



Chilling*Facts II



The supermarket
refrigeration
scandal continues

Background

In January 2009 the Environmental Investigation Agency (EIA) launched their Chilling Facts Campaign with the publication of their first survey on supermarket refrigeration, which was carried out in the summer of 2008.

This survey showed that UK supermarkets were making a huge contribution to climate change through the cooling gases used in their refrigeration systems. In fact as much as one third of the carbon footprint of most supermarkets comes from this source – and the energy used for powering the equipment is in addition to that.

The offending gases used in commercial refrigeration are hydrofluorocarbons, HFCs for short. They are often several thousand times more powerful than CO₂ in terms of their global warming potential (GWP). Unfortunately this was not considered when they were accepted as a

viable replacement to ozone destroying CFCs in the 1990s.

It is technically feasible for supermarkets and other commercial refrigeration users to switch away from using highly destructive HFCs to climate-friendly alternatives such as carbon dioxide, hydrocarbons or ammonia. (In terms of their global warming impacts, CO₂ has a GWP of one, hydrocarbons are commonly about three and ammonia is zero.) But the first Chilling Facts survey showed that none of the supermarkets had more than four stores using HFC-free alternatives.

Our conclusion at the time was that this was totally inadequate. But we hoped that, by raising the profile of the issue and producing a league table on their performance, supermarkets would make climate-friendly refrigeration a higher priority.

About EIA

EIA is a small charity set up over 25 years ago to fight environmental crime. We have developed innovative and effective investigative methods for defending the environment and seeking lasting solutions. From stopping the live transport of wild birds and getting the elephant ivory trade ban in place in the late nineties, to shutting down one of the biggest illegal timber trade routes, EIA's work has changed the face of the world for the better.

We play a unique and essential role in combating climate change. In addition to campaigning against the use of HFCs, our work on the ground to stop illegal logging and protect the habitats of endangered species helps prevent the deforestation that is fuelling climate change.





2009 Chilling Facts highlights

We are pleased to report that the second Chilling Facts survey has revealed some big improvements on last year. This year's results show that there are now a total of 46 stores across the UK using carbon dioxide-based technology, up from just 14 stores last year. This is a great improvement showing that HFC-free refrigeration is not just technically viable but commercially too. However the overall percentage of stores using this technology is still less than 2 per cent of all UK supermarkets, so the supermarkets still have a way to go in proving their commitment to the climate.

Most significantly, nine retailers have announced measures to reduce their use of HFCs; Marks and Spencer, Tesco, Morrisons, Lidl, Co-operative Group, Aldi, Midlands Co-operative, Sainsbury's and Waitrose; the latter three having made commitments to stop using HFCs in any future projects.

Other highlights from the survey include:

- Waitrose moved from bottom position to top in our ranking of supermarkets, as they have implemented ambitious and innovative commitments towards HFC-free refrigeration.
- Marks and Spencer and Morrisons have together managed to convert 34 stores to carbon dioxide-based technology in the past year.
- Sainsbury's is the biggest retailer to commit to phasing out HFCs.
- Tesco has made some significant pledges in reducing the climate change impact of their systems.
- Midlands Co-operative has committed to buying only HFC-free refrigeration from 2010, proving smaller retailers can also phase out HFCs.

An in-depth results table can be found at the back of this report in Appendix 2.

The Chilling Facts team however were disappointed in the high levels of HFC leakage from supermarket equipment. Although efforts are being made to reduce it, the reported emissions amount to the equivalent of 1.13 million tonnes of CO₂. This roughly equates to over one billion car journeys to a supermarket, or taking a return flight to Australia over 300,000 times¹. Furthermore this figure does not include leakage rates from Aldi, Morrisons or Sainsbury's, as they refused to share their data on this, so the actual release of climate damaging HFCs is significantly higher.

¹ Assuming a distance of 6km and petrol consumption of 7.3 litres per 100km or 39 mpg. Flight information was taken from <http://www.foodcarbon.co.uk>

Chilling Facts – A call for action

Scientific evidence shows that climate change is accelerating and that we must do everything we can to avoid dangerous 'tipping points', which will lead to irreversible impacts.

Given that HFCs have a very significant global warming impact and a relatively short atmospheric life they should be phased out as a priority.

This would buy some much needed time for other greenhouse gas mitigation measures to take effect. Specifically, we are calling for all supermarkets to:

1. Make a commitment to have fully phased out HFCs by 2015.
2. Immediately use HFC-free refrigeration in all new builds and major retrofits.
3. Phase out the use of HFCs in all in-store air conditioning systems and refrigerated transport.
4. Encourage government action to phase out HFCs in the supermarket sector.
5. Lobby the refrigeration industry to be more pro-active on this issue.

