



## SUSTAINABLE REFRIGERATION

Cooling with natural gas R290



ONE STEP AHEAD ON  
THE PATH TOWARDS  
THE SOLUTIONS OF  
THE FUTURE

## FREOR LT CONTRIBUTES TO A MORE SUSTAINABLE WORLD

*More retailers are becoming oriented towards the choice of environmentally-friendly refrigeration systems. Improving system architectures, using refrigerants with lower global warming potential (GWP) can significantly improve the carbon footprint of an installation.*

To suit all retail formats from small convenience shops to large supermarkets, at FREOR we have developed a comprehensive range of environmentally-friendly commercial refrigeration products, operating with propane R290 in self-contained systems and CO<sub>2</sub> in remote refrigeration systems. Our line of sustainable refrigeration solutions also offer glycol-based systems and heat pump terminals for cooling and heating large areas.

FREOR has 17 years of experience in designing, manufacturing and selling commercial refrigeration solutions for the supermarket sector. Company offers a wide range of equipment to preserve the freshness and enhance the appearance of refrigerated products, while minimizing the impact on the environment.

## ARE YOU READY FOR HFC PHASE-OUT?

In January 2017, the first requirements of the UE 517/2014 regulation on F-gas came into force. In the light of this, the prices of HFC refrigerants have risen disproportionately and continue to rise.

The use of HFC refrigerants with a GWP above 2500 will be banned in all new commercial refrigeration equipment placed on the EU market after January 1st 2020. Therefore equipment with R404A will no longer be supplied.

The use of HFC refrigerants with a GWP above 150 will be banned in all new hermetically sealed commercial refrigeration equipment placed on the EU market after 1 January 2022. This will outlaw all HFCs (e.g. R134A, R448A, R450A) and many other refrigerants.

Currently the only available alternatives are hydrocarbons (R290, R600A, R1270A etc), natural refrigerants (R744A etc), and HFOs (such as R1234).

### Timeline of F-gas Phasedown

PHASE-OUT PERIOD	By 2020 year	By 2022 year	By 2022 year	By 2022 year	No time limits
REFRIGERANT					
GWP (Global Warming Potencial)	3920	1430	1273	547	3

# REASONS TO GO GREEN ...DID YOU KNOW?

## Timeline of F-gas phasedown regulations and proposals affecting commercial refrigeration (EU F-gas Regulations No. 517/2014)



### Bans placing on the market new equipment:

- Refrigerators and freezers for commercial use (hermetically sealed systems) with F gases **GWP > 150 GWP**
- Multipack centralised refrigeration systems for commercial use, with a rated cooling capacity > 40 kW with F gases **GWP > 150**

- EU proposes 79% reduction of HFC's by 2030
- EU bans servicing equipment with refrigerant GWP > 2500 (not even recycled)
- US/Canada/Mexico calls for global phasedown of HFC's- 30% by 2030

Bans the use of HFC's R134A, GWP 1430; R448A, GWP 1273; R450A, GWP 547, as refrigerants.



### Bans placing on the market new equipment:

- Refrigerators and freezers for commercial use (hermetically sealed systems) with HFC's **GWP > 2500**
- Stationary refrigeration equipment (except equipment for temperatures below -50°C) with HFC's **GWP > 2500**



Bans the use of HFC's R404A, GWP 3920, as a refrigerant.

5 Tons CO<sub>2</sub> eq. = a system with 1.28 kg charge of R404A.



### Bans service and maintenance of:

- Refrigeration equipment using HFC's with **GWP > 2500** and a charge size of 40 tonnes of CO<sub>2</sub> equivalent.
- Only recycled refrigerant with **GWP > 2500** is allowed for servicing until 2030

Bans servicing of HFC's R404A with 10.2 kg or more charge.




A growing number of countries are phasing down HFCs and implementing "GWP taxes".



