

Environmental Policy



**Greencold Limited
Unit 8
Trinity Centre
Park Farm Industrial Estate
Wellingborough
Northants
NN8 6ZB**

The Management of Environmental at Work Regulations require that Environmental arrangements be reviewed at suitable intervals. To ensure the validity of this policy, it is recommended that this document be reviewed as often as necessary and in any case within 12 months of the date shown below.

Version 1.0: 1 February 2021

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Section 1

Our policy statements

Greencold Limited recognises the increasing importance and need to safeguard our environment. The Company is fully committed to continual improvement of environmental performance and prevention of pollution and will assist our clients in maintaining and selecting efficient and effective equipment.

Greencold Limited will comply with the Environmental Protection Act 1990 as well as all relevant environmental legislation that relates to the Company.

We will actively encourage our suppliers, contractors, subcontractors, and all of our employees to participate in our efforts to reduce the environmental impact of our day-to-day operations. Throughout design, manufacture, installation and service and maintenance, we aim to monitor and minimise the impact of these activities on the environment.

Our Objective and Principles

We will assess the environmental impacts of our operations and set objectives and targets in order to improve our environmental performance. We will regularly review these targets.

We will:

- Promote responsibility for the environment within the organisation and communicate and implement this policy at all levels within the workforce;
- Reduce the use of energy, water and other resources;
- Minimise waste by reduction, re-use and recycling methods – please see our Waste Disposal Policy regarding this.
- Comply with all relevant environmental legislation/regulation;
- Ensure that our policies and services are developed in a way that is complimentary to this policy;
- Identify and provide appropriate training, advice and information for employees and encourage them to develop new ideas and initiatives;
- Provide appropriate resources to meet the commitments of this policy;
- Promote and encourage involvement in local environmental initiatives/schemes.

This action plan is available to all employees of Greencold in the office as well as when on site.

Our Environmental Attitude Towards CO₂

As a company Greencold are one of the leaders in the proactive marketing of environmentally cooling and heating solutions using ammonia (we are members of the International Institute of Ammonia Refrigeration) including more recently systems utilising low toxicity and non-flammable refrigerants such as CO₂ (R744).

Greencold are also an active partner and sponsor of R744.com – an international web-based portal that has evolved into the leading global platform for CO₂ as a refrigerant, with global coverage and increasing number of partners and readers.

Since its launch, over 70 companies and research institutes have joined R744.com as Partners.

As pioneers in CO₂ technology, we are actively involved in the development of this collaborative platform.

Our Environmental Policy Towards Refrigerant Gas

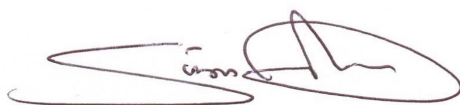
Greencold will ensure that all of the products that are used or sold will meet, at the very least, all UK Legislation.

Greencold will only purchase refrigerant gases and equipment from large international manufacturers who have similar environmental policies and objectives to our own company. Greencold Limited is committed to only using equipment that promotes refrigerants that have a reduced impact on the environment. The disposal methods of any Refrigerant Gas are located in our Waste Disposal Policy.

Our Environmental Policy Towards Oil

Greencold will ensure that all of the products that are used or sold will meet, at the very least, all UK Legislation.

Greencold will only purchase oils and equipment from large international manufacturers who have similar environmental policies and objectives to our own company. Greencold Limited is committed to only using equipment that promotes oil that have a reduced impact on the environment. The disposal methods of any Oil are located in our Waste Disposal Policy.



..... Simon Andrew
Director

Section 2

Our Partnership with Panasonic

In 2019 Greencold formed a partnership with Japanese OEM Panasonic as we worked together in producing the UK's first CO₂ mobile refrigerant trailer.

Contributing to society has been the management philosophy for Panasonic ever since its founding, and they have been taking measures against pollution since the 1970s. Panasonic announced their Environmental Statement in June 5, 1991, clarifying their approach to address global environmental issues as a public entity of society. Since then, Panasonic have been carrying out initiatives including matters on global warming prevention and resources recycling corporate-wide, aiming to attain a sustainable, safe, and secure society.

The Panasonic CO₂ Cold Chain Condenser units provided the perfect mobile refrigeration solution for cooling specialists, Greencold. A reliable, efficient and eco-friendly solution to cool and freeze a mobile trailer was required and where the Panasonic CO units have now been installed.

The Panasonic CO₂ units are compact, lightweight, have low noise levels (a range of 35.5 dB(A) to 36dB(A)) and designed to fit into smaller spaces with dimensions of (HWD) 930mm x 800mm x 350mm and weighs only 67kg.