Chilling Facts - The results

Table 1: Chilling Facts survey - results at a glance

Supermarkets	Points (Last year's score)	Good areas	Not so good...
1 Waitrose	60/100 (12/100)	Commitment to roll out HFC-free refrigeration in all new stores and major refurbishments; Innovative leakage reduction measures; trialling HFC-free options for transport refrigeration.	No deadline for total HFC phase-out; as yet only have three out of 197 stores fully running on HFC-free technology.
2 Tesco	55/100 (32/100)	Ambitious near-term plans to reduce leakage and introduce HFC-free refrigeration in 150 stores by 2012; pioneering use of HFC-free systems in developing countries; good work raising awareness of the issue.	As the UK's biggest food retailer they are also by far the biggest HFC emitter; commitment to HFC-free refrigeration roll out is dependent upon further trials; no firm HFC phase-out date set.
3 M&S	46/100 (42/100)	Have installed CO ₂ based systems in 13 stores; given a date by which final HFC phase out will be complete; established a training school to tackle skills shortage.	Not enough being done on HFC-free transport refrigeration; Need to move away from reduced HFC to HFC-free systems in-store.
4 Sainsbury's	38/100 (20/100)	Have committed to phase out HFCs by 2030; increased focus on training of engineers to meet this target; planning seven HFC-free stores in coming year and 135 by 2014.	Don't publish their refrigerant emissions data; still have a quarter of stores running on ozone depleting HCFCs; don't give information on leakage rates.
5 Lidl	33/100 (0/100)	Impressive roll out of HFC-free freezers, 1/3 now HFC-free; drop in direct emissions despite an increase in number of stores; innovative development of climate-friendly frozen food transportation.	High use of HFCs in distribution centres; disappointing reliance on HFC chillers, however they claim to be considering HFC-free alternatives; don't send contractors on training courses.
6 Morrisons	32/100 (17/100)	Have installed CO ₂ based systems in 21 stores; retailer with most amount of stores converted to climate friendly alternatives so far; have designed a training workshop.	Lack of transparency in data reporting; unwilling to trial chiller doors; need to move away from reduced HFC to HFC-free systems.
Asda	32/100 (24/100)	Good apparent in-store energy savings; consistent leakage reduction; improved training initiatives.	Reneging on previous commitments to phase out HFCs; as the UK's second biggest retailer they are worryingly behind the leaders; no new HFC-free stores since last survey.
8 Midlands Co-operative	22/100 (NA)	Good leakage reduction; developed HFC-free systems suitable for smaller stores; committed to HFC-free system purchasing policy from 2010.	Unnecessary use of HFCs in distribution centre; 95% of all refrigerant used is still HFC; need to set future leakage reduction targets.
9 Co-operative Group	16/100 (23/100)	Adopting HFC-free freezers; have reduced leakage rates this year; lower direct emissions from leaking refrigerant.	Heavy reliance on ozone depleting HCFCs in distribution centres; have recently refitted lots of stores with HFC-based refrigeration; unclear data reporting
10 Iceland	14/100 (0/100)	Low reported leakage; some good energy savings.	Not proactive at all; incorrectly claim commercially produced HFC-free options are not available; claim restrictions on quantity of hydrocarbons used limits their use-despite the fact other supermarkets are using them widely.
11 Aldi	6/100 (1/100)	One entirely HFC-free store; have used HFC-free freezers since 2007; doing good work in Germany.	Didn't complete survey so very limited info; need to take this issue more seriously.

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Chilling Facts - Technical points from the results

1. ENERGY EFFICIENCY

It has been argued that HFC systems are more energy efficient than the HFC-free alternatives. The Chilling Facts survey shows that this is no longer the case and that efficiencies are improving all the time. Here are some examples of this:

- Waitrose is using hydrocarbon (climate-friendly) based chillers and freezers. They are expecting at least a 10% reduction in energy use compared to the equivalent HFC (non climate-friendly) systems.
- Marks and Spencer's refrigeration systems that use reduced HFCs are now as energy efficient as their systems using 100% HFCs.
- The Co-operative Group's HFC-free refrigeration systems are apparently on target for a 10% energy saving compared to the HFC system.

CHILLER DOORS AND NIGHTBLINDS

An enormous amount of energy is lost by not having doors on chilled and frozen food cabinets. Even worse, some retailers actually increase in-store heating to compensate for the cool air that escapes from their fridges and freezers.

Chilling Facts discovered that whilst most retailers use doors on freezers, chiller cabinets are another matter. The concern was that customers may be slowed down by having to open and shut doors, which may reduce sales – and that this was more important than the energy efficiency gains. However, we think that supermarkets need to be more innovative in coming up with a solution to this problem.

Nightblinds on refrigeration cabinets can save up to 20% of total energy consumption and thankfully their use is now almost universal.

2. COOLANTS

REDUCED GLOBAL WARMING COOLANT

The HFC that is generally used as a refrigerant is HFC-404a. This has a GWP that is around 3,800 times greater than CO₂. However, there is another HFC – HFC-407a – that has a GWP of about 1,500. As well as the reduced GWP from the gas itself, supermarkets have reported energy savings of between 3% and 10% when using this coolant. Several retailers have started using this as a temporary replacement refrigerant in their existing equipment, while some

are considering this to be a long term option.

Chilling Facts recognises that there is a significant climate benefit from using the lower GWP HFC refrigerant, but recommends this as an interim solution in existing systems only. We believe that it would be irresponsible to use an HFC with a GWP of 1,500 in the longer term and that the use of HFC-407a should not be used as an excuse to slow down the complete phase-out of HFCs.

