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Keeping F-Gas on the rails

As the cooling sector addresses fears that illegal refrigerant imports could undermine the HFC phasedown, our latest round table finds that enforcement is just one of the challenges. **Neil Merrett** reports

Chair
Andrew Gaved RAC Magazine
John Austin Davies Independent consultant, formerly of EPTA
Giuseppe Borgese Apleona and president-elect of BESA
Nabil Cook Wave Consultants
Deane Flint Mitsubishi Electric
Ray Gluckman Gluckman Consulting
Ken Logan A-Gas
Neil Merrett RAC Magazine
Paul Osborne Aermec

As we enter 2019, uncertainty remains as to just how well-prepared the cooling industry is to realise a switch to lower-GWP products.

With an upcoming ban on R404A and other high-GWP products now just over a year away, the industry appears to have managed to avoid a crippling scarcity of refrigerant during 2018. However, it remains hard to predict prices for key products in 2019.

The latest RAC round table, held with Chemours, looked at how industry can keep F-Gas regulation on the rails as it faces up to these challenges. Experts from across the supply chain convened to discuss the issues around an emerging number of refrigerants with some degree of flammability, as well as ensuring a more holistic approach to curbing greenhouse gas emissions and ensuring a more energy-efficient performance.

Janet Ludert, fluorochemicals marketing manager for Chemours, was unable to attend the event, so she wrote an introduction for the gathered experts. She noted that the industry faced several short, mid and long-term challenges that needed to be addressed around meeting F-Gas ambitions.

She said: "In the short-term, many of us are seeing the impacts of non-quota compliant imports that not only jeopardise the success of F-Gas, but also have a bottom-line impact to your businesses. In the mid-term, we need to keep the A2L transition at the forefront and stay proactive to adopt these necessary low-GWP technologies. Brexit may have long-term impacts that need to be planned for today."

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John Austin Davies

Chemours, which has been introducing a range of lower flammability HFOs and blends onto the market, also identified training as a vital focus for engineers to understand the challenges posed by using these products.

Where we find ourselves

Consultant Ray Gluckman opened the discussion by reviewing the past year's progress around HFC phasedown. He noted that by the end of 2017, the value of commonly-used R404A refrigerant had surged to £100 per kg. With the introduction in January of one of the most significant cuts in HFC quota yet, that price surge had led to predictions from experts (including Mr Gluckman himself, he noted) that scarcity and higher prices were inevitable.

He said: "Here we are a year later, and it seems we have got through 2018 unscathed – we have not run out of refrigerant. So, it begs the question, what has happened?"

The likely explanation, he said, is that a range of developments over

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the course of 2018 may have mitigated, distorted – or, in some cases, delayed hardship – around price and availability in the market.

He said that many of these developments were probably driven by those 2017 price rises, including the increased concerns over illegal imports of refrigerant into Europe, threaten to undermine F-Gas targets.

"[Illegal imports] are the elephant in the room and it could be a substantial reason for why things have been going easy this year."

He said another likely factor in the non-appearance of shortages or market disruption may have been widespread stockpiling by industry in anticipation of the increased prices. Mr Gluckman said it was hard to explain the significant demand for product seen in 2017 without assuming companies were intending to stockpile in the run-up to quota reductions.

He said: "One of the reasons why the market softened a bit in 2018 was the unwinding of the stockpiling."

Another factor identified by Mr Gluckman was a massive acceleration in the amount of new equipment coming to market designed to make use of lower-GWP product such as R32 and the HFO blends over the past 12 to 24 months.

"I think there was a notable difference in products displayed at the most recent Chillventa trade show held in October, when compared to two years ago, in terms of the volume of equipment designed for lower-GWP."

A manufacturer's perspective

Deane Flint, vice-president of Mitsubishi Electric Europe's UK and Ireland operations, said the company had seen notable changes as a result of the impacts of F-Gas regulation.

He gave the example of a survey of the company's partner programme, consisting of 900 or so contractors from the end of 2017, which found that less than 5 per cent were classed as 'R32-ready'.

Mr Flint said: "Of the split products that I have that are designed for R32, that figure is now 95 per cent. That's a massive change in a year."

He said that this immediate shift was likely to have been dictated by concerns about R410A prices, which was getting near to £60 to £70 a kilo, while R32 was around about £10 or £18.

He said that manufacturers had equally accelerated their ranges of low-GWP equipment. "If you then take a look at all of the split-type air conditioning manufacturers, everyone, apart from one manufacturer, has a full-range R32 offering. Whether it's a basic model, one with decent efficiency or premium efficiency, they have all got an R32 offering."