The condensing units use a natural refrigerant that has a GWP (Global Warming Potential) equal to 1 as opposed to the current refrigerant typically used such as R404A having a GWP equal to 3,800. With refrigeration legislation increasing over the coming years, HFC R404A will be out of circulation by 2020.

With the Panasonic CO₂ units already having a proven track record for reliability and efficiency with a clever single two stage temperature compression condensing unit and of compact size, Greencold were able to combine the Panasonic units with a suitable air cooler of sufficiently high working pressure from a cooler manufacturer. With changes to the F-Gas regulations coming into force, alongside reducing carbon emissions and energy costs becoming key drivers for change in refrigeration systems, both specifiers and end users are recognising the need to consider CO₂ as a refrigerant.

Based on Panasonic monitored data, 16% energy savings for chilled refrigeration and 25% energy savings for lower temperature freezer applications have been achieved in comparison to R404A. Greencold are happy to be collaborating with Panasonic and assisting them in spreading the word about the benefits of CO and demonstrating its technology.

Section 3

Client Case Studies



CRANSWICK CONVENIENCE FOODS MILTON KEYNES

MISSION ZERO

NET ZERO

CRANSWICK PLC WILL BE A NET ZERO BUSINESS BY 2040



MILTON KEYNES WILL BE CARBON NEUTRAL BY DECEMBER 2020

OUR JOURNEY SO FAR...



HOW WE WILL ACHIEVE CARBON NEUTRALITY BY DEC 2020



FROM 2016 - 2020, OUR SITE HAS REDUCED TOTAL GREENHOUSE GAS EMISSIONS BY 50%, EQUAL TO 5,421 TONNES OF CO2!

It would take 89,000 trees grown for 10 years to absorb that much CO2.

CARBON NEUTRALITY IS THE FIRST STEP ON OUR JOURNEY TOWARDS NET ZERO BY 2040

CUTTING OUR CARBON EVEN FURTHER

2020

- > UPGRADE REMAINING FRIDGES TO CO2

2021

- > HEAT RECOVERY PROJECTS
- > INSTALLATION OF SECOND CHP
- > GAS BURNER | GAS ROASTING UPGRADE

2022

- > OPERATIONAL EFFICIENCY INCREASE TARGET BY 30%
- > EVAPORATOR COOLER UPGRADE
- > VACUUM SYSTEM UPGRADE

2023

- > FURTHER REDUCTION IN FOOD WASTE DURING PRODUCTION

1ST BY DECEMBER 2020, WE WILL BE THE FIRST UK COOKED SLICED MEAT MANUFACTURING SITE TO BE CERTIFIED CARBON NEUTRAL!

1ST CRANSWICK SITE TO BE CARBON NEUTRAL!



#MISSIONZERO

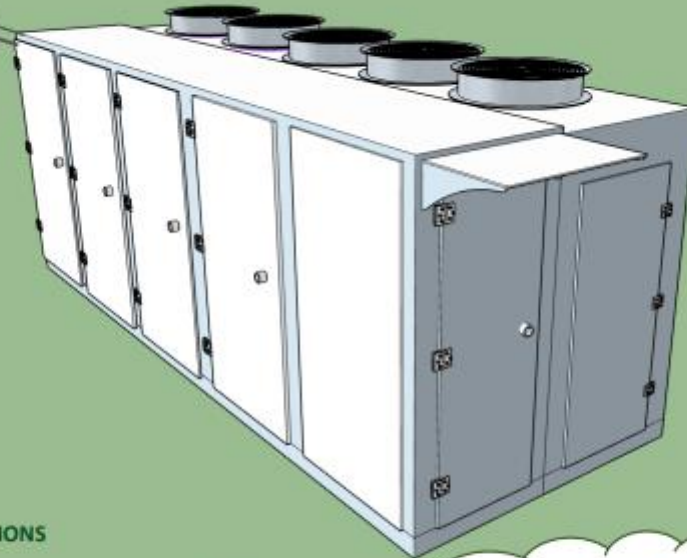


FUTURE PROOF YOUR PLANT WITH OUR COMPACT FOOTPRINT CO₂ DIRECT EXPANSION CONDENSING UNITS FOR CHILLING & FREEZING

SAVES UP TO
20% ON ENERGY
BY REPLACING
HFC'S WITH CO₂
IN WARMER CLIMATES



ROOM AIR COOLERS



- WEATHERPROOF HOUSED SELF-CONTAINED UNIT
- UP TO 300 KW CAPACITY FROM -40°C TO +12°C
- EASY LOW MAINTENANCE
- SIMPLE INSTALLATION: PLUG AND PLAY
- HIGH SEASONAL ENERGY PERFORMANCE COP
- NON-FLAMMABLE CHEAP REFRIGERANT
- LOW TOXICITY (CLASSED SAME AS PREVIOUS HFC's)
- ENVIRONMENTALLY FRIENDLY AND FUTURE PROOF
- NOT LIABLE TO FUTURE PHASE OUT OR F-GAS REGULATIONS
- ADD A HEAT RECLAIM OPTION