OZONE DEPLETING CHEMICALS

From 2010 the use of ozone destroying “virgin” HCFCs (hydrochlorofluorocarbons) will be banned within the EU. There is growing concern that demand for reclaimed or recycled HCFCs will become greater than supply. And worryingly, there are still some supermarkets that are reliant on these chemicals. HCFCs are not only ozone-destroying but commonly have a GWP about 700 – 1,800 times greater than CO₂.

It is reported that over 50% of the Co-operative Group's depots are running on HCFCs, while Iceland still has 15%. Sainsbury's has more than a quarter of their stores running on HCFC refrigerants and the Midlands Co-operative has 10% of their refrigerated transport fleet reliant on HCFCs. Sainsbury's has made plans to move straight from HCFCs to HFC-free refrigeration by 2014 and Midlands Co-operative will remove HCFCs from their transport fleet in early 2010.

Chilling Facts urges supermarkets to complete their phase-out of HCFCs as a matter of urgency – preferably within a year. It is vital that they take this opportunity to move directly to climate-friendly refrigerants rather than switching to HFCs, which are not ozone-destroying but still have a significant GWP.

LEAKAGE

Although there has been some reduction in leakage rates, Chilling Facts still feels that they are unacceptably high. The lowest reported rate from supermarkets using centralised systems was about 14% per annum. Supermarkets need to recognise that leakage reduction must be carried out in conjunction with phasing out HFCs.



Tesco has set an example with this by giving short-term leakage reduction targets and a longer term deadline for moving away from HFCs. Asda on the other hand has taken the wrong track; they are focusing solely on leakage reduction as an alternative to phasing out HFCs. Unfortunately, the benefit to the climate of reducing leakage rates by a few percentage points is minimal compared to moving away from high GWP refrigerants altogether.

3. TECHNICAL TRAINING

One of the obstacles in moving to climate-friendly refrigerants has been related to maintenance. Contractors in the refrigeration servicing industry need to be trained to work with the new technologies.

Although this is still an issue, it is one that is being overcome by the supermarkets. Chilling Facts were impressed to see a large increase in contractors being sent on training courses to learn about the alternative refrigerants.

Waitrose has gone a step further and has sent other contractors, suppliers and even internal shop staff on these courses, so that there is a full understanding throughout the company. We were also impressed with Sainsbury's creation of a DVD about their experiences in installing and maintaining a climate-friendly system. And we felt that Marks and Spencer's training school went some way towards addressing skills shortages.

A number of the supermarkets expressed some concern that the refrigeration servicing industry has been reluctant to embrace climate-friendly technologies, and that they have not invested enough in this area. Chilling Facts calls on the industry to stop dragging its feet and to be more pro-active on this issue. With more and more attention focused on reducing greenhouse gas emissions, HFCs will not be a viable option in the long term. It is in the industry's business interests to adapt quickly.

4. TRANSPORT REFRIGERATION

Chilling Facts is concerned that the supermarkets have not given enough attention to transport cooling systems. Although climate-friendly alternatives are technically viable for transport, they are not as far developed as those for in-store refrigeration.

To date, only Waitrose and Asda are trialling hydrocarbon alternatives and they are at an early stage of R&D. Lidl has developed an innovative system using eutectic plates, which are frozen at the distribution centres and then used to transport frozen goods. This reduces both the need for refrigerant, and the associated energy use and reduces the number of freezer vehicles on the road.

Chilling Facts is disappointed that more progress has not been made in climate-friendly refrigeration for transport. We urge the supermarkets to improve on this next year.

5. AIR CONDITIONING

Air conditioning systems have not been included in the Chilling Facts surveys to date, but they will be next time. HFCs are widely used in air conditioning systems and for heat pumps – and there are climate-friendly alternatives available. This applies in-store, in distribution centres and in transport.

6. COMMUNICATIONS AND LOBBYING

Chilling Facts believes that supermarkets have an important role to play in raising awareness of the significant climate change impacts of refrigeration. As direct emissions from leaking refrigeration can account for up to one third of a retailer's carbon footprint, it is imperative that these stores recognise the importance of phasing out HFCs as part of their wider CSR (corporate social responsibility) commitments. In addition to phasing out HFCs from their systems, supermarkets have an important role to play in persuading government and the refrigeration industry to help make this a priority. This includes raising awareness of the detrimental impact of HFCs with all their suppliers and contractors, thereby helping them to shift away from HFCs as fast as possible.



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HFCs and the political agenda

Since EIA launched the Chilling Facts campaign at the beginning of 2009, HFCs have shot up the political and business agenda – both nationally and internationally.

The impact of HFCs on climate change is huge: by 2020 it is predicted that global HFC emissions will be equivalent to between 2 billion and 2.6 billion tonnes of carbon dioxide equivalent.² That's four times the UK's total annual greenhouse gas emissions. And commercial refrigeration is the second largest source of HFC emissions globally.³

The generic name for HFCs is halocarbons. These account for 12.9% of historic global warming.⁴ The role of HFCs in creating climate change tipping points is even more pronounced than the data may at first suggest. The GWP measurement used to compare the impacts of different greenhouse gases is usually averaged over 100 years. As most HFCs persist in the atmosphere for far less than 100 years, this means that they have a greater short-term impact on climate change than other gases with the same GWP. Effectively, this means that by cutting HFC emissions, we can buy some more time before we get to irreversible climate change.

