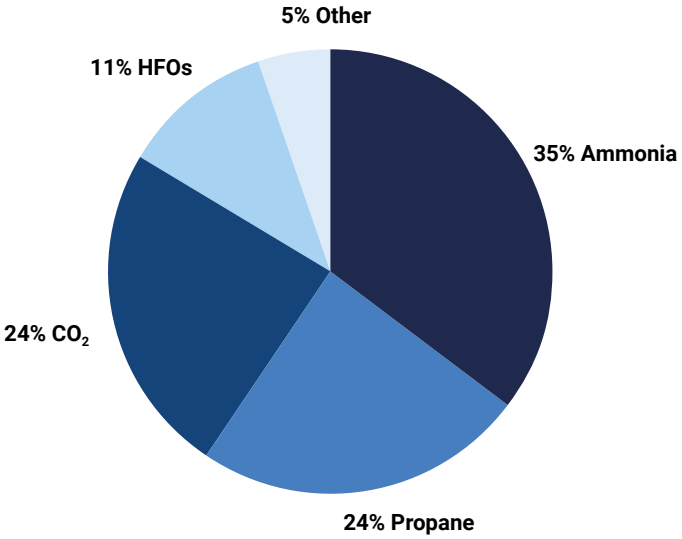


When asked whether they support a full ban on HFC-based equipment in industrial heat pumps by 2024, 81% said they did.

The survey also looked at the preferred refrigerant for use in industrial heat pump applications and natural refrigerants claimed all three top spots: ammonia at 35%, with propane and CO_2 tied at 24%. Interestingly, none of the survey respondents selected HFCs as their preferred refrigerant. In the comments, many expressed their inability to select only one natural refrigerant as they were all suitable depending on the exact application. Efficiency and sustainability were listed as the key reasons for going natural.

Figure 3.8.2
What is your preferred refrigerant for use in industrial heat pump applications?

37 responses



3.9 Rooftop Systems

There is currently no ban on new HFC-based rooftop HVAC equipment included in the F-Gas Regulation's Annex III. As done with the other sectors where no ban was introduced, the survey looked at how this lack of a market prohibition has affected the sector in terms of 1) increasing the uptake of climate-friendly alternative technologies; 2) increasing the development of climate-friendly alternative technologies; and 3) increasing the price competitiveness of climate-friendly alternative technologies.

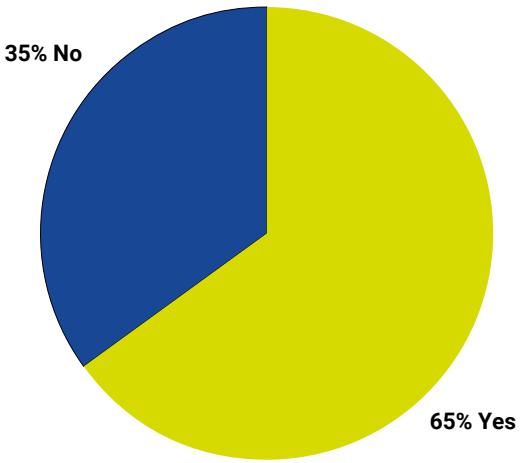
Sixty-five percent of survey respondents said it slowed the uptake of climate-friendly alternative technologies, while 70% said it also slowed the development of such technologies. Sixty-five percent believed that it negatively impacted the price competitiveness of alternative technology.

Respondents were asked if they thought this sector would have fully converted to natural refrigerants by now had sectoral ban had been included for 2020.

When asked whether they support a full ban on HFC-based equipment in rooftop systems by 2024, 65% said they did.

Figure 3.9.1
Do you support a full ban on new HFC-based equipment in the rooftop systems sector by 2024?

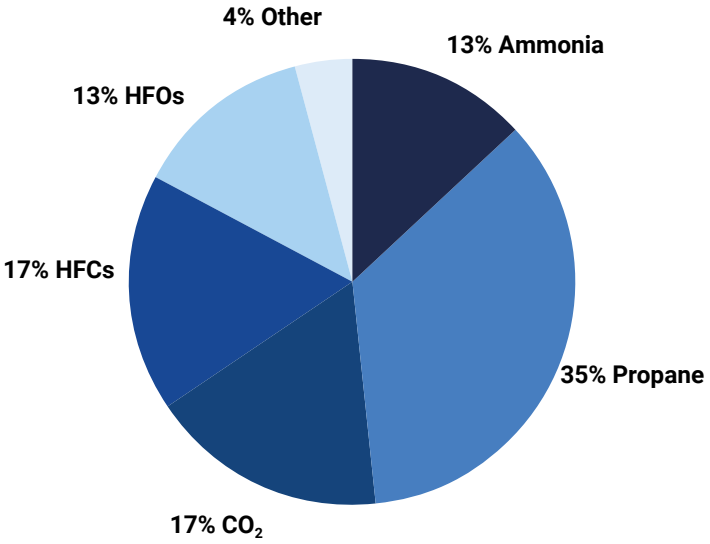
23 responses



In the rooftop HVAC systems sector, 35% of survey respondents indicated propane as their refrigerant of choice, listing the main reason as "good performance" and its environmental sustainability. The rest of the responses were similarly split between the remaining options with HFOs being favoured least.

