Carbon dioxide: don't suffocate the facts

IT'S an old refrigerant whose time has come again; the gas of choice for supermarkets that is being recommended for a host of other applications. Non-ozone-depleting, non-flammable and a GWP of 1 make this an environmentalists' dream. In fact, one wonders why it was ever cast aside all those years ago in favour of man-made fluorocarbons, particularly when so many will tell you that it is more efficient?

I'm talking, of course, about carbon dioxide, the born-gain refrigerant worshipped by the likes the EIA and Clive Efford MP.

But is it more efficient and what are the true financial costs of CO_2 systems? I ask the question because someone has to and I'm a journalist and paid to be inquisitive. And that's the problem, there appear to be a lot of unanswered questions about the viability of this particular gas.

Now I have no particular axe to grind here but would dearly love to know the truth – not just someone else's version of it.

The industry certainly seems to be split on the subject. Those who have installed CO_2 systems swear by their efficiency. Others, many of them people who I would consider to be learned refrigeration experts, claim that this is not the case. There are accusations that the figures are being "fudged", that those proclaiming the efficiency of CO_2 systems are not comparing like with like. Others claim that the true efficiency figures are being suppressed.

Are companies comparing the running costs of their new CO_2 systems against the running costs of the presumably old and possibly leaky systems they replaced?

Most would agree that CO_2 systems are more expensive but its supporters would argue that component costs will reduce as quantities rise. This is undoubtedly true but the high pressure nature of the gas requires thicker pipes and heavier gauge componentry, a fact which will always incur higher costs. Also, whatever CO_2 system is employed, whether using cascade systems or transcritical, etc, extra componentry is required and this too increases costs.

"Freed from the sanctions of the F-gas regulations and the financial disincentives of allowing increasing costly HFCs to leak to atmosphere, what will be the incentive for supermarkets to ensure that their CO_2 systems are leak-free?"

Heat recovery must also be employed in order to make full use of the physical characteristics of CO_2 – and there must be a credible use for this reclaimed heat.

Our increasingly overwhelmed national grid has led to warnings that frequent power cuts may be inevitable in the future. Has it been overlooked that because of its high pressure nature, in the event of a power cut CO_2 will vent to atmosphere? So, will companies employ standby generation with the added costs that will bring or will there be some sort of back-up dosing system? If not, each power outage will require the visit of an engineer to recharge the system.

I was highly critical of the lack of depth and credibility in the EIA's "report" exposing the supermarkets' lack of action in getting rid of "environmentally harmful" HFCs in favour of natural refrigerants. I stand by those remarks but, boy, did the report have an effect on the image-conscious supermarkets – or, at least, some of them. Now the major players are falling over themselves to extol their green credentials and CO_2 is the focus for many of them.

In fairness, some might say the supermarkets had it coming. While the acr industry as a whole has not been blameless for its inability or, in some cases, lack of serious intent in dealing with leaks, it is well known that the supermarkets have been the worst offenders in this area.

Perhaps it is best that they adopt a refrigerant which is not seen to damage the environment if they are unable to ensure their systems are leak-free? And freed from the sanctions of the F-gas regulations and the financial disincentives of allowing increasing costly HFCs to leak to atmosphere, what will be the incentive for supermarkets to ensure that their CO_2 systems remain leak-free? As we know, there is a substantial impact on the environment from the increased energy required to power under-charged systems.

Far too little real knowledge seems to have been disemminated on the subject of CO_2 systems. What applications are best suited for CO_2? What are the initial cost advantages/disadvantages? What are the potential environmental/financial benefits/drawbacks to a mass introduction of this refrigerant?

We owe it to ourselves, to our customers, the general public and the environment to find the answer to some of these questions.

Neil Everitt
Editor