The political process dealing with HFCs is almost as complicated as the science. Ozone depleting substances such as Chlorofluorocarbons (CFCs), were restricted under the Montreal Protocol. But HFCs, which are often

used to replace the ozone destroyers, are covered by the Kyoto Protocol. This means they are included in the recent failure to agree on a long term climate change agreement at the Copenhagen climate conference at the end of 2009.

Whatever the complexities, it is widely accepted that we need a global phase-down agreement for HFCs. Without this, HFC emissions will spiral and their impact on climate change will be even greater. The longer we delay the more difficult it will be.

The European Union (EU) is waking up to this issue, and has indicated that commercial refrigeration will be a priority when reviewing the F-Gas regulation in 2011. The EU will be curbing the use of HFCs and will hopefully have a positive influence in promoting a global agreement.

At the UK level, the Chilling Facts campaign has received a lot of political support. In 2009 MP Clive Efford managed to get over 100 other MPs to call for government and supermarkets to take action on this issue. He has followed this up with a Private Member's Bill calling for a phase-out of HFCs in the supermarket sector. However, despite the support of many supermarkets the government has proven unwilling to take the lead and so far has not supported any initiatives to promote the use of HFC-free systems.



2. Velders G., D. Fahey, J. Daniel, M. McFarland and S. Anderson. (2009) "The large contribution of projected HFC emissions to future climate forcing" PROC. NAT'L. ACAD. SCI. Early Edition (22 June 2009)

3. Data taken from US EPA and ADEME (2004) "Determination of comparative HCFC and HFC emissions profiles for the foam and refrigeration sectors until 2015, Part I"

4. IPCC, (2007) Summary for Policymakers. In: Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA

UK supermarkets setting a european standard

The Chilling Facts campaign has shown that UK supermarkets have some of the most progressive refrigeration policies in Europe. For example Carrefour, France's largest and the world's second largest retailer,⁵ has embraced HFC technology with little regard for the environmental consequences. Its 2008 Corporate Social Responsibility report claims that one of the Carrefour Group's key environmental principals is to "Encourage the development and diffusion of environmentally friendly technologies." However later on in the report they appear to boast about investing millions of Euros into HFC technology in Spain. Furthermore

leaking refrigerant accounts for almost 40% of their carbon footprint so it's hard to understand why they have totally failed to consider HFC-free technologies.⁶ Clearly Carrefour needs to look to its British competitors to get an idea of what environmentally friendly technologies actually are. Parts of Northern Europe such as Denmark are ahead of the UK in their implementation of HFC-free refrigeration systems, Denmark has between 350-500 supermarket stores running on climate friendly alternatives but this is mostly due to government legislation phasing out the use of HFCs in supermarkets.⁷

5. The Economist Intelligence Unit "France retail: Caring for Carrefour" 30 September 2009. Available online at http://viewswire.eiu.com/index.asp?layout=ib3Article&article_id=1774867162&pubtypeid=1122462497&rf=0

6. Carrefour Group (2008) "At the Heart of Life" 2008 Sustainability Report

7. Personal communication with a senior consultant to the Danish Technological Institute

Technical overview of refrigeration technologies

Given that there are climate-friendly alternatives to HFCs for supermarket refrigeration, you may wonder why these chemicals are still being used.

The first HFC-free supermarket was Out of this World, which opened its first organic, ethical store in Bristol in 1996. Tesco opened their first store in 1998, Iceland followed in 1998 and Sainsbury's in 2000, with their landmark Millennium store in Greenwich. But our first Chilling Facts survey, published in 2009, revealed that there were no more than a handful of HFC-free stores at that time.

In 2010 there are more – enough to show that HFC-free refrigeration is not only technically viable but commercially too. The optimum solutions differ depending on where the cooling is needed; in-store, in distribution centres or for transport.

Here's a summary of the different cooling technologies available to the supermarkets with a perspective on the pros and cons:

IN-STORE REFRIGERATION

Most supermarkets today are still using HFC-404a for their in-store refrigeration systems. This has a GWP that is about 3,800 times CO₂. Even worse, the equipment they use involves running several kilometres of pipes throughout each building, which means they are very prone to leaking.

The main alternatives are described in Table 2.

DISTRIBUTION CENTRES - WAREHOUSES AND COLD STORES

Ammonia has been used since Victorian times for cold stores. It is the most energy efficient and cost efficient refrigerant of all the technologies; however, it is not suitable for shopfronts because it is toxic.

Surprisingly, only three stores use 100% ammonia in distribution centres – Asda, Tesco and Waitrose. Marks and Spencer uses 83% ammonia but have a deadline to move to 100%, Sainsbury's use 59% ammonia with a deadline to switch HCFC systems to natural refrigerants in 2010, and Lidl uses just 25% ammonia. Morrisons use 90% ammonia but the remaining 10%

of distribution refrigeration uses HCFCs, which are both contributors to climate change and ozone depleting. Worst of all is the Co-operative Group, using 54% HCFCs and the rest HFCs.