## FREOR RESPONSE TO THE F-GAS REGULATION

FREOR has been a supporter of the use of propane R290, an efficient, ecological and natural gas, as an alternative refrigerant. FREOR has been one amongst the first to use R290 as a refrigerant in large-size commercial refrigeration units with multiple circuits of limited 150 g charge per circuit and it proved to be a commercially attractive alternative to equipment using F-gases.

The use of R290 in FREOR equipment does not contribute to global warming, while traditional alternatives such as fluorinated refrigerants (HFCs) are powerful greenhouse gases. R290 is a natural choice with a perfect balance between performance and costs.



### R290 advantages:

- ◆ Natural non-toxic refrigerant with zero ODP.
- ◆ Future proof solution with GWP of 3, not impacted by F-gas legislation.
- ◆ Low carbon footprint.
- ◆ Excellent thermodynamic properties.
- ◆ Standard operating pressures.
- ◆ Significantly reduced refrigerant charge compared to systems using hydro fluorocarbons (HFCs).
- ◆ R290 systems do not require significant changes versus current HFCs.
- ◆ Applied in the most efficient appliances produced in Europe with very positive results.

These features make R290 an attractive candidate in light of the F-gas regulation.

Our GREEN WAVE line, a line of low GWP products, can help our clients meet the existing HFCs phase-out requirements. Natural refrigerants such as R290 represent a sustainable technology and are a long term solution.

In addition to being nature-friendly, FREOR GREEN WAVE R290 equipment offer great energy efficiency, high reliability and lifetime economy.

The equipment with highly efficient inverter compressors makes it possible to save about 25 % of energy compared to the other equipment of the same category.



## GREEN WAVE R290 PRODUCT LINE

Meet the environmental regulations with natural high efficiency cooling by FREOR! We have developed a range of stand-alone cabinets, based on natural refrigerant propane R290. Each display case runs off its own propane system. This technology enables stores to reduce energy consumption and limit their environmental impact.

### R290 plug-in equipment benefits:

#### ◆ Energy efficiency

This type of equipment operates under low pressure and is up to 20 % more energy efficient than HFC operated.

#### ◆ Environmental friendliness

Natural nature-friendly refrigerant with the global warming potential (GWP) = 3, ozone depletion potential (ODP) = 0.

#### ◆ Cost-effectiveness

No need for machinery room for a compressor unit, thus saving the store area. Long copper pipelines are eliminated, guaranteeing up to 70% cheaper system installation and ensuring easy care.

#### ◆ Flexibility

Equipment can be easily relo-

cated, new equipment can be added at any time without closing the store.

#### ◆ Maximum food safety

Every refrigerator operates as a separate unit, therefore failure in one piece of equipment does not affect the others, and potential loss of products is minimised.

#### ◆ Quicker and cheaper installation

All refrigeration components are factory integrated, no need for welding on site.

#### ◆ Convenient repairs and component replacement

Easy access to all the components of the refrigeration equipment.

### Possibilities:

◆ Multiple circuit with R290 charge <150 gr.  
Complies with EU regulations.

◆ Single circuit with R290 charge > 150 gr.  
Non European countries.  
Standard in some of the countries.  
Possible compliance with future regulations.

Green Wave R290 product line  
at the exhibition EUROSHP 2017,  
Dusseldorf, Germany





## EFFICIENT NATURAL SOLUTION - HYDROLOOP SYSTEM

As a part of our sustainable energy consumption optimizing solutions, FREOR has introduced HYDROLOOP system with R290 plug-in equipment.

Our designed solutions allow you to have plug-in R290 equipment, connected to a closed circuit waterloop system. In this system, each display case and cold room has its own compressor and a glycol cooled condenser. Water is recirculated by a pump between the internal units and an outdoor dry cooler.

HYDROLOOP is a sustainable solution, which helps significantly reduce a negative effect caused by refrigerant leaks in central refrigeration systems.