30%
REDUCTION
OF CARBON
FOOTPRINT



TRANS-CRITICAL SYSTEMS
PROVIDE AN EFFICIENT,
SIMPLE AND COST-EFFECTIVE
SOLUTION FOR
ALL CLIMATES



Greencold 
Refrigeration & Air-Conditioning Engineers

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Environmentally
friendly cooling

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SAVES UP TO
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IN WARMER CLIMATES



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Environmentally
friendly cooling



Greencold go large with Panasonic CO₂ Refrigerated Trailer

Cooling specialists, Greencold, has taken its refrigerated trailers to a larger specification to accommodate the needs of an established multi-national UK food manufacturer. The project followed on from the success of its Quickfreeze rental trailer, where the Panasonic CO₂ Cold Chain Condenser unit is installed within the trailer to provide the perfect mobile refrigeration and freezing solution.

Simon Andrew, Director of Greencold commented “We originally worked with Panasonic on a solution for our smaller QuickFreeze trailer in 2019 where we were impressed with the support and output of the units. We use the trailer as a cold-room test facility and mobile refrigeration unit. The trailer allows us to easily conduct onsite tests for customer products to show chill and freeze temperatures, in addition to also allowing more capacity at our own site that doesn’t take up workshop space at HQ. It was because of the original trailer and the natural refrigerant CO₂ being used on the Panasonic cold chain units, that our client Cranswick Convenience Foods MK, a multi-national food manufacturer, asked if they could purchase a larger trailer that could be fitted with the same Panasonic cold chain units.”

Panasonic Appliance
Air Conditioning Europe
(PAPAEU)
Maxis,
Western Road,
Bracknell,
Berkshire,
RG12 1RT

01344 853182
www.panasonic.eu

Wildwood PR Ltd
Tel: 01293 851115
E: tanya@wildwoodpr.com

The Panasonic CO₂ 2kW units were tested on the larger trailer (internal length of 5860mm, width 2030mm and height 2000mm), which proved to provide the ideal freezing and chilled capacities that the customer was looking for. This larger trailer can accommodate five standard UK sized pallets end to end (1200mm x 1000mm) with a total static payload of 2500 kilograms and a capacity to reach -20°C. The inside is equipped with an 100mm joint free insulated panels and 100mm insulated floors with sanded surface.

On both the large and small trailer, the Panasonic Cold Chain CO₂ units used are compact, lightweight, have low noise levels (a range of 35.5 dB(A) to 36dB(A)) and designed to fit into smaller spaces with dimensions of (HWD) 930mm x 800mm x 350mm and weighs just 67kg. The units are installed with a compatible ceiling mounted room air cooler and electronic controller and expansion valve.

The natural refrigerant of CO₂ used in the condensing units has a GWP (Global Warming Potential) equal to 1 as opposed to the current refrigerant typically used such as R404A having a GWP equal to 3,800. With refrigeration legislation increasing over the coming years, HFC R404A will be out of circulation by 2020.

Paul Taylor, UK Sales Manager for Panasonic UK further commented, "It's great to see our units being used for mobile refrigeration logistic requirements and proving themselves on the larger trailers. The Panasonic CO₂ units already have an impressive track record for reliability and efficiency with a clever single two stage temperature compression condensing unit and of compact size".

Based on Panasonic monitored data, the units provide 16% energy savings for chilled refrigeration and 25% energy savings for lower temperature freezer applications achieved in comparison to R404A.*

Simon Andrew further added, "The Panasonic CO₂ cold chain units offer a practical and straightforward method of installation with complete design support available. The units are compact, lightweight and have very low noise levels – we are more than happy with the collaboration of working with an eco-friendly manufacturer such as Panasonic. From our facility in the UK, we are able to supply CO₂ refrigerated trailers for sale built to the customers' requirements; size, shelving or dual compartment function for example.

Furthermore, our client's feedback has been very positive and has assisted with their objective of eliminating the need for their larger under-used cold store on site and HFC cooling systems dependency in general. Our client commented: "We have been pleasantly surprised by the unit's performance during the warm weather spells this year and its reliability to date. It also contributes towards our goal of reducing our carbon footprint and eradicating HFC's from our site"

For more information on Panasonic air source heat pumps, please visit www.aircon.panasonic.co.uk or to contact Greencold – www.greencold.com.