Co-operative Group and Morrisons need to phase out HCFCs without further delay. All supermarkets should set an early deadline to move to using 100% ammonia in their distribution centres.

TRANSPORT REFRIGERATION

This is an area where the supermarkets have been slow to adopt alternatives.

Liquid nitrogen is being tried as an alternative by Sainsbury's and Asda. This has no impact on climate change during use but the process of making the liquid is very energy intensive plus there

aren't many liquid nitrogen plants, so transporting it is not efficient either.

Using hydrocarbons for transport refrigeration would appear to be the obvious solution, particularly since their flammability is no worse than the fuel needed to power vehicles. Surprisingly, this has been an option available for at least 10 years but with no interest at all. However, Waitrose and Asda have just started trialling hydrocarbon technology for transport.

Eutectic plates can be cooled in distribution centres, for example with ammonia, and then used in lorries. This means no further coolants are required and is the most efficient option available, although they may not be suitable for all distribution. Lidl has deployed this option in all their frozen food transportation.

Table 2: Alternatives to HFC refrigerants

Technology	Pros	Cons	Retailer take-up	
Subcritical CO₂ Cascade	A combination of CO ₂ (GWP 1) used in the low temperature cycle and hydrocarbons (GWP 3) or reduced amounts of HFCs used in the medium temperature cycle.	If hydrocarbons are used rather than HFCs, this system has a minimal climate change impact and is simple to use. Even when using HFCs the leakage is much less than with existing systems.	The use of HFCs in this system is an improvement on existing systems but should not be seen as a long-term solution. There are some concerns about the reliability of this equipment.	Marks and Spencer are using this system with HFCs as an interim solution before moving to hydrocarbons, but Morrisons appear to have committed to HFCs for the long term.
Transcritical CO₂	CO ₂ is used in both low and medium temperature cycles.	Minimal climate change impact.	The technology is complex. Both the capacity and the efficiency of the system are compromised when it's too hot – above 35°C.	Tesco and Sainsbury's are planning to use this technology.
Water-cooled hydrocarbons	Hydrocarbons used in conjunction with water cooling to minimize the refrigerant charge.	Minimal climate change impact. Much simpler than transcritical CO ₂ , so engineers can be trained in a day. The leakage is very low.	It means putting flammable liquids in stores but these are already used in aerosols.	Waitrose has committed to this technology.
Air-cooled hydrocarbons	Hydrocarbons used in exactly the same way as in domestic refrigerators.	A reliable and cheap solution with low leakage, ideal for small convenience stores. Easy to use as the unit comes ready made and only has to be plugged in.	If you have lots of refrigeration cabinets they will be releasing too much heat into the store and might overload the air conditioning systems.	Lidl, Aldi, Midlands Co-operative and Co-operative Group have adopted the Unilever design of this technology, which has been used by Unilever globally in 350,000 units without incident.

Conclusion

The Chilling Facts campaign has been very successful in its first year in getting the supermarkets to start introducing more climate-friendly refrigeration. So much so that this year's survey demonstrates not only the technical viability of HFC-free refrigeration but importantly its commercial viability. Whilst there remains a lack of skilled engineers to work with HFC-free technologies, this is to some extent being addressed by the supermarkets themselves. However we are still concerned that there is a lot more to do.

We were impressed with some ambitious plans from a number of supermarkets, most notably Waitrose and Sainsbury's. Marks and Spencer and Morrisons have also made some good progress in rolling out reduced HFC systems. Tesco has announced the most ambitious near term roll out of

HFC-free refrigeration but is yet to fully commit to it. Midland's Co-operative have addressed the need for HFC-free chillers as well as freezers in smaller stores and next year we expect other smaller retailers to follow suit.

However some supermarkets are beginning to fall behind the pack, in particular Co-operative Group, Asda, Aldi and Iceland. Given the growing concern about the devastating impacts of climate change, Chilling Facts will focus attention on these retailers. We believe that their competitors are demonstrating how much more could be done and that there is no excuse for dragging their heels.

We are particularly disappointed with Asda. The UK's second biggest retailer has been trialling HFC-free refrigeration for several years now but has decided not to switch to these climate-friendly alternatives across the board. Clearly

this is a step in the wrong direction and Chilling Facts urges Asda to think again. They should not renege on the commitments they made in 2007 to phase out HFCs.

The overall good response from the supermarkets has served to highlight the inexcusable inaction from the UK government. It has ignored calls for a complete phase-out of HFCs in supermarkets and has failed to introduce measures that would ensure more engineers were trained in climate-friendly refrigeration maintenance.

Chilling Facts believes that in the fight against climate change, targeting HFCs is a relatively easy win. HFCs have a huge global warming impact and replacement technology is both available and cost effective. All that is needed now is some focus and commitment from all parties involved.