Figure 3.9.2
What is your preferred refrigerant for use in rooftop applications?

23 responses



3.10 Chillers (Displacement)

Chillers can be classified by compressor type, including centrifugal and positive displacement. Positive displacement compressors include reciprocating, screw, and scroll compressors. There is currently no ban on new HFC-based displacement chiller equipment.

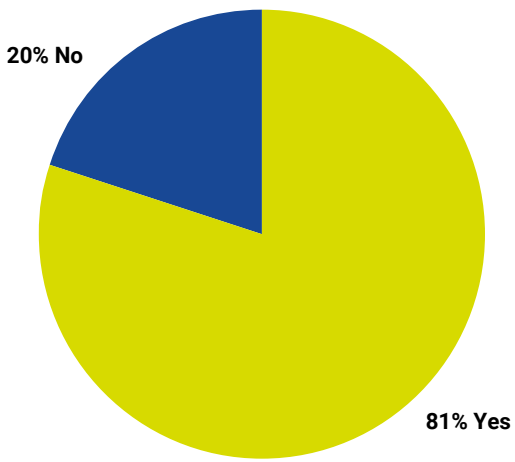
Industry representatives who took the survey were asked how this lack of a market prohibition has affected the sector in terms of 1) increasing the uptake of climate-friendly alternative technologies; 2) increasing the development of climate-friendly alternative technologies; and 3) increasing the price competitiveness of climate-friendly alternative technologies.

Seventy-six percent of survey respondents said the lack of a ban slowed the uptake of climate-friendly alternative technologies, while 73% said it also slowed the development of such technologies. Sixty-eight percent believed that it negatively impacted the price competitiveness of alternative technology.

Respondents were asked if they thought this sector would have fully converted to natural refrigerants by now had a sectoral ban been included for 2020. The majority (66%) were positive that this would have happened by 2020.

Figure 3.10.1
Do you support a full ban on new HFC-based equipment in the chillers (displacement) sector by 2024?

41 responses

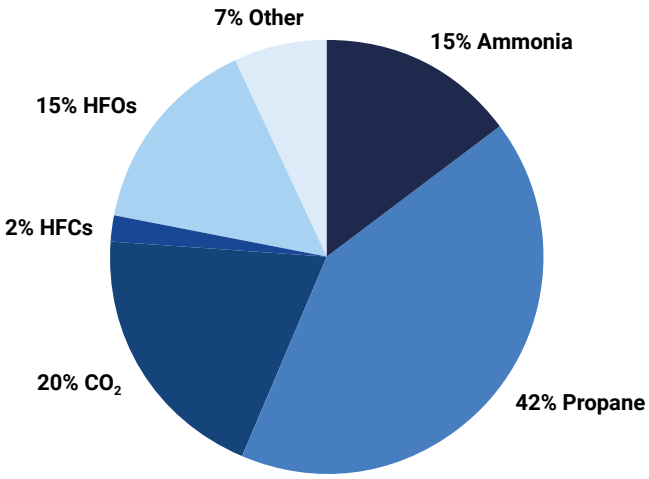


When asked whether they support a full ban on HFC-based equipment in displacement chillers by 2024, 81% said they did.

With regards to refrigerant of choice in displacement chillers, propane took the majority of votes with 42%. Numerous respondents mentioned how they have not experienced problems with the flammability of propane chillers, and have achieved great efficiencies and performance. The improved environmental impact compared to fluorinated refrigerants was also raised.

Figure 3.10.2
What is your preferred refrigerant for use in displacement chiller applications?

41 responses



3.11 Chillers (Centrifugal)

There is currently no ban on new HFC-based centrifugal chiller equipment in Annex III of the current F-Gas Regulation. Those who selected this sub-sector in the survey were asked how this lack of a market prohibition has affected the sector in terms of 1) increasing the uptake of climate-friendly alternative technologies; 2) increasing the development of climate-friendly alternative technologies; and 3) increasing the price competitiveness of climate-friendly alternative technologies.

Seventy-one percent of survey respondents said it slowed the uptake of climate-friendly alternative technologies, while 64% said it also slowed the development of such technologies. The same percentage (64%) believed that it negatively impacted the price competitiveness of alternative technology.

Respondents were asked if they thought this sector would have fully converted to natural refrigerants by now had a sectoral ban been included for 2020. The majority (57%) were positive that this would have happened by 2020.

When asked whether they support a full ban on HFC-based equipment in centrifugal chillers by 2024, 64% said they did.

With regards to refrigerant of choice in centrifugal chillers, the majority of responses selected HFOs (50%) stating reasons such as the unavailability of suitable alternatives in this sector. This is a clear opportunity for incentive schemes to drive further development of climate-friendly, natural-refrigerant alternatives in this sector. However, it should be noted that this sub-sector had the least participation (16.8%). In the "Other" category, water (R718) was mentioned repeatedly, showing potential.

Figure 3.11.1
Do you support a full ban on new HFC-based equipment in the centrifugal chillers sector by 2024?