Mr Flint said that not offering an R32 variant in split AC units was a major gamble in the current climate. He also noted that chillers that run on R32 that were starting to prove popular too. But he argued that important questions needed to be asked by manufacturers as where they look for the next step after R32 from 2023 onwards when the GWP threshold reduces.

Consultant John Austin Davies agreed that across Europe attitudes had shifted on lower-GWP

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products. He said it has changed from being something that had to be done at some point, to something that was now actively being addressed.

He also cited his experiences of how cooling industries around the world were tackling greenhouse gases outside of the EU F-Gas regulation.

He said: "Within Europe there seems to be a feeling that outside the EU, nobody is doing a hell of a lot. I suppose when you look at the framework of the Kigali Agreement, it does seem that Europe takes the brunt of it while other countries are increasing use of high-GWP refrigerant. But this overlooks some of the positive initiatives that are going on. Markets such as South America are pushing towards natural refrigerants in larger volumes than I had anticipated, for instance."

However, on the other hand, he added, the large population areas of China and India represented massive challenges in introducing viable new approaches to air conditioning.

Skills

Mr Austin Davies emphasised that skills and training were widely regarded throughout the industry as being the most significant barrier to successfully ensuring a low-GWP switch, particularly with the move into flammables, whether via low-flammable A2L products or higher flammability A3s gas. He noted that this, alongside the particular demands of CO_2, put further pressure on current skills and training.

He said: "I am far from satisfied with what is currently being done to address that massive training gap. That is something the industry has to focus very strongly on."

Andrew Gaved noted that while contractors and installers were one part of the puzzle in driving moves towards lower-GWP refrigerants, those involved in maintenance, such as FMs, were another important factor.

Giuseppe Borgese of engineering group Apleona, who is closely involved with risk assessment and compliance, said that he was personally concerned about the broader notion of 'lower flammability' refrigerants.

He said: "I know they are not like natural gas or propane, but if refrigerants now have an element of flammability, it's going to make a big change in the way they are handled, concerning procedures and risk assessments.

Mr Borgese added that he was not sure that the switch to lower flammability gases has been fully appreciated in the FM sector, particularly with regard to ensuring adequate training of staff and to any implications for DSEAR (Dangerous Substances and Explosive Atmospheres Regulations).

He said: "Now I can't say how all companies have dealt with this, from the FM side, but because facilities managers are often part of a business rather than an entire company, then they may be a bit lagging in catching up on compliance."

Nabil Cook of Wave Refrigeration said that while large retailers were familiar with the move to lower-GWP, it was fair to say a majority of them were still "wary" of the use of flammables. However, he said that a number of clients had now begun trialling potential applications of HFO blends that were A2L rated, while some had been working with propane-to-glycol for a number of years.

He said: "But the overwhelming majority of retailers have gone down the transcritical CO_2 route. In terms of refrigerant contractors, most [we work with] are now

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upskilled in CO_2 and also in flammables. I know speaking to many contractors that they got the shock of their lives when they realised that with the rising cost of HFCs, their refrigerant costs had now become equal to their pipework costs. They did not like that whatsoever."

He added that this price difference has arguably facilitated a shift towards transcritical CO_2 among some retailers, as the investment cost of natural systems had become, by comparison, more affordable.

Paul Osborne of Aermec, a company that is working with or looking at both natural and HFO solutions, questioned whether products such as R32 would serve as a viable long-term solution for reducing greenhouse gas emissions in the case of larger cooling equipment.

He said: "R32, I think, is going to be the interim for larger chillers. There may be other refrigerants on the horizon that will possibly overshadow that one."

Mr Osborne said that he understood his R&D team was already working on some natural refrigerant options.

Compliance challenge

The issue of compliance was another topic that the experts were concerned about, particularly the challenges of noncompliant refrigerant being sold via online marketplaces.

Ken Logan of A-Gas noted he had been trying to eradicate such sales for the best part of a decade and that it was difficult to understand the actual levels of illegal trading behaviour because by nature it is hidden – however, he said that based on reports to his company, it wasn't such a widescale problem in the UK as it is in mainland Europe, where there have been reports of serious volumes of illegal imports across borders.

He emphasised that the F-Gas regulation had seen EU countries well ahead of the rest of the world in regard to GWP reduction – and to this end, he noted that it had driven innovation and change, not least in the types of technology and gas now available on the market, with industry around the world looking to Europe for expertise that may be applicable to other markets.

Non-EU countries are next year set to start their own refrigerant phasedown, with the possible exception of the US, whose position has not yet been clarified. While President Trump has formally pulled the US out of the Paris Climate Change agreement, which set overall CO_2 emissions targets, he has retained a studious silence over the Montreal Protocol and the Kigali agreement, which specifically relates to HFC phasedown.