Appendix 1 METHODOLOGY AND CHILLING FACTS CAMPAIGN STEERING GROUP

EIA's supermarket survey league table has been compiled on the basis of data gathered from three sources:

- Supermarket responses to a refrigeration survey issued by EIA in August 2009.
- Correspondence with retailers and brand suppliers arising from the survey.
- Material that is publicly available on retailer and brand supplier websites.

Questions were asked about which cooling gases were used in store, in distribution centres and in transport. The survey also covered training, energy efficiency, leakages and future plans.

Once the results were in they were analysed by the campaign steering group: Fionnuala Walravens (EIA), Nick Cox (Earthcare Products) and Julia Hailes (consultant and writer). They created a score card on a range of issues and ranked each supermarket's

performance accordingly. A detailed breakdown of how each supermarket scored in each category is available in the results section.

It should be noted that although objectivity has been strived for, EIA does not in any way claim this survey to be a scientific analysis – the results simply represent EIA's perspective on the issue. EIA is grateful for the assistance it has received from retailers and brand suppliers.

FIONNUALA WALRAVENS

Fionnuala is a campaigner for EIA's Global Environmental Campaign. She is the leading authority on the interlinkages between ozone and climate policies. As part of her work on the campaign Fionnuala regularly attends international ozone and climate talks where she is part of a team lobbying for global action on HFCs.



JULIA HAILES MBE

Julia is a leading opinion former, freelance consultant and speaker on social, environmental and ethical issues. She is author or co-author of nine books, including The Green Consumer Guide which sold over 1 million copies worldwide and more recently The New Green Consumer Guide, published in 2007. In 1999 she was awarded an MBE. Visit her website at www.juliahailles.com.



NICHOLAS COX

Nicholas is MD of Earthcare Products Ltd and is considered to be a leading authority on environmentally friendly refrigeration and air conditioning. During a long career he has presented many papers on refrigeration and coolants as well as advising both the UK government and the EU commission.