14 responses

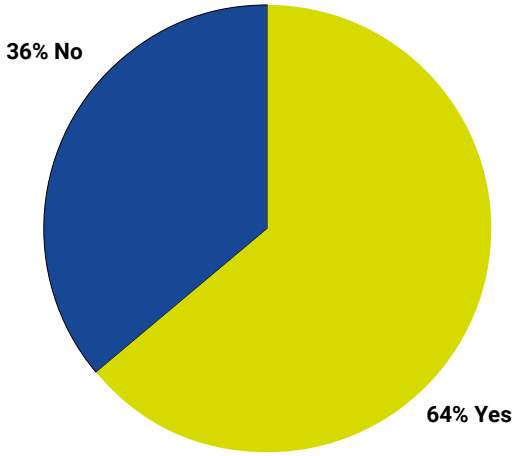
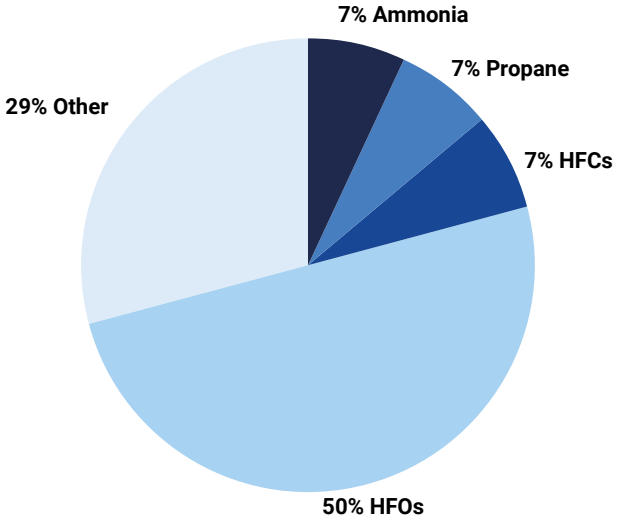


Figure 3.11.2
What is your preferred refrigerant for use in centrifugal chiller applications?

14 responses



3.12 Mobile Air Conditioning (MAC) for Buses and Trains

It is important to note that the survey only looked at mobile air conditioning for buses and trains, not at personal vehicles. These are covered by the MAC Directive.

There is currently no ban on new HFC-based MAC equipment for buses and trains in Annex III of the current F-Gas Regulation.

Stakeholders were asked how this lack of a market prohibition has affected the sector in terms of 1) increasing the uptake of climate-friendly alternative technologies; 2) increasing the development of climate-friendly alternative technologies; and 3) increasing the price competitiveness of climate-friendly alternative technologies.

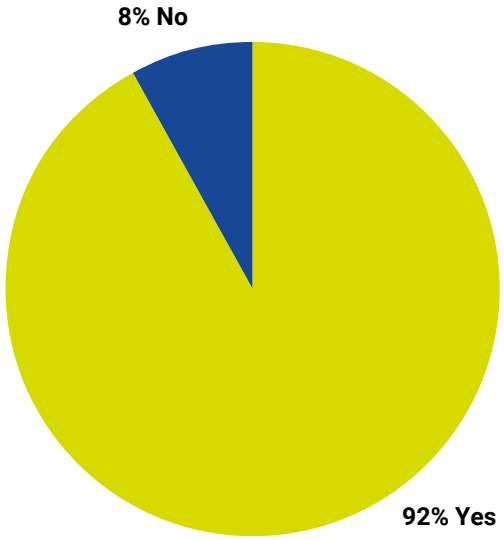
Ninety-two percent of survey respondents said the lack of a sectoral ban has slowed the uptake of climate-friendly alternative technologies, while 92% said it also slowed the development of such technologies. The majority of respondents (83%) believed that it negatively impacted the price competitiveness of alternative technology.

Respondents were asked if they thought this sector would have fully converted to natural refrigerants by now had a sectoral ban been included for 2020. The majority (67%) were positive that this would have happened by 2020.

When asked whether they support a full ban on HFC-based equipment in mobile air conditioners by 2024, a resounding 92% said they did.

Figure 3.12.1
Do you support a full ban on new HFC-based equipment in the mobile air conditioning sector by 2024?

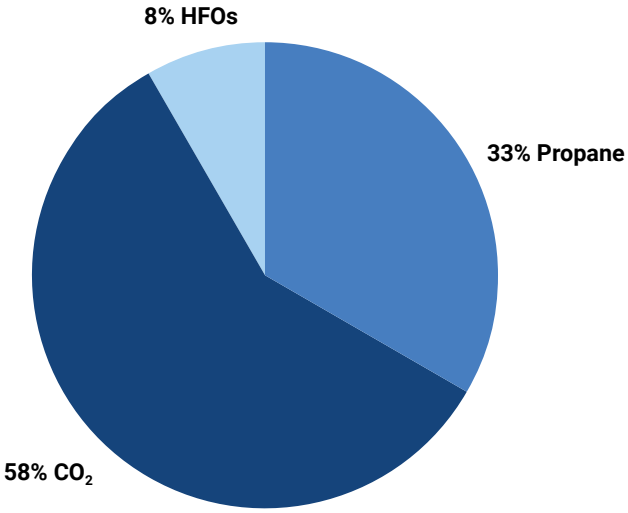
12 responses



When the survey respondents were asked to identify their preferred refrigerant for use in mobile air conditioning (MAC) pertaining to bus and train applications, 58% indicated CO_2 while 33% preferred propane.