*Monitored within a 5°C to 27°C ambient 12-month operating period.

Compared to R404A

About Panasonic

Panasonic Corporation is a worldwide leader in the development of diverse electronics technologies and solutions for customers in the consumer electronics, housing, automotive, and B2B businesses. The company, which celebrated its 100th anniversary in 2018, has expanded globally and now operates 591 subsidiaries and 88 associated companies worldwide, recording consolidated net sales of Euro 61.4 billion for the year ended March 31, 2018. Committed to pursuing new value through innovation across divisional lines, the company uses its technologies to create a better life and a better world for its customers. To learn more about Panasonic: <http://www.panasonic.com/global>

ACCELERATE NEWS

ADVANCING HVAC&R SUSTAINABLY WORLDWIDE



EUROPE

Panasonic Provides Compact CO₂ Unit for Greencold Demo Trailer

BY TINE STAUSHOLM - DECEMBER 10, 2019



The QuickFreeze trailer with the young football players.



Japanese OEM Panasonic has provided a compact and lightweight CO₂ condensing unit that Greencold, a U.K. refrigeration and air-conditioning firm, has installed in a mobile demonstration trailer that it is also renting out.

Greencold has identified the trailer as an efficient educational tool that it can take out to customers to prove that a “CO₂ cooling system is nothing to be frightened about,” according to a release on Panasonic’s website.

“We had always wanted a large cold-room test facility in our premises to enable us to carry out product testing for our customers for both chill and freeze temperatures,” said Simon Andrew, Director of Greencold, in the release, “However, due to limited space inside our workshop we decided that it would be a better idea to construct a mobile CO₂ cooling system in a refrigerated box trailer.”

This could then be parked both on our premises and also taken to our customers site to test their products locally or demonstrate the technology,” added Andrew. “Panasonic worked with us to develop a perfect solution.”

Aiming to utilize the income potential of its new mobile refrigerated trailer, Greencold has set up a sister company, QuickFreeze, which rents it out to events, hospitality functions and pop-up stalls, and as emergency back-up for food and pharmaceutical companies with refrigeration needs. The trailer can help avoid logistical challenges faced when using a standard-sized truck, which is not always convenient for smaller drop-off locations, noted the Panasonic release.

One of QuickFreeze’s customers is a youth football (soccer) club that used the trailer for a tournament, where it was parked on-site next to a portacabin where food was being prepared for the players.

“We commissioned QuickFreeze to set up the trailer for chilled conditions which enabled us to serve the food and replenish the stocks quickly,” said Chris Terry, Team Chairman of FC Aztec Youth. “The event ran trouble free for the whole of the tournament from Friday to Saturday evening and made our life a lot easier.”

“The CO₂ branding on the trailer also caused a few heads to turn and brought attention to the visiting public and showed the importance of green refrigerant technology,” Terry added.

The compact Panasonic CO₂ condensing unit is a single two-stage temperature system measuring 93x80x35cm (36.6x31.5x13.8 inches) and weighing 67kg (147.7lbs). It is also quiet, with a noise level of 35-36 dB(A), said Panasonic. Based on monitoring data, the units deliver 16% energy savings for refrigeration, and a 25% saving for freezing applications, compared to traditional units using R404A, according to Panasonic.

“The Panasonic range has been specifically developed for small to medium capacity applications within the refrigerated retail and food service sectors,” said Paul Taylor, UK Sales Manager for Panasonic. “Furthermore, by combining reliability and efficiency with the natural refrigerant CO₂, the range removes any risk of future costs associated with the f-gas refrigerant phase out whilst also minimizing energy use and operating costs.”

Carrier Transicold, a U.S.-based refrigerated transport company, also markets a transcritical CO₂ container refrigeration unit for ocean transport and trucks.



How to build an efficient cold store

Reducing electrical energy consumption in cold stores is a complex matter but will become necessary to achieve EU energy efficiency goals.

– By Charlotte McLaughlin

The European Union's '*Clean Energy for All Europeans*' strategy – a legislative framework agreed in 2018 – put in place strong targets to mitigate the effects of climate change.

The new climate plan includes a binding target of improving energy efficiency in the EU by 32.5% by 2030, which contains an upward revision clause in 2023. "This deal is a major push for Europe's energy independence," EU Climate Action and Energy Commissioner Miguel Arias Cañete said when the political agreement was struck in June 2018.