### HYDROLOOP system advantages:

- ◆ Low GWP (R290) available
- ◆ Low amounts of refrigerant
- ◆ Energy efficiency
- ◆ Simple hydraulic piping
- ◆ No machinery room required
- ◆ Fast installation
- ◆ High flexibility
- ◆ Easy layout change
- ◆ Recovery of condensing heat to prepare hot water.



**-97 %**

Less refrigerant leaks \*



**-80 %**

Lower refrigerant charge \*



**25 %**

More energy efficient \*

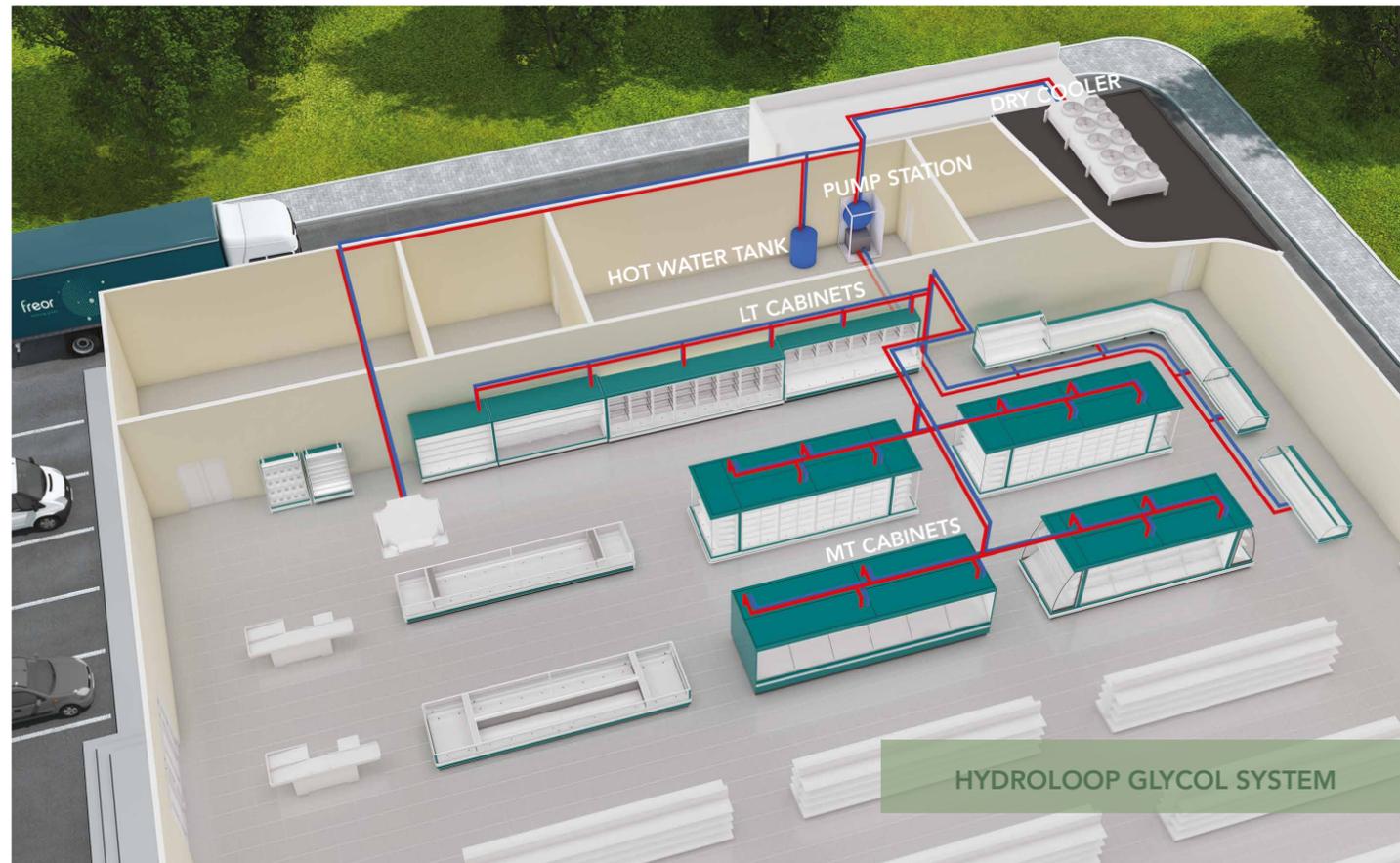
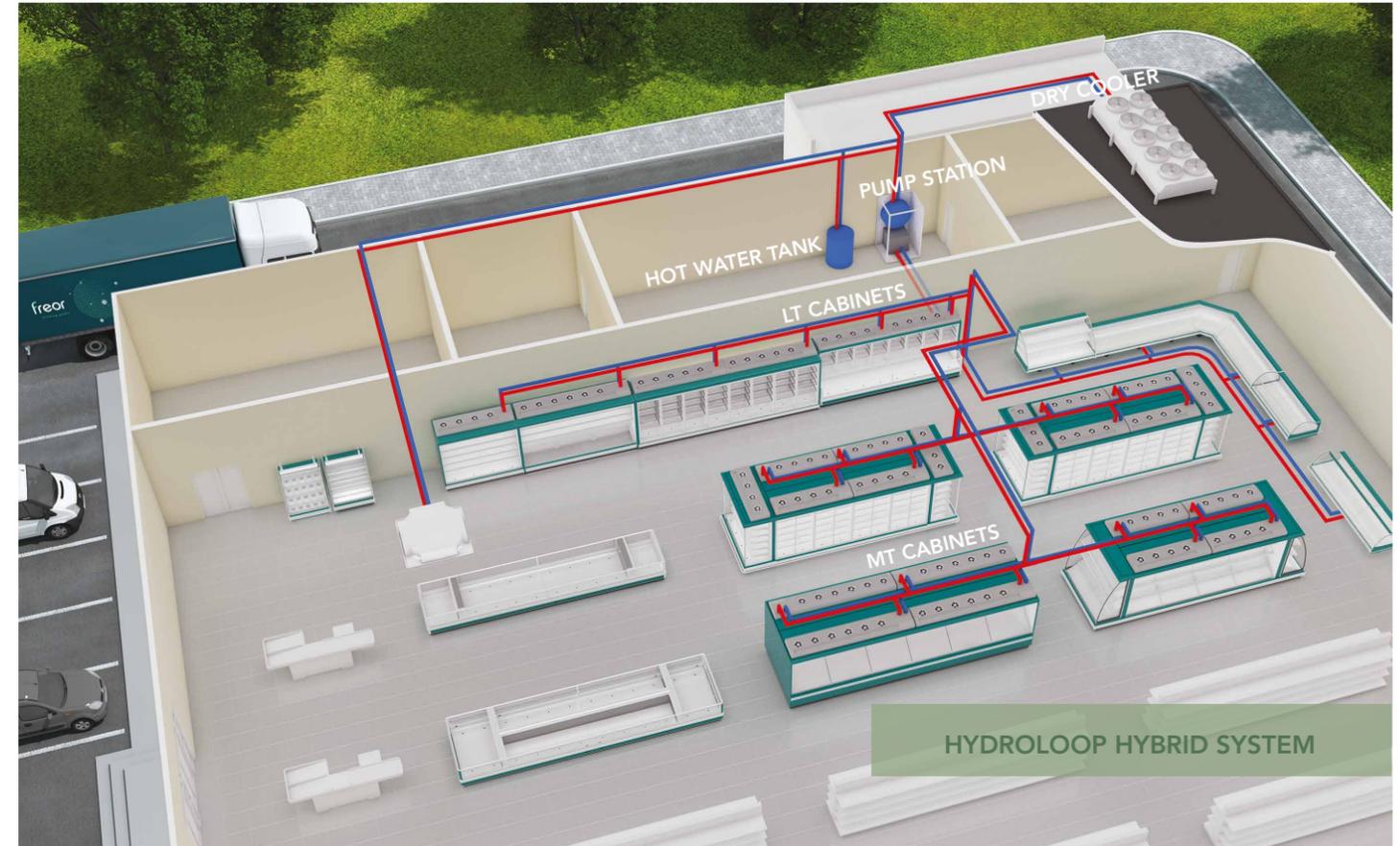
\* compared to remote refrigeration system