Figure 3.12.2
What is your preferred refrigerant for use in MAC (bus and train) applications and why?

12 responses



What does industry say:

Why do you prefer natural refrigerants for use in bus and train MAC applications?

No flammability nor toxicity problems. Excellent performance can now be achieved, especially with reversible systems for heating and cooling.

– Giacomo Pisano, Sales Manager, Dorin

CO_2 fits wells with the reversible cooling/ heating modes that are needed in transport AC

– Marco Portale, Marketing Manager, Carel

Efficiency and safety in secondary systems.

– Thore Oltersdorf, Senior Engineer, Fraunhofer ISE

It is a low-GWP solution.

– Jason L Fraser, MD, Advanced Refrigeration Ltd

CHAPTER 4

CLOSING THE LOOPHOLES

4.1 Mandatory Training on Natural Refrigerants

During the previous F-Gas Regulation revision, certification programmes established under Article 10 did not include mandatory training on natural refrigerants and technologies. This then prevented certified personnel from gaining a familiarity and comfort with climate-friendly natural refrigerants and technologies, consequently stifling their uptake.

Firstly, this is potentially dangerous as natural refrigerants require specific training to address associated risks with toxicity, flammability, or higher operating pressures. This puts the untrained certified personnel at risk. Secondly, it also disproportionately impacts small- and medium-sized enterprises (SMEs) that do not have the capacity to set up their own training schemes and places the onus to secure training on the certified personnel themselves.[9]

Additional barriers also contribute to the lack of trained technicians and engineers, both among contractors that install and maintain equipment, and professional engineers that specify and design equipment.[10] Although training materials are generally available, such as informational documents and software, these are not often translated into all relevant languages.[10] Translation would encourage wider use across the EU, and would be required if training were a part of certification programmes.

Although some Member States plan to open (or have opened) additional practical training facilities for hands-on training on relevant equipment, there is a considerable shortage in many regions.[11]

Fourty-four percent of respondents said that the lack of mandatory training on natural-refrigerant technologies in the certification programmes established by Member States created barriers to the uptake of their product.

When asked whether their business would benefit from mandatory training on natural-refrigerant technologies in the certification programmes established by Member States, **75% responded that their business would positively benefit from mandatory training.**

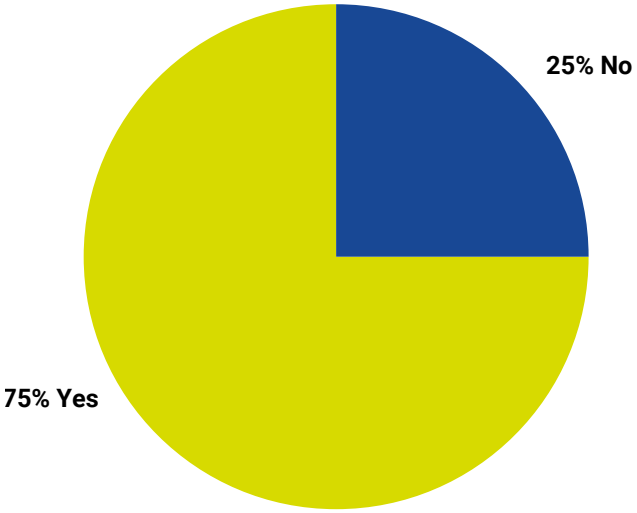
[9] Regulation (EU) No 517/2014, Recital 6.

[10] European Commission. Report from the Commission on Availability of Training for Service Personnel Regarding the Safe Handling of Climate-Friendly Technologies Replacing or Reducing the Use of Fluorinated Greenhouse Gases (Brussels, November 2016) COM(2016) 748 final, p. 8-9; see also Real Alternatives, Blended Learning for Alternative Refrigerants (website), available at http://www.realalternatives.eu/home.

[11] European Commission. Report from the Commission on Availability of Training for Service Personnel Regarding the Safe Handling of Climate-Friendly Technologies Replacing or Reducing the Use of Fluorinated Greenhouse Gases (Brussels, November 2016) COM(2016) 748 final, pp. 7-9.

Figure 4.1.1
Would your business benefit from mandatory training on natural-refrigerant technologies in the certification programmes established by Member States?

79 responses



What does industry say:

What would be the benefit of mandatory natural-refrigerant training?

It removes one of the market barriers for natural refrigerants.

– Biagio Lamanna, HVAC/R Knowledge Center Manager, Carel Industries Spa

Obligation for mandatory training on natural refrigerants (NR) would contribute to increase skills, standardise methods and procedures, would make NR technologies reputation better.

– Francesco Mastrapasqua, Advocacy & Regulatory Affairs Manager, EPTA S.p.A.

Education always helps understanding and acceptance, which in turn increase the motivation to move in this direction, which in turn increases R&D budget…

– Timo Methler, Engineer, Fraunhofer ISE

Training brings awareness and opens up new possibilities for application of technologies in the minds of industry specialists. Education is the key to change.

– Tsyplakov Vladyslav, Development Director, Mirai Intex

If training is mandatory, the market launches of natural refrigerant solutions would be easier. People would better understand the real safety topics and not the perceived, influenced ones.