"Much of what we spend on imported fossil fuels will now be invested at home in more efficient buildings, industries and transport. The new target of 32.5% will boost our industrial competitiveness, create jobs, reduce energy bills, help tackle energy poverty and improve air quality," Cañete said.

Member states have until 19 December 2019 to transpose the energy efficiency target into national legislation. Reducing energy consumption in buildings and industry will play a key role in meeting the target.

"Cooling and air conditioning systems account for around 15-20% of world energy consumption," according to data present in an EU project on

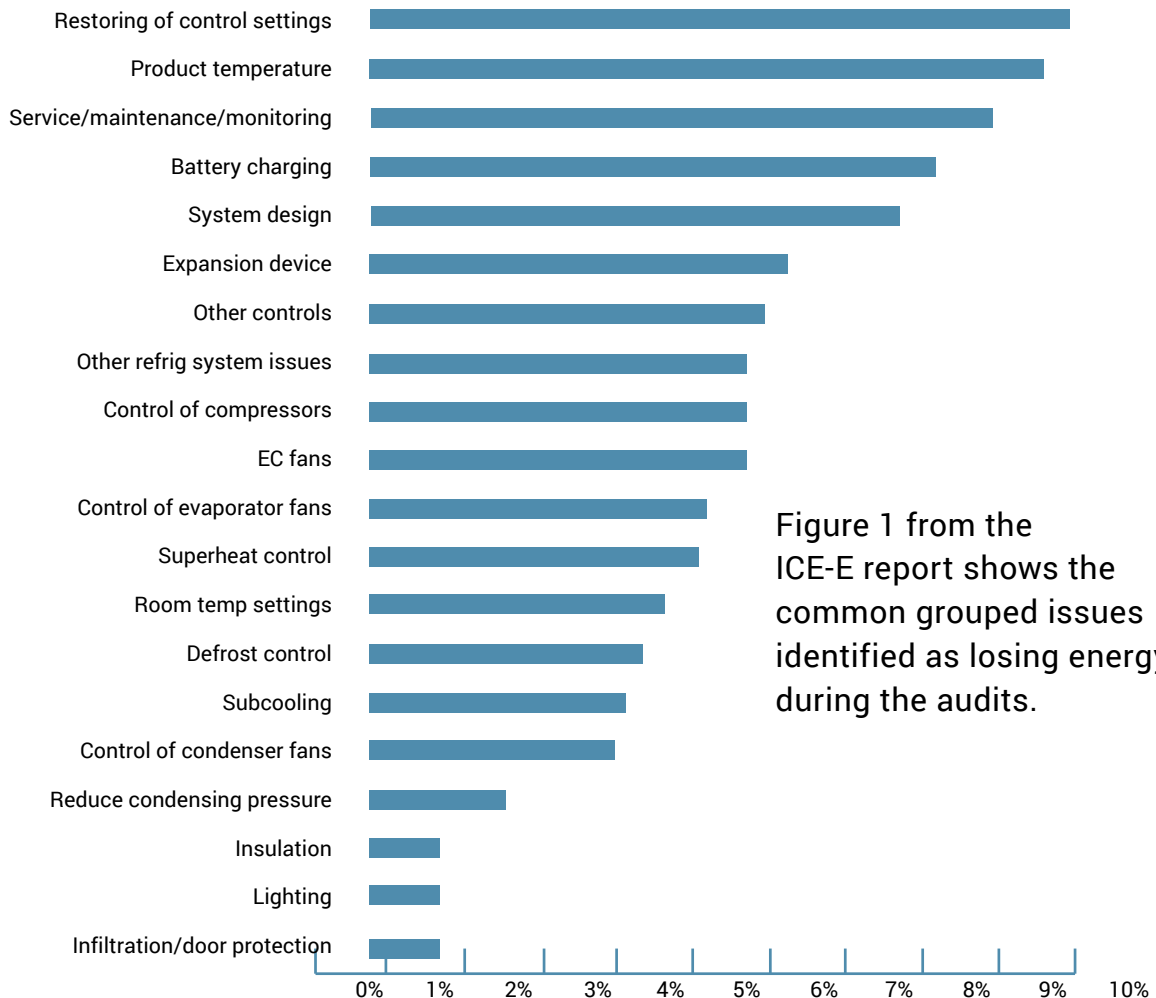


Figure 1 from the ICE-E report shows the common grouped issues identified as losing energy during the audits.

cost-effective strategies to improve energy efficiency in cooling systems in the food and drink sector, called [COOL-SAVE](#).

The project, completed in 2015, reports that, “industrial cooling installations [...] due to their significant energetic impact [need] effective and realistic saving strategies”.