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Ray Gluckman

Mr Gluckman said that the EU phasedown, which had been in place for four years, had only really seen a particular flurry of activity in the past 12 months, which was due to clear signals to the market from refrigerant manufacturers with regard to price and availability.

He noted that the complexities facing the EU in trying to prevent illegal sales and shipments of refrigeration may result in some changes to approach during the next review of legislation – such as looking at an increased number of bans.

He said: "The two signals that the market does respond to are either price, or a clear ban on certain applications. Now the industry, as represented by the views of groups such as Epee, was that if you have a phasedown, you don't need bans as well. Because it would be a case of 'let the market decide'. But actually, markets are far from perfect, and this illegal activity, if it is true, would undermine the investments being made to try and move onto better technologies."

Concluding remarks

John Austin Davies said that knowledge of the changing nature of refrigeration, both in terms of training, but also end-user awareness of the need to switch, was the major challenge to ensuring F-Gas regulation was able to meet its wider aims.

He also cited recent calls from the Intergovernmental Panel on Climate Change (IPCC) for drastic

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additional action on trying to further restrict global temperature change to a maximum of 1.5 deg C to prevent near certain irreversible environmental damage.

However, he complained that the focus on the figure of 1.5 deg C over-simplified the scale of the challenge. Instead, he said, there needed to be a shift in perception to emphasise the massive technological changes required.

Giuseppe Borgese said that from his perspective, it was clear that the 'top' of the cooling supply chain was on track to introduce new types of gas and equipment in line with the requirements of F-Gas, but much more work was now needed to tighten up competence in the industry downstream with the FMs, end-users and the like.

He said: "With refrigerant handling, the statutory training needs to be upgraded to make sure we have covered flammable refrigerants. Another related issue is that when you have a refrigeration engineer who has done all his refrigerant handling and he's now qualified – done his City and Guilds and NVQs etc – he can then be let loose on a chiller that has 500 amp fuses. So what makes him electrically competent?"

Mr Borgese said that training beyond simply being able to handle F-Gas requirements to include more general health and safety was a vital issue and that the emphasis needed to be firmly on competence, not just passing qualifications.

Nabil Cook said he hoped to see a shift away from industry looking at refrigerants in terms of one type of gas or technology being superior to another across the board. He instead, urged different end users, installers and building managers to consider which refrigerants or cooling technologies were best tom meet the specific long-term, lifetime needs of that application or estate.

He said: "Ask yourself what suits your estate better and why? How do we go about proving that? This goes back to things such as training as well. It is going back to the whole lifecycle approach and trying to get figures around the whole lifecycle performance, rather than just guessing."

Paul Osborne said that closing the link between a system's concept, design and maintenance for the end-user was a significant industry challenge. He said new approaches were needed to tie all these things together and to come up with a design that can then be maintained as planned.

Ken Logan added it was important to emphasise that what was connecting all the legislations such as the Montreal Protocol and F-Gas was the importance of containing existing refrigerant in a system. He said: "That's what we should probably focus on the most to start with, keeping the gas in the system. If you cannot do that, then recover it properly and reclaim it."

He added: "We should look at the whole lifecycle package and not just the cost of the refrigerant or the type of product – how it will work over the entire life of the product and what value it will bring, along with its energy efficiency, which remains a key element we shouldn't lose sight of."

Deane Flint argued that it would be important for equipment manufacturers to continue to focus on moving down lower-GWP paths.

He added: "I think once we have achieved that, it is then about optimising the efficiency that is gained from using that plant with that refrigerant type in it. I think that the manufacturers are capable of doing those type of developments. All we have to do is look at what has happened over the last 20 years."

Mr Flint said that especially in terms of developing countries, he believed it would be possible to find further efficiencies around energy use from using lower-GWP gases.

"That's what we should probably focus on the most – keeping the gas in the system"

Ken Logan

More shortages?

In conclusion, Ray Gluckman said that the market had achieved an enormous amount of progress over the past 12 months. However, he warned that he expected the possibility of shortages, which had largely been avoided during 2018, over the course of 2019.

He said: "If the reason that 2018 went well was because of stockpiling in 2017 – and I cannot prove that, but I have a feeling this happened – 2019 could be tough. So bearing in mind that in 2019 we have the same level of quota cut, it could become a tougher year again."

He ended with a final warning that if the reported scale and scope of illegal refrigerant trading – including some claims that up to 80 per cent of refrigerant trade in Greece was illegal this year – also proved to be true, this could undermine the whole fabric of the F-Gas regulations. rac

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