– Stefan Pietrek, Sr. Dir., Applications & Marketing, Danfoss

Mandatory training will substantially reduce the psychological barrier for using naturals among technicians.

– Marek Zgliczynski, R&D Director, Nidec Global Appliance

4.2 Illegal Trade

Although the F-Gas Regulation requires HFC importers and producers to have quotas before placing HFCs on the EU market, various studies and news reports show that the illegal trade in HFCs is prevalent.[12]

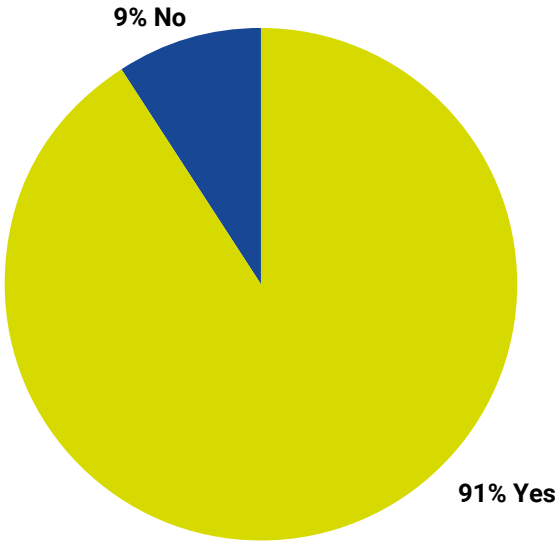
An analysis of trade data indicates that HFCs equivalent to 119 million metric tons of CO_2 were imported into the EU in 2018, but only 111.8 of these were reported by companies to the f-gas register, meaning that more than 7% of the imports went unreported. In addition to this, there is smuggling of HFCs into Europe.[12] For example, in January 2020, the Bulgarian authorities seized almost 13 metric tons entering the country from Turkey.

Current penalties for illegal trade offences are set and enforced by individual Member States. **When asked whether they support EU-wide minimum penalties for HFC and HFC-equipment smuggling, 91% of survey participants responded that they support this measure.**

When asked whether they would support the introduction of **real time quota tracking being made available for customs officials, 92% indicated their support for this change**.

Figure 4.2.2
Do you support EU-wide minimum penalties for HFC and HFC-equipment smuggling?

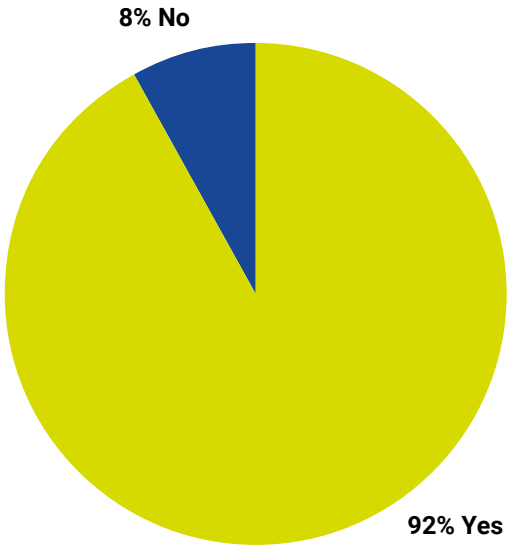
78 respondents



[12] Environmental Investigation Agency. 2019. Doors Wide Open. Available online at: https://eia-international.org/wp-content/uploads/EIA-report-Doors-wide-open.pdf

Figure 4.2.3
Do you support changing this system to introduce real time quota tracking being made available for customs officials, which would prohibit a quota holder from exceeding their allowance in real time?

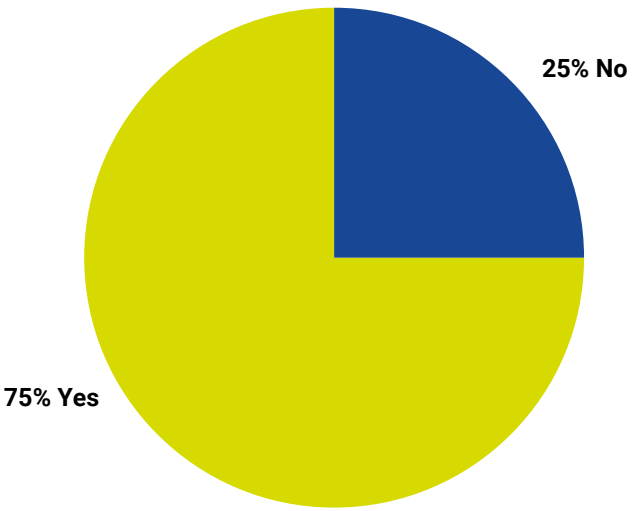
76 responses



Seventy-five percent of the survey respondents indicated that they support having the names of all HFC quota holders being made available to interested parties and stakeholders. (See Figure 4.2.2.)

Figure 4.2.4
Do you support having the names of all HFC quota holders being made available to interested parties/stakeholders?