## HYDROLOOP GLYCOL SYSTEM

Hydroloop Glycol system is a cost-effective solution for stores, which allows removal of waste heat from the store through environmentally-friendly glycol line in summer and additional use of the heat for warming up the store and water in winter. Your chosen heating system can be additionally installed.

### Advantages:

- ◆ No heat discharge into the store area
- ◆ Very small quantity of refrigerant
- ◆ Easy installation – saving costs
- ◆ No additional room height is needed to secure air flow
- ◆ Emitted heat can be used for shop heating
- ◆ Easy to integrate with various heating systems



## HYDROLOOP HYBRID SYSTEM

This environmentally-sustainable solution allows combining two different heat removal systems with the possibility to switch between the regimes, which guarantee easy use of excess heat for store needs. Heat is either emitted directly into the store area via air condenser mounted on the unit (in winter) or removed via glycol line to the outside (in summer).

### Advantages:

- ◆ Direct warm air supply to the store area in winter
- ◆ Easy to install
- ◆ Easy to integrate with various heating systems
- ◆ Reliable operation – in case of fault in water circulation, heat is removed via air condenser on the top of the equipment



# GREEN EFFICIENCY

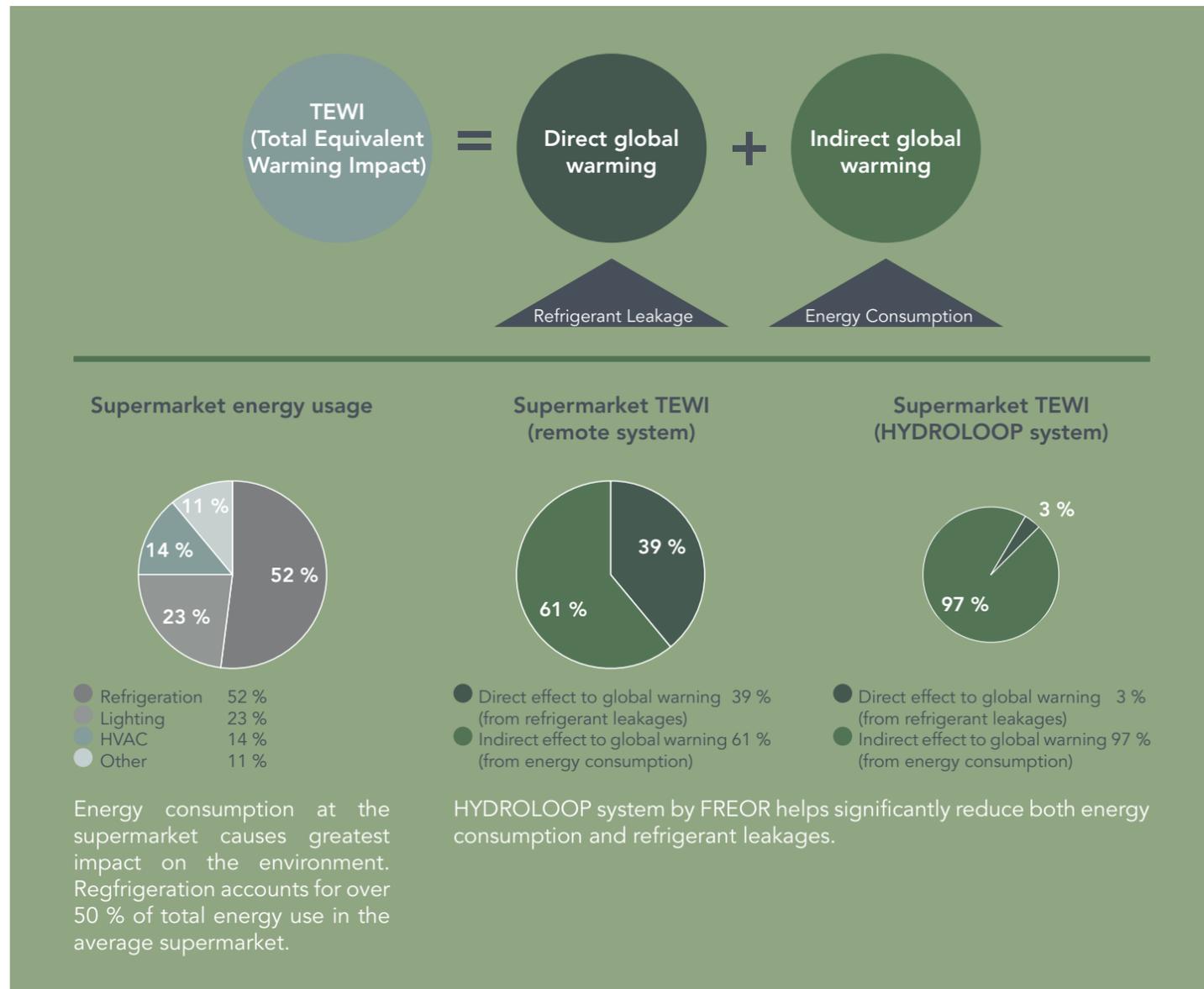
At FREOR we believe that minimizing F-gas usage, reducing leakages and saving energy is protecting the environment. Therefore FREOR is proposing solutions reducing both direct and indirect global warming effect.