	Waitrose	Tesco	Marks and Spencer	Sainsbury's	Lidl
Section 1 Emissions	No data last year so nothing to compare with. Pleased to see direct emissions are lower than indirect indicating lower leakage. Data not verified externally.	Emissions from energy use are down, despite an increase in stores. Generally good, but they are still far the biggest emitter and therefore have a big responsibility to reduce emissions.	More transparent than last year about indirect emissions, not discounting for renewable energy. Direct emissions are down despite increased stores. Direct emissions are externally verified.	Not impressed that no direct emissions figure is given, lack of transparency.	Lower direct emissions despite increase in stores.
	3 points	5 points	5 points	2 points	5 points
Section 2 Leakage	We were impressed with their innovative measures such as scented HFCs and mystery shoppers. Good leakage reduction from last year and we like their commitment reduce leakage by 50% between 2008-2012.	Consistent year on year reduction in leakage to achieve 14% this year. Impressed by their plans for further significant leakage reduction in next 9 months.	Good measures, higher leakage rates but due to low critical change.	Some good measures but impossible to tell efficacy as they don't publish achieved reductions. Transparency is vital. Board level attention on this issue is good though.	Some use of leak detection systems, minimal measures taken but use of low leakage equipment.
	7 points	6 points	5 points	2 points	3 points
Section 3 Use of natural refrigerants in store	From 0 to 3 stores. Claim to have been carrying out trials but don't give much information.	Say they plan to have 6 more stores in 2009, no confirmation though. Good development of natural refrigerants in warmer climates, looks like they are on the verge of more progress.	A big improvement, from 3 stores last year they now have 13-15 running on pumped carbon dioxide. However some of these are not HFC-free systems, which only have a reduced charge. Only a minority of systems are totally HFC-free. Another point for trialling of carbon dioxide based air-conditioning.	Have seven stores planned by spring 2010. But still have a quarter of stores running on HCFCs.	Great news to hear that 1/3 of all freezers are now running on hydrocarbons, we want them to go all the way. However disappointed to see chillers running on HFCs, they claim to be looking into HFC-free options.
	3 points	4 points	5 points	3 points	6 points
Section 4 Use of natural refrigerants behind the scenes	100% of distribution centres converted to natural refrigerants.	100% of distribution centres converted to natural refrigerants.	83% of distribution centres converted to natural refrigerants, last centre due to convert in 2010/2011.	59% of distribution centres converted to natural refrigerants. Disappointing use of HCFCs but plan to convert them in summer 2010.	25% of distribution centres converted to natural refrigerants but the rest using HFCs. Not impressed.
	10 points	10 points	9 points	6 points	2 points
Section 5 Use of natural refrigerants in transport refrigeration	Too much reliance on HFCs but trialling hydrocarbon based system, could be a much needed breakthrough this sector needs. We are very excited about this.	Too much reliance on HFCs, one point awarded for a failed trial of carbon dioxide but we're not impressed with insulated boxes approach, these are the norm!	Disappointed that this has received no attention to date, hope for better news next year.	"Too much reliance on HFCs, a point for use of energy efficient trailers and trial of nitrogen, but warning that it has a higher carbon footprint."	Although use of HFCs is still high they have developed innovative use of eutectic plates. This has moved beyond trial and is now implemented in a significant part of their fleet.
	3 points	1 point	0 points	1 points	6 points
Section 6 Training and technical	Great to see they are sending a broad spectrum of personnel to training courses for natural refrigerants. Not clear how many have attended so far. Could do more in terms external influence.	Paving the way, spreading lots of knowledge and transparent. Lots done internally as well as externally.	Paving the way in this area. Have established a training school and have an input into the development of training modules. Could do more work internally through expanding training scheme beyond those in service and maintenance.	A big improvement on last year. New focus on training of engineers in use of natural refrigerants, some innovative schemes and wide range of measures including a skills sharing DVD.	Send contractors on training but not natural refrigerant training.
	6 points	7 points	6 points	6 points	0 points
Section 7 Energy efficiency	Innovative use of warm air from cooling cabinets to heat store. Claim 20% energy saving on refrigeration in past five years.	Plans to use chiller doors in dairy and meat sections of smaller format stores. Consistently reducing energy used in refrigeration.	Not much information given, we think their refrigeration should sub-metered to help with their energy use improvement targets.	Project Reset is doing quite well, planning to roll it out wider. Not too great energy use reduction, 15%. Chiller doors, only on frozen food, have trialled but highlight the problems.	Use of energy efficient scroll compressors. Chiller doors tested and found to have a negative effect.
	5 points	5 points	3 points	4 points	3 points
Section 8 Future plans	Very impressed at their commitment to stop using HFCs in future projects, but have not set a deadline for total HFC phase-out.	Plan to have 150 HFC-free stores by 2012. Good that they are setting targets but not so big relative to size of estate. And also uncertain as it is pending outcome of tests. No firm HFC phase-out date.	A big improvement. Have committed to use carbon dioxide based systems where possible and have set a deadline of 2030 for phase-out of HFCs. However not clear when they will move over to totally HFC-free systems.	Committing to go to carbon dioxide-based refrigeration across entire estate. Plan seven stores in 2010 and 135 by 2014. Impressed that they are setting a lead, and especially that it relates to existing stores and future investment in up-skilling engineers.	Good plans to stop using HFCs in distribution centres. Great to see their commitment to use HFC free freezers in all new stores. However we were disappointed about their use of HFC in chillers, they need to revisit this and look at what Waitrose is doing.
	8 points	6 points	6 points	9 points	5 points
Section 9 Raising awareness	Signed DEFRA's F-gas regulation compliance agreement. Importantly Waitrose recognises the role of HFC-free equipment in reducing their carbon foot-print and improving their customers' shopping experience. Very positive campaigning. They claim to have played an important role in pushing the industry for change.	Not signed DEFRA's F-gas regulation compliance agreement. Done a lot of work promoting their climate-friendly refrigeration solutions to industry.	Have signed DEFRA's F-gas regulation compliance agreement. Played an important role in developing alternatives technologies. We think their Plan A should contain a commitment to go HFC-free and set a time frame in which they plan to achieve it.	Have signed DEFRA's F-gas regulation compliance agreement. Have done some work raising awareness of HFC-free alternatives in the media. But very future based, not many tangible results to date.	Haven't signed DEFRA's F-gas regulation compliance agreement. And not much to raise awareness but do have some good use of natural refrigerants in non-UK stores.
	7 points	5 points	4 points	3 points	1 point
Section 10 Bonus score	They are pushing new energy efficient hydrocarbon technology in chillers, taking their commitment to the climate impact of refrigeration seriously.	Bonus points for exporting carbon dioxide technology to developing countries and those with warmer climates.	Plan A is a good commitment and some positive campaigning for natural refrigerants.	Have taken a big leap in committing to alternatives. Sainsbury's are planning to leapfrog HFCs in 25% of their stores, proving that it is an unnecessary technology.	Good work on freezer cabinets and their information given was transparent.
	8 points	6 points	4 points	8 points	2 points
Total score	60	55	46	44	33