75 responses



4.3 Incentive Schemes and Subsidies

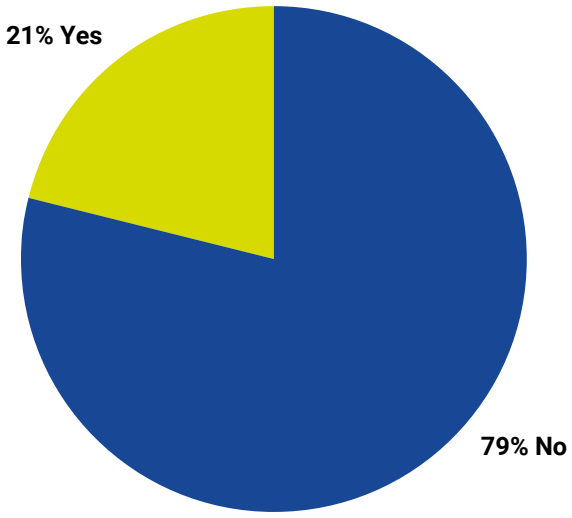
Incentive schemes and subsidies are a great way to support the development and uptake of alternative, climate-friendly technologies in the EU HVAC&R sector. Lack thereof is often cited as one of the main barriers for the uptake of more sustainable solutions.

For instance, the subsidy programme by the German Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU, Bundesministerium für Umwelt, Naturschutz und nukleare Sicherheit) began in 2008 and was prolonged until 2021. It aims to accelerate the adoption of climate-friendly HVAC&R technologies and specifically supports natural refrigerants. It is offered to end users purchasing such technologies. In the period of 2008-2017, the estimated savings in greenhouse gases due to reduced refrigerant emissions and improved energy efficiency was 1.6 million metric tons of CO_2e.[13] A total of 1,852 projects were supported with this programme. This is but one example of a successful subsidy scheme.

Seventy-nine percent of respondents answered that their product does not benefit from an incentive scheme in a Member State. (See Figure 4.3.1.)

Figure 4.3.1
Does your product currently benefit from an incentive scheme or public procurement in a Member State?

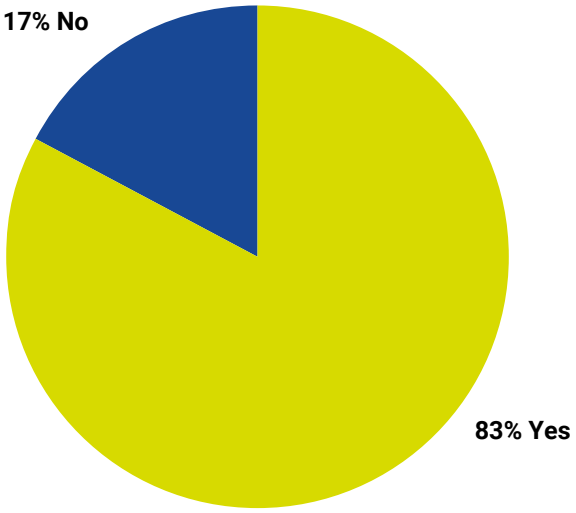
72 responses



Currently, some Member States offer to incentivise the installation and use of heat pumps, regardless of GWP of the refrigerant used. When asked whether linking a GWP 150 threshold to government incentives schemes would improve the uptake of climate friendly alternatives, 83% of respondents said, "yes", it would. (See Figure 4.3.2.)

Figure 4.3.2
Would linking a GWP 150 threshold to government incentive schemes improve the uptake of climate friendly alternatives?

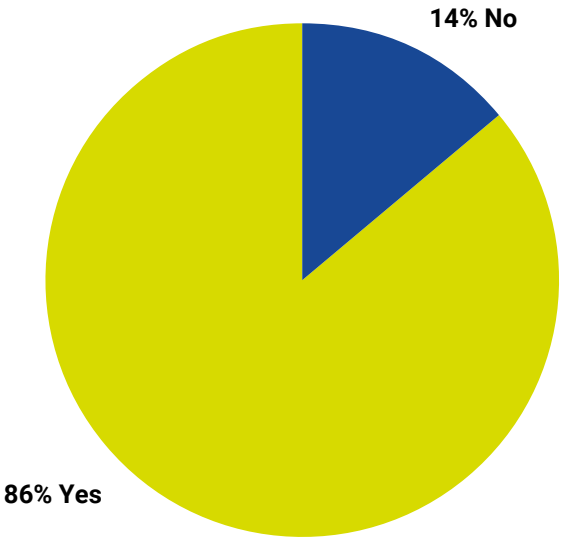
72 responses



When asked if EU institutions and national governments should be required to impose GWP thresholds to their Green Public Procurement processes when purchasing HVAC&R equipment, 86% responded "yes."

Figure 4.3.3
Should EU institutions and national governments be required to impose GWP thresholds to their Green Public Procurement processes when purchasing HVAC&R equipment?

71 responses



What does industry say:

Why should EU institutions and national governments be required to impose GWP thresholds to their Green Public Procurement processes when purchasing HVAC&R equipment?

This would speed up the transition.

– Pedro Olalla, Sales Director, Huayi Compressor Barcelona

It is the only way to encourage progress.

– Michael R. Ingvardsen, Global Technical Training Manager, Nissens Automotive A/S

Governments should lead by example.