## Reducing direct global warming effect:

- ◆ Self-contained plug-in equipment with hermetically sealed compressors
- ◆ Reduced refrigerant charges
- ◆ Increased use of natural coolants such as R290 and CO<sub>2</sub>

## Reducing indirect global warming effect:

- ◆ Improving energy efficiency of refrigerated cabinets
- ◆ Offering efficient energy-saving technology - HYDROLOOP system



**R290 - A GREEN FUTURE-PROOF ALTERNATIVE TO TRADITIONAL HFCS**

# HIGH ENERGY EFFICIENCY

GENERATION - FRIENDLY REFRIGERATION

## NATURAL REFRIGERANT R290

PART REPLACEMENT EASE

**LOWER OPERATING COSTS**

CHEAPER TECHNICAL MAINTENANCE

**NATURAL REFRIGERANT CO<sub>2</sub>**

GREEN WAVE CO<sub>2</sub>

**NO "GWP" TAXES**

GOOD HEAT TRANSFER

HIGHER COP THAN HFC

OPTIMAL PERFORMANCE AND RELIABILITY  
**LIFETIME ECONOMY**  
ENERGY SAVING (REDUCTION BY 30%)<sub>2</sub>

LOWER INVESTMENT COSTS

SAVING THE NATURE

OZONE - FRIENDLY

**SUSTAINABLE**

SYSTEM EFFICIENCY

**NEGLIGIBLE GWP**

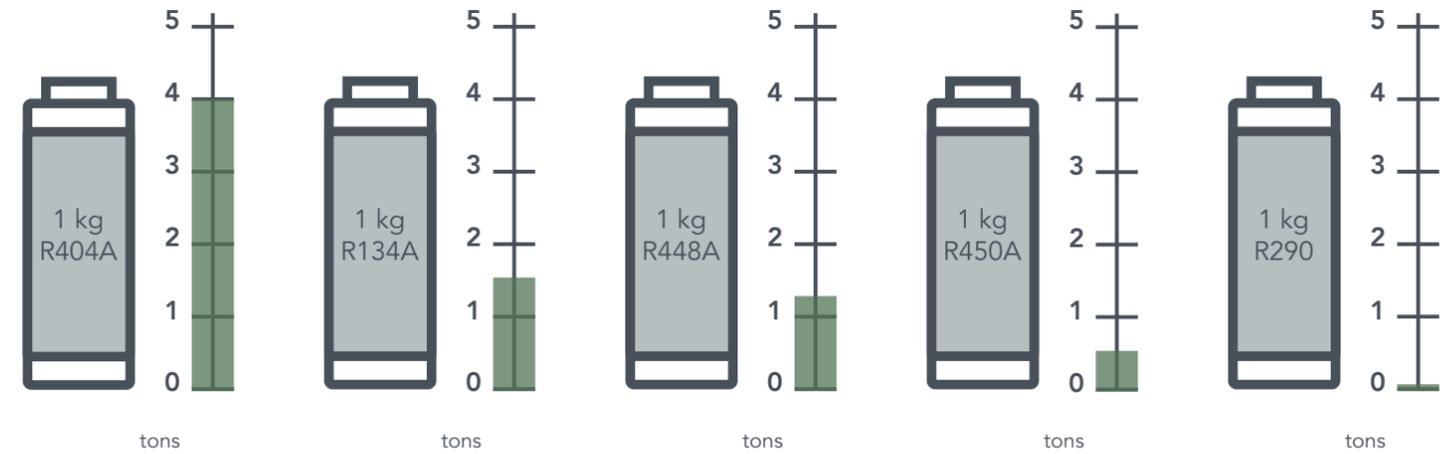
REDUCED CO<sub>2</sub> EMISSION

GREEN WAVE

R290

## ENVIRONMENT RESPECT

CO<sub>2</sub> equivalent refrigeration



Global warming potential (GWP) is a relative measure of how much heat a greenhouse gas traps in the atmosphere. CO<sub>2</sub> equivalent is a standard unit for measuring carbon footprints. The amount in tons of CO<sub>2</sub> equivalent is the mass in tons of F-gas multiplied by the GWP of that F-gas. The higher the GWP of a refrigerant, the more it will come under pressure by the HFC phase-down. Prepare for a low GWP future now!

HOW MUCH CO<sub>2</sub> WOULD YOU LIKE TO REMOVE?



1 London - New York flight