Another EU project, completed in 2012, called ‘[Improving Cold Storage Equipment in Europe \(ICE-E\)](#)’, reports that, “within cold storage facilities, 60-70% of the electrical energy used is for refrigeration”. Reducing demand for cooling could go a long way to meeting the energy efficiency targets.

The cold chain is believed to be responsible for approximately 2.5% of global greenhouse gas (GHG) emissions through direct and indirect (energy consumption) effects, maintains the ICE-E project, which was funded by two now defunct parts of the European Commission: Intelligent Energy – Europe (IEE) and the Executive Agency for Competitiveness and Innovation.

How easy is it to address efficiency?

In considering how to reduce energy consumption in cold stores, it is worth looking at how energy is measured. Unfortunately there has been very little research into this area, according to Claudio Zilio, an HVAC&R researcher at the University of Padova in Italy, who also took part in the ICE-E project.

“There is a limited amount of research available about cold stores’ energy consumption,” Zilio explains. “Based on the previous figures and considering that as a rough estimate, the total cold store volume installed in the world is about 300 million m³, the reader may speculate about the yearly worldwide energy consumption for cold store operation.”

Dr. Andy Pearson, group managing director of Star Refrigeration, offers his perspective. “Calculating efficiency should always be done as a measurement of kWh/m³/year [known as SEC or Specific Energy Consumption] in order to account for the effect of seasonality and the

economies of scale in larger facilities,” Pearson told *Accelerate Europe*. “The end user should also have a means of correlating his cold store performance with the level of business activity – either production output or cold store throughput.”

The average estimated SEC is between 30 and 50 kWh/m³/year, according to a 2002 study carried out by the France-based International Institute of Refrigeration (IIR), but the ICE-E project concluded that this isn’t often the case for the majority of cold stores.

“Previous surveys carried out on a small number of cold stores have shown that energy consumption can dramatically exceed [the IIR] figure, often by at least double,” the ICE-E project found. “These surveys also demonstrated that energy savings of 30-40% were achievable by optimising usage of the stores, repairing current equipment and by retrofitting of energy-efficient equipment.”

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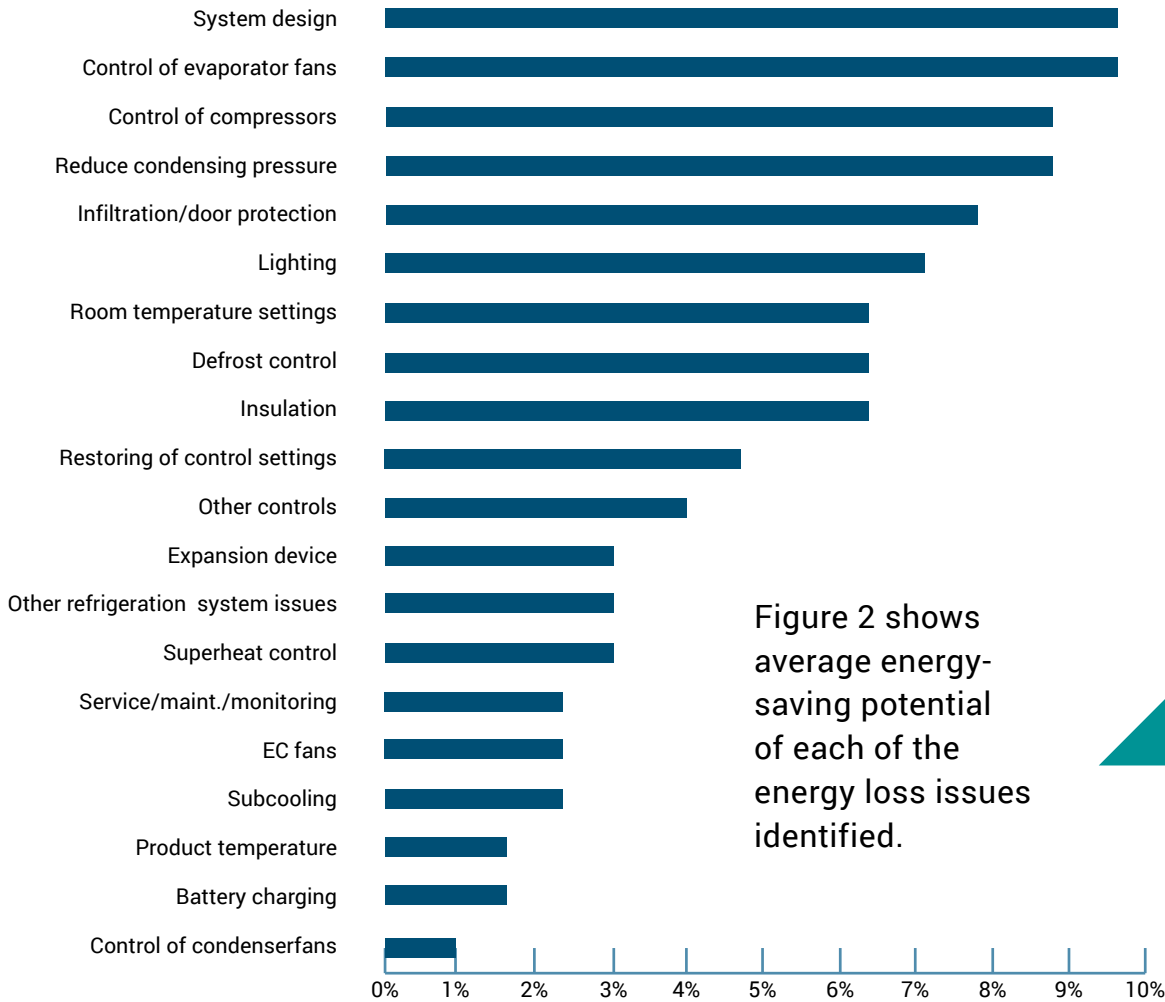