– Max Bellfield, National Refrigeration Manager, Aldi

To justify the adjective "green".

– Francesco Cattaneo, Sales Director, Euroklimat SPA

This would accelerate investment in low-GWP alternatives and further push for these technologies to be installed.

– Joao Paulo Pinto, Managing Director, RACE

This forces the market to look at alternative technology.

– Florian Hanslik, Mechanical Engineer Pre-Development, Efficient Energy GmbH

[13] (in German) Ziesing, H.J., Klinski, S. 2019. Evaluierung der Nationalen Klimaschutzinitiative (NKI). Evaluierungszeitraum 2008-2017- Vorstellung der Evaluierungsergebnisse. Accessed online at: https://www.oeko.de/aktuelles/2019/evaluation-der-nationalen-klimaschutzinitiative/

4.5 Recovery and Reclamation

Recovery and reclamation are key for the life cycle management of refrigerants and minimising the harmful impact of refrigerants on the environment.

Survey respondents were asked how the F-Gas Regulation (2014) has affected HFC recovery and reclamation rates, 47% indicated that these were "slightly increased", while 31% indicated that it has "significantly increased" the recovery and reclamation rates. (See Figure 4.5.1).

When asked about the most important measures to improve f-gas recovery and reclamation, the top choice was further bans on servicing HFC systems with virgin high- and mid-GWP HFCs.

Figure 4.5.1
How has the F-Gas Regulation (2014) affected HFC recovery and reclamation rates?

70 responses

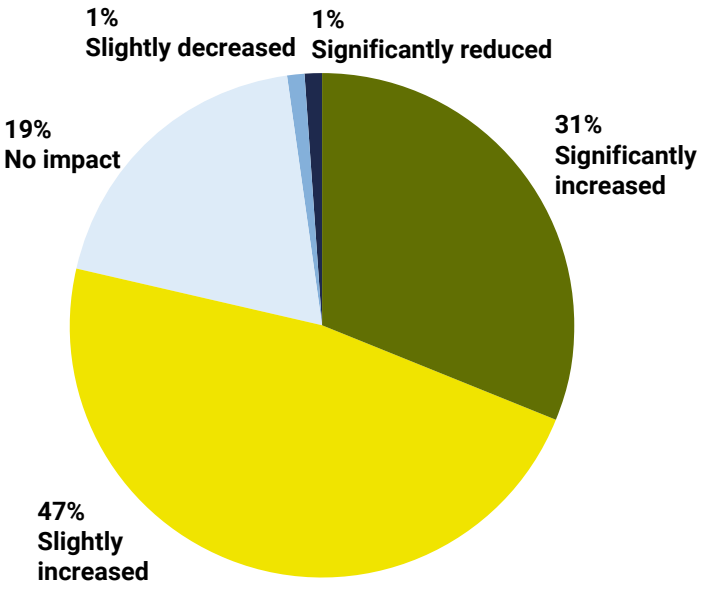


Figure 4.5.2
What do you think are the most important measures to improve f-gas recovery and reclamation that should be included in the revised regulation? (Please rank from 1 to 5, with 1 being the least important and 5 being the most important)?

Futher bans on servicing HFC systems with virgin high- and mid - GWP HFCs	★★★★½
Deposit-refund schemes	★★★★☆
Ban of all disposable cylinders	★★★★☆
Extended producer responsibility schemes	★★★½☆

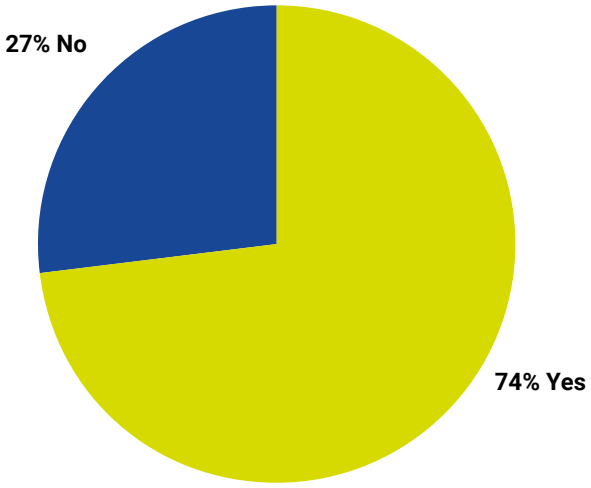
4.6 Sector-Wide Servicing Bans

As stipulated by the current F-Gas Regulation, from 1 January 2020, the use of HFCs with a GWP of 2,500 or more, to service or maintain commercial refrigeration equipment with a charge size of 40 metric tons of CO_2 equivalent or more, shall be prohibited. This has not been stipulated for any other of the industry sectors, however.

Industry stakeholders were asked whether they think similar high-GWP servicing bans should be introduced in other HVAC&R sectors. A majority of **74% answered "yes" to these bans also being introduced for the other sectors beyond commercial refrigeration as well**.

Figure 4.6.1
Do you think similar high-GWP servicing bans should be introduced in other HVAC&R sectors?