=

**0.9** tons CO<sub>2</sub>



10 000 km road trip (average)

=

**2.1** tons CO<sub>2</sub>



Household heating (average)

=

**4.5** tons CO<sub>2</sub>

# freor

FREOR production facilities  
in Vilnius, Lithuania



## ABOUT US

FREOR LT is an internationally operating manufacturer of commercial refrigeration equipment for any type of store. From discounters to supermarkets and hypermarkets, we offer our clients a broad range of products, including remote and plug-in cabinets, serve-overs and freezers, designed to increase the sales of food products. Our competent local partners in more than 25 countries provide expert support and service for the products we supply.

FREOR is headquartered in Vilnius, Lithuania and owns two modern production plants, which are conveniently situated for logistics purposes - facilities in Vilnius, Lithuania (18 000 m<sup>2</sup>) and Belarus (10 000 m<sup>2</sup>). FREOR's high quality standards are certified by the ISO 9001 (quality management), ISO 14001 (environmental management), and ISO 50001 (energy management).

*To meet our customers needs, we continually invest into solutions, which enable our clients to reduce their energy consumption and limit environmental impact. We develop new refrigeration technologies, enabling the achievement of excellent refrigeration efficiency by using lower amounts of F-gas, employing low GWP natural „green“ refrigerants, which do not have any negative impact on the environment, such as CO<sub>2</sub> and propane R290.*



# Innovative food refrigeration solutions for every store!

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