Figure 2 shows average energy-saving potential of each of the energy loss issues identified.

SEC measurements can also be plagued by variables that are not shown in the data, explains Simon Andrew, director of Greencold, a UK-based contractor specialising in CO₂ refrigeration.

“If the product entering the store is not at the pre-agreed temperature of acceptance, then the plant would work harder and for longer to remove the excess heat from the product in order to obtain the required set point for the room storage temperature,” Andrew says. He explains that this is often due to the need for cold stores to cool down products quickly.

“We would not tend to use a calculation of kW x m³ to compare systems, as we believe there are just too many variables that can influence the results,” says Greencold’s Andrew.

“Practically the first big question our clients ask us is, ‘how much will the plant cost?’” Andrew says. “Often the cheapest plant will be the most expensive to run, so it is our task to

encourage them to make wiser choices on the energy-efficiency front.”

How to reduce a cold store’s energy consumption

Regardless of such calculation issues, SEC remains an important way to benchmark a cold store’s performance. “All cold stores are different, so the key to improvement is to enable operators to compare against benchmarks,” says Star’s Pearson.

He adds: “The end user should also have a means of correlating his cold store performance with the level of business activity – either production output or cold store throughput. A good surrogate measure for this is the number of door openings in the cold store.”

He explains that this, “assumes that every time a door opens, a fork truck goes through – so it relates the level of activity to door use”.

While measuring 360 cold stores throughout Europe, the ICE-E project found, “that 47% of chilled stores, 35% of frozen stores and 50% of mixed stores had an SEC of less than 50 kWh/m³/year [the average predicted]. This demonstrates that there is considerable potential to reduce energy consumption in cold stores”.

The ICE-E project partners subsequently carried out energy audits on 28 cold stores across the EU (nine in the UK, nine in Italy, five in Denmark, four in Bulgaria, and one in Belgium).

The audits were carried out by estimating heat load (including electrical load), investigating the electrical consumption, analysing the refrigeration system, and identifying and quantifying potential savings.

The researchers initially expected to discover high energy consumption to be caused by similar issues from cold store to cold store; instead they found that all 28 had very different issues.

"Apart from maintenance-type issues, which are all quite different but that you could at least class under maintenance, we didn't find anything much that was common. All the stores had different issues," Professor Judith Evans, a researcher on air conditioning and refrigeration at London South Bank University and who was part of the ICE-E project, told *Accelerate Europe*.

"In total 130 options were identified, which could be grouped in 20 different issue-groups," the ICE-E report says. "No one issue dominated in terms of the energy that could be saved." (See the figures on these pages. Source: ICE-E report).

To solve these issues it is generally necessary to turn to a refrigeration engineer, but Evans also noted nearly "40% had issues that could be solved relatively simply by someone that is not highly technical" – for example, by checking the cold storage facility for issues with a check board.

The refrigerant question

This benchmarking, conducted under the original ICE-E project, could also be a clear way to reveal how different natural refrigerant systems perform.

At ATMOSphere Europe 2018, held by *Accelerate Europe* publisher shecco in Italy last November, Enrico Zambotto, refrigeration director at Arneg, presented data that did just that.

He compared an ammonia/CO₂ system in an 18,400 m² cold store in Tarquinia, Italy, to an updated worldwide benchmark study (which took some of the original ICE-E research) conducted by *J. Evans et al.* in 2015 on 'Specific consumption index per unit of volume' in 439 cold stores.

