

Refrigerants, Naturally! for LIFE

SUSTAINABLE COOLING FOR EUROPE'S SMALL FOOD RETAIL STORES

POLICY GUIDE

GUIDANCE DOCUMENT



CONTENT

GLOBAL POLICIES

To set a political framework for the international community to fight climate change.

EUROPEAN POLICIES

To detail out the global political framework with concrete deadlines and limits defined for Europe.

NATIONAL POLICIES

To implement the European policies through national policies and voluntary programs.

GLOBAL



Montreal Protocol, Kyoto Protocol, Paris Agreement

EU



Direct Emissions

ODS Regulation
F-Gas Regulation

Indirect Emissions

EU Ecodesign Directive
EU Energy Label

NATIONAL



National Policies

REGULATIONS

FOR THE USE OF REFRIGERATION, AIR CONDITIONING AND HEAT PUMPS (RACHP)

The refrigeration, air conditioning, and heat pump (RACHP) sector is a large consumer of energy and emitter of greenhouse gases (GHG). Global, national, and regional policies have been put in place to reduce this impact on the environment.

As RACHP appliance user, it's not only a challenge to find out which policy is applicable to you and why, but also to understand the complex language in which policies are often written. This guiding document will give you a brief overview about the most relevant policies on RACHP appliances for the food retail sector and discuss each of them in a more simplified language explaining how they can relate to you. In the first section this guide gives you a global background, the following sections address regulations that impact you directly. Finally, this guide will provide you with links if you need further information and support.

MONTREAL PROTOCOL AND KIGALI AMENDMENT

OZONE LAYER PROTECTION BY PHASING OUT CFCs

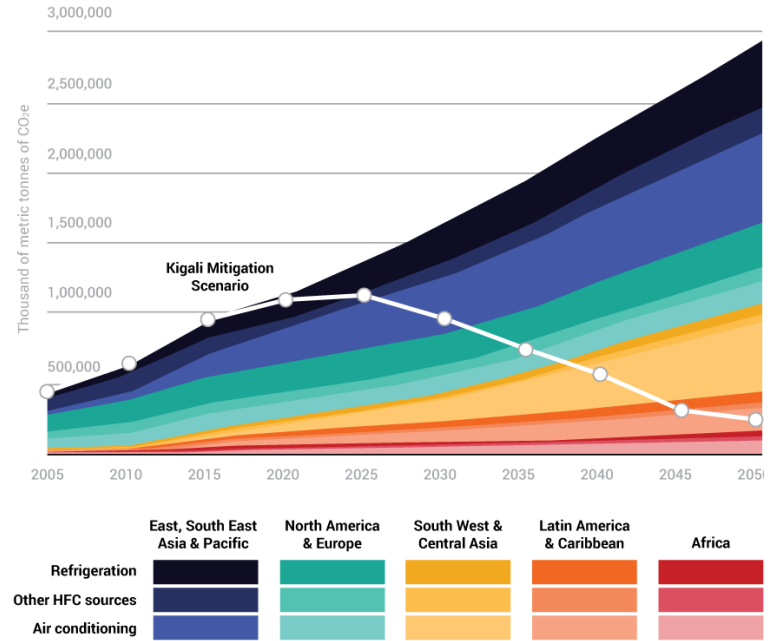
The Montreal Protocol entered into force in January 1989 and is an international treaty to protect the ozone layer by phasing out the production of numerous substances that are responsible for ozone depletion and climate change. The most significant revision of the Montreal Protocol was the Kigali Amendment in 2016. Due to its widespread adoption and implementation the Ozone layer is starting to heal, and a recovery is expected by around 2050.

WHY IS THIS RELEVANT FOR YOU?

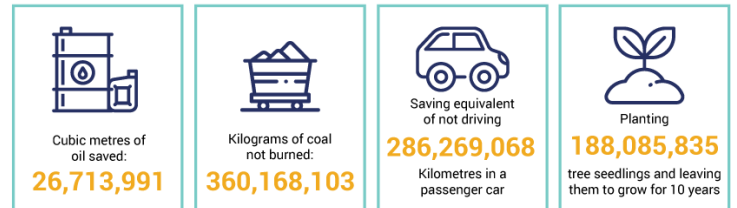
Ozone depleting substances (ODS) such as CFCs¹ were used in many appliances until they were phased out under the Montreal Protocol. The refrigerants first used to replace CFCs, the so called HCFCs², are less harmful to the ozone layer but are still very damaging to the environment and were later replaced by HFCs³ that are not harmful to the ozone layer but still cause climate change because of its global warming potential (GWP⁴). Under the Kigali Amendment those refrigerants are being phased down as well but still exist in many appliances today.