Asda	Morrisons	Midlands Co-operative	Co-operative Group	Iceland	Aldi
Direct emissions are down from last year but indirect are up. This seems paradoxical. Disappointing to see increase in energy used with little increase in stores but pleased to see a moderate reduction in refrigerant use.	No data given.	No data last year so nothing to compare with. Pleased to see direct emissions are lower than indirect indicating lower leakage. Data not verified externally.	Lack of clarity in data reporting, appear to be muddled over their own reporting. Direct emissions are lower and figure for indirect emissions no longer discounts for renewable energy.	Much lower proportion of direct emissions to indirect. No comparison from last year.	No data given but have been putting in natural refrigerants into stores which implies less direct emissions.
2 points	0 points	3 points	2 points	3 points	1 point
Some good measures and consistent reductions year on year. Very transparent. This is their area of focus. Comparatively low leakage rates of 14%. Haven't set targets for further leakage reduction.	Seem to be behind the pack on leak detection systems. Not very transparent. Leakage rates were not provided. A lot of room for improvement.	have successfully managed to reduce leakage rates since 2006, however no future targets set.	Not so many innovative ideas and information, but good as they have reduced leakage.	Use of low leakage equipment but no innovative measures. Leakage rate figure seems unrealistically low.	No information given.
5 points	1 point	5 points	4 points	1 point	0 points
No improvement on last year.	A very big improvement with 21 stores now converted. However they are not using HFC-free systems, the systems they use only have a reduced charge.	one store fitted with CO ₂ in Nov 2009, increasing use of hydrocarbons in integrals but 95% of refrigerant use is HFC.	No improvement on last year.	Claim trials are being carried out but our understanding is they were a long time ago and in just one place. Generally not impressed and feel more needs to be done.	One entirely HFC-free store, a great start but only one. We like that it covers chillers as well.
1 point	6 points	3 points	1 point	1 point	2 points
100% of distribution centres converted to natural refrigerants.	"90% of distribution centres converted to natural refrigerants but a minus point for continued use of HCFCs."	Only one distribution centre and it runs on HFC.	0% converted to natural refrigerants. We were shocked to see 54% of distribution centres running on HCFCs.	83% of distribution centres converted to natural refrigerants but a minus point for continued use of HCFCs.	No information given.
10 points	8 points	0 points	0 points	7 points	0 points
Too much reliance on HFCs but trialling hydrocarbon based system, could be a much needed break through this sector needs. We are very excited about this.	Reliant on HFCs, no alternatives being developed.	Reliant on HFCs and 10% still running on HCFCs, although plans are in place to replace these units.	High use of HFCs, use of solar panels on top of refrigerated trailers is good. 10% of transport fleet still runs on HCFC but is due to be replaced in early 2010.	Reliant on HFCs, no alternatives being developed.	No information given.
3 points	0 points	0 points	2 points	0 points	0 points
Training in naturals HC, ammonia and CO ₂ , big improvements. Doesn't say what percentage of engineers have been trained. Their ideas are not as inspirational as Sainsbury's.	Designed a workshop for contractors, but not sending a spectrum of roles to attend.	No training courses offered but on site engineers have to prove they have been trained to work with naturals. High use of hydrocarbon integrals means less need for extra training.	No information given.	No information given.	No information given.
3 points	3 points	3 points	0 points	0 points	0 points
Good. Very significant savings in both existing stores and new stores (23% from 2005 baseline and 32% from 2005 baseline), actually achieved and not just targets. Trialling glass doors on chiller cabinets.	Lack of innovative measures. We're not impressed at their unwillingness to trial chiller doors. Vague about data on energy usage savings. Could be doing much better.	New measures in 20 stores have resulted in 18% energy savings, time they implemented these in all stores.	Targets are good, 17% saving since 2006 and estimated figures appear to be quite good.	3% energy use reductions per store per annum are good.	Happy to see heat recovery from refrigeration systems installed as standard. No tangible targets or achievements-we'd like some figures.
6 points	1 point	3 points	4 points	2 points	2 points
Very contradictory as they have a new store planned which will use hydrocarbons and carbon dioxide, but still claim to focus on HFCs. Feels like they are sitting back waiting for others to take a lead and that they are going back on 2007 commitment to phase-out HFCs. Generally feel that they are complacent and disappointing in terms of their target.	A bit vague on this. Good to see that they are trying hydrocarbon and carbon dioxide cascade systems. They claim to continue roll out of HFC/CO ₂ system. We call on them to make a commitment and set dates. More drive required.	Plan to switch to HFC-free integral units for both frozen and chilled food as standard in 2010. Claim hydrocarbon units are now available to meet 95% of their total requirements.	For integral cabinets they plan to go to hydrocarbons and will be doing a bit of a catch up in 2010, this is a proven technology so their move isn't innovative. Disappointed that they prefer HFCs for centralised systems, claim to be looking into alternatives but yet to demonstrate it.	Seem to be confused about availability of hydrocarbon technology as they claim cabinets are not available but Unilever have rolled out over 350,000 cabinets worldwide and Lidl, Aldi and Co-operative are all using these widely. No excuse!	No future plans beyond monitoring. Need to take this issue more seriously.
1 point	4 points	6 points	4 points	0 points	0 points
Haven't yet signed DEFRA's F-gas regulation compliance agreement. Have been engaged in sharing information between supermarkets.	Have signed DEFRA's F-gas regulation compliance agreement. And have spread some positive information about climate friendly alternatives and leakage reduction amongst industry.	Not willing to sign DEFRA's F-gas compliance, have done some work to promote CO ₂ at trade meetings.	Haven't yet signed DEFRA's F-gas regulation compliance agreement. They haven't done much campaigning to promote HFC-free alternatives and dwell too much on the difficulties rather than how they can overcome them.	Haven't signed DEFRA's F-gas regulation compliance agreement or done anything to promote HFC-free alternatives.	Good use of naturals in Germany.
1 points	3 points	2 points	1 point	0 points	1 point
Haven't done much, disappointed that they are not moving ahead with the others.	We feel their answers didn't reflect some of the good work we know they are doing. Bonus points for having the most amount of stores converted to climate-friendly refrigeration.	They asked to be part of the survey, glad they want to share their information with us.	Good CSR report.	Clearly not taking this seriously.	Clearly not taking this seriously.
0 points	6 points	3 points	1 point	0 points	0 points
32	32	28	19	14	6



Artwork by Clifford Singer

www.ChillingFacts.org.uk

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