Compared to this baseline, the Tarquinia system's energy consumption was "62% below the world average, 58% below the European average, and 46% below the Italian average, thanks to energy efficiency solutions adopted," he said.

Not even benchmarking is always accurate, warns Evans of London South Bank University. "All you can do is try, by having a large enough data set. Even if you're worse than that average, it doesn't necessarily mean you're bad [in terms of energy use]. It means there might be a good reason for it," she says. "It might mean there's something you can do about it."

The best way of finding out is by cold stores doing regular audits on energy and by measuring changes in a system. "When you make a change, people should see a big drop with actual vs. predicted energy. So you know you can see quite clearly if you've made a significant change," she says.

Star's Pearson maintains that ammonia is a better performer than HFCs. "You can generalise about these systems – for example, a direct ammonia system will usually be more efficient than a direct R404A system or a glycol system, but the variables in operation store-to-store will be greater than the differences caused by refrigerant, so it's wrong to say ammonia is always the most efficient."

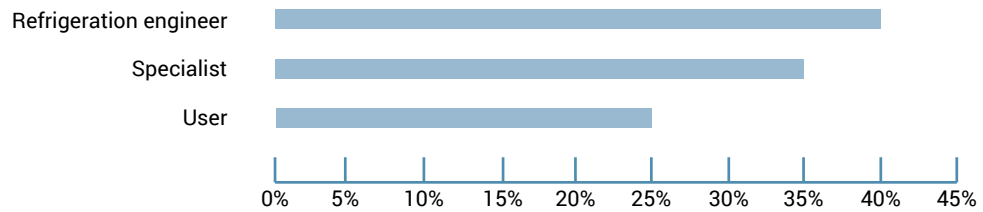
The ICE-E project did create models to help installers to design systems, but "often upfront cost is really important to people [as] they don't always invest in the most energy-efficient technologies," says London South Bank's Evans.

Cost is a big factor in why "big cold stores built by refrigeration contractors usually [opt for] ammonia," Evans argues. "Then you have the smaller cold stores that aren't bespoke in any way and are more flatpack-type stores. You buy them and you put an extra panel in the wall to make it bigger. They're very traditional and created for a [flat] price," she explains.

Maintaining efficiency

Greencold's Andrew does try to get the cost factor across to end users. "Yes, we would look at several types of system and compare the purchase price against 'on paper' lifetime operational energy consumption cost based on the same running hours, along with anticipated annual service costs of the plant, and

Figure 3 demonstrates level of expertise required to solve energy-related issues identified in the audits.



present our findings to the client. [The end user] can make an informed decision based on initial capital cost vs. running costs for the plant's full lifecycle."

Sometimes, the efficiency of a cold store declines over time. "Over the years people [change] things [and make] a very inefficient [cold store] without realising [it] over time," Evans says. She recommends continually monitoring performance.

In reassessing system performance, some changes are simply too expensive or too difficult for cold storage operators to make.

One cold store had lots of lighting, Evans says, so moving to LEDs would be more efficient. However, it was very difficult to get on the roof and "they used the store all the time," Evans says, so change would have cost too much.

Another non-technical barrier is lack of information. "We found out relatively quickly that people either didn't have that information or the person, often the energy manager, looks at how efficient the cold store is and very often doesn't have the refrigeration information – because the refrigeration manager or engineer has got that. So you end up with this sort of block, as no single person has all the information," Evans says.

This lack of information explains why Evans could not take into consideration the refrigerant in these cold stores, as energy managers and cold store operators simply lacked this data.

Zilio from the University of Padova points out that the ICE-E report found, "that a significant percentage of the 'small' stores in Europe still operate with R22". Zilio said: "I can't find a reliable and consistent number of published case studies to address the crucial choice for cold store operators and owners: to replace R22 with a transition mixture or to install a new plant. In both cases, which is the best refrigerant to adopt?"

"It is time to broaden the competencies and studies that have so far been developed for air-conditioning and supermarket refrigeration applications to display new efficiency enhancement opportunities and to increase the sustainability of the 'old' and still reliable technology adopted in refrigerated warehouses," Zilio argues.

Star's Pearson suggests it is ultimately down to end users themselves to monitor the performance of their cold storage facilities. "A few of our customers look at their refrigeration system energy consumption and benchmark it, but they are very unusual," he says.

Pearson also stresses the importance not just of measuring the information, but also acting upon it, if cold store performance is to be improved. "Otherwise, on that basis it is impossible to tell whether the refrigeration plant is good, bad or indifferent," he concludes. ■ CM