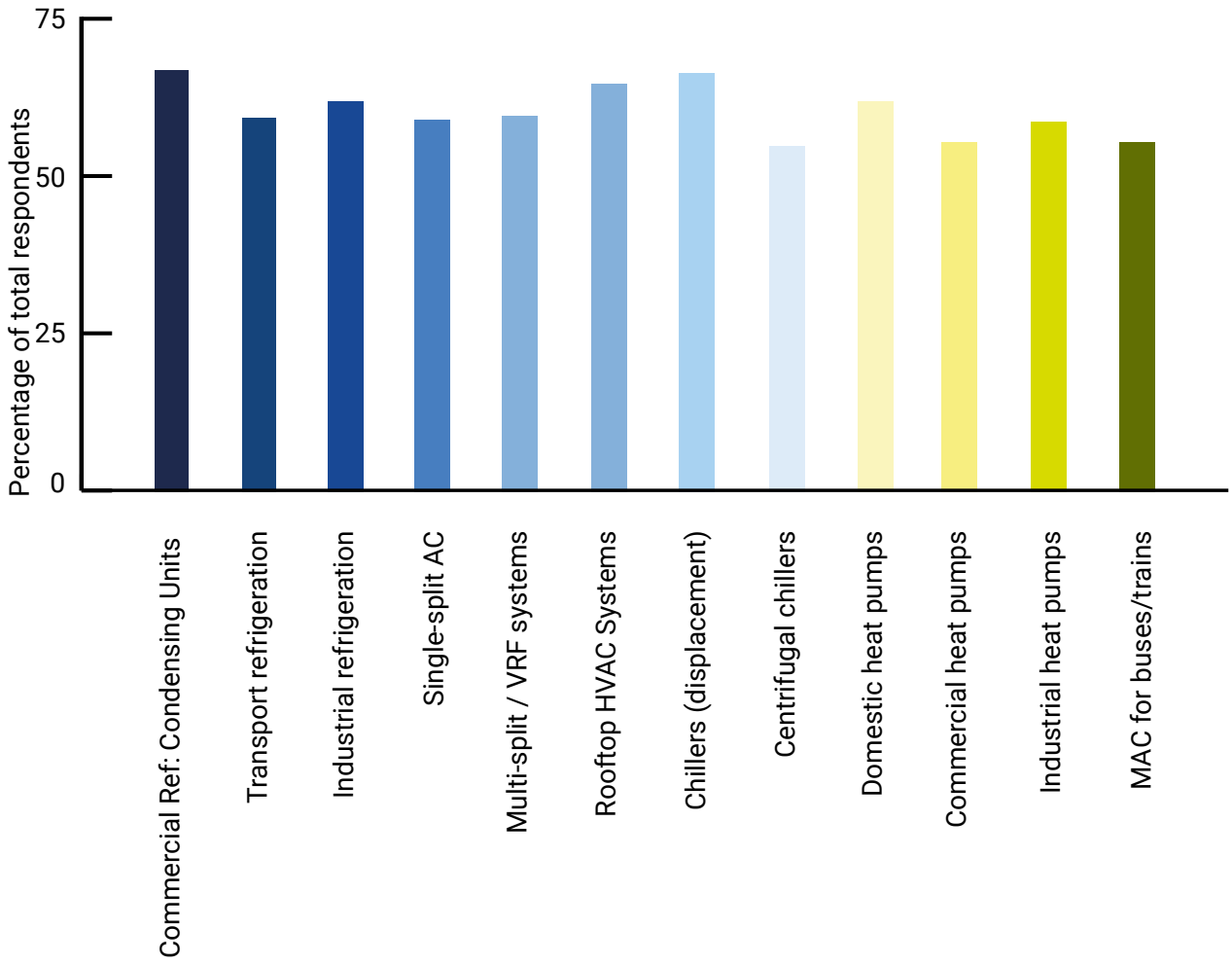
98 responses



When asked for which sectors specifically these bans could be introduced, all available choices were highlighted by the respondents.

Figure 4.6.2
For which sectors can high-GWP servicing bans be introduced?

Total 98 responses - multiple answers possible



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4. See Preparatory Study; *European Commission, Impact Assessment: Review of Regulation (EC) No 842/2006 on certain fluorinated greenhouse gases* (Commission Staff Working Paper), SWD(2012)0364 (hereinafter "Impact Assessment"), available at https://ec.europa.eu/clima/sites/clima/files/f-gas/legislation/docs/swd_2012_364_en.pdf ; see also Umweltbundesamt, *Avoiding Fluorinated Greenhouse Gases: Prospects for Phasing Out (June 2011, English Version); SKM Enviros, Phase Down of HFC Consumption in the EU – Assessment of Implications for the RAC Sector* (Final Report, Version 11, September 2012).

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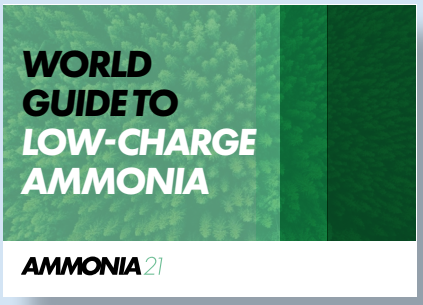

Get in touch with the shecco team to learn more about the market for natural refrigerants or find out how we can help you in gathering market intelligence and proactively building your business with our tailored market development services, to get your technology faster to market.

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