Worldwide impact of the Kigali Amendment

Evolution of HFC emissions from main sources and Kigali Amendment mitigation scenario*



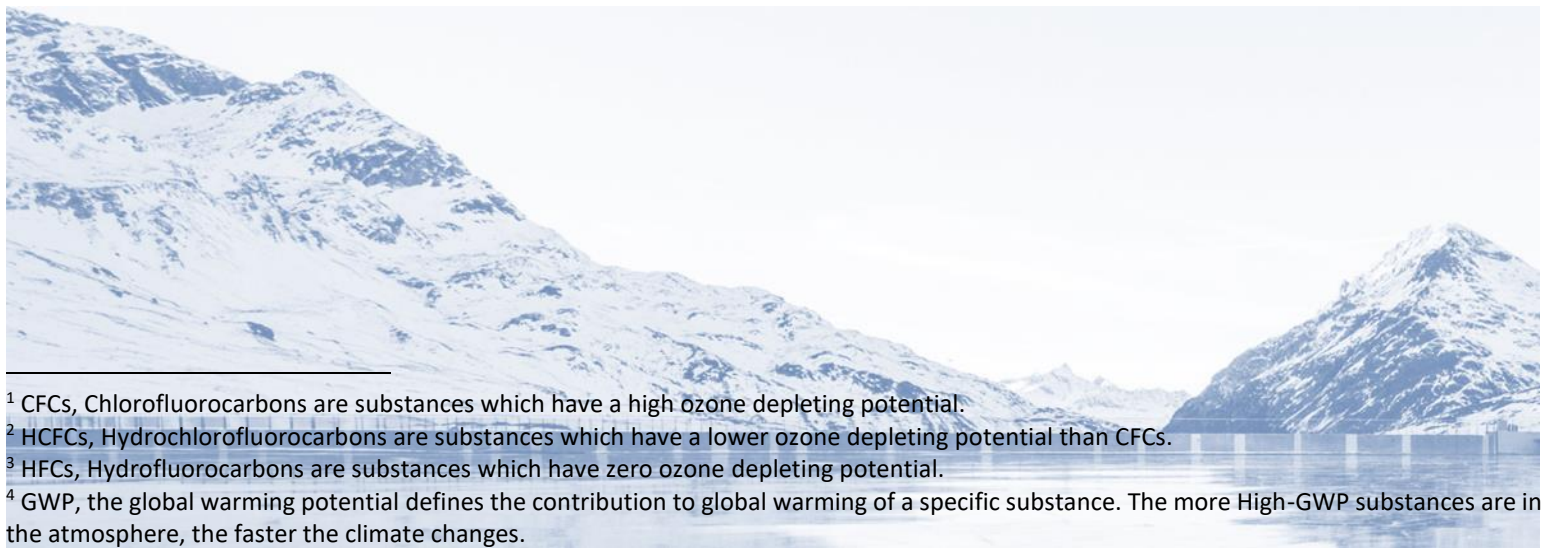
Greenhouse gas mitigation impact**



sheccoBase

FIGURE 1 WORLDWIDE IMPACT OF THE KIGALI AMENDMENT, SOURCE: SHECCOBASE

*International Institute for Applied Systems Analysis (IIASA) / Climate and Clean Air Coalition (2016-2017 Annual Report)
**According to the European Commission, 80 billion metric tonnes of direct GHG and CO₂e emissions will be saved from Kigali between 2020 and 2050, which translates (using the U.S. Environmental Protection Agency's greenhouse gas equivalencies calculator) to the above.



¹ CFCs, Chlorofluorocarbons are substances which have a high ozone depleting potential.

² HCFCs, Hydrochlorofluorocarbons are substances which have a lower ozone depleting potential than CFCs.

³ HFCs, Hydrofluorocarbons are substances which have zero ozone depleting potential.

⁴ GWP, the global warming potential defines the contribution to global warming of a specific substance. The more High-GWP substances are in the atmosphere, the faster the climate changes.

KYOTO PROTOCOL

REDUCTION OF GREEN HOUSE GAS EMISSIONS

The Kyoto Protocol is an international legally binding treaty that entered into force in February **2005** and aims to reduce greenhouse gases (GHG) in the atmosphere, addressing global warming. In Europe, the Kyoto Protocol became the basis for the Energy Policy encouraging efforts and investment in energy efficiency technologies research and implementation as well as renewable energy deployment to meet the agreed targets.

WHY IS THIS RELEVANT FOR YOU?

Many commonly used refrigerants are GHG with a high global warming potential and you might have units with such refrigerants in your store. So, when you need to replace your next unit, look into the refrigerant and the energy efficiency of the unit. The more efficient your equipment is, the better for the environment and your energy costs. This will also future proof your equipment and help you to stay compliant.

PARIS AGREEMENT

GLOBAL WARMING BELOW 1,5°C/ 2°C

The Paris Agreement is an international treaty in force since November **2016** and signed by **197 countries**. This agreement aims to limit the global warming temperature increase to well below 1.5°C/ 2°C compared to pre-industrial levels. It is generally agreed that immediate action on GHG emissions reduction is needed to achieve the goals.

WHY IS THIS RELEVANT FOR YOU?

When you need to invest into new appliances, choose appliances with natural refrigerants and those that are highly energy efficient. This will minimize your contributions to global warming, reduce your costs, and is part of the needed action to keep the temperature increase below 1.5°C/ 2°C.



ODS REGULATION

IMPLEMENTATION OF THE MONTREAL PROTOCOL

Governments in the EU implemented regulations phasing down and then banning the use of ozone depleting substances (ODSs). The regulation includes measures with requirements to reduce the use of ODSs for applications with no alternatives and a complete ban in other cases such as in cooling and refrigeration where CFC refrigerants were replaced by substances that had a lower ozone depletion potential such as HCFCs, and ultimately by substances such as HFCs whose ozone depleting potential is zero.

TABLE 1 REFRIGERANTS WITH THEIR GWP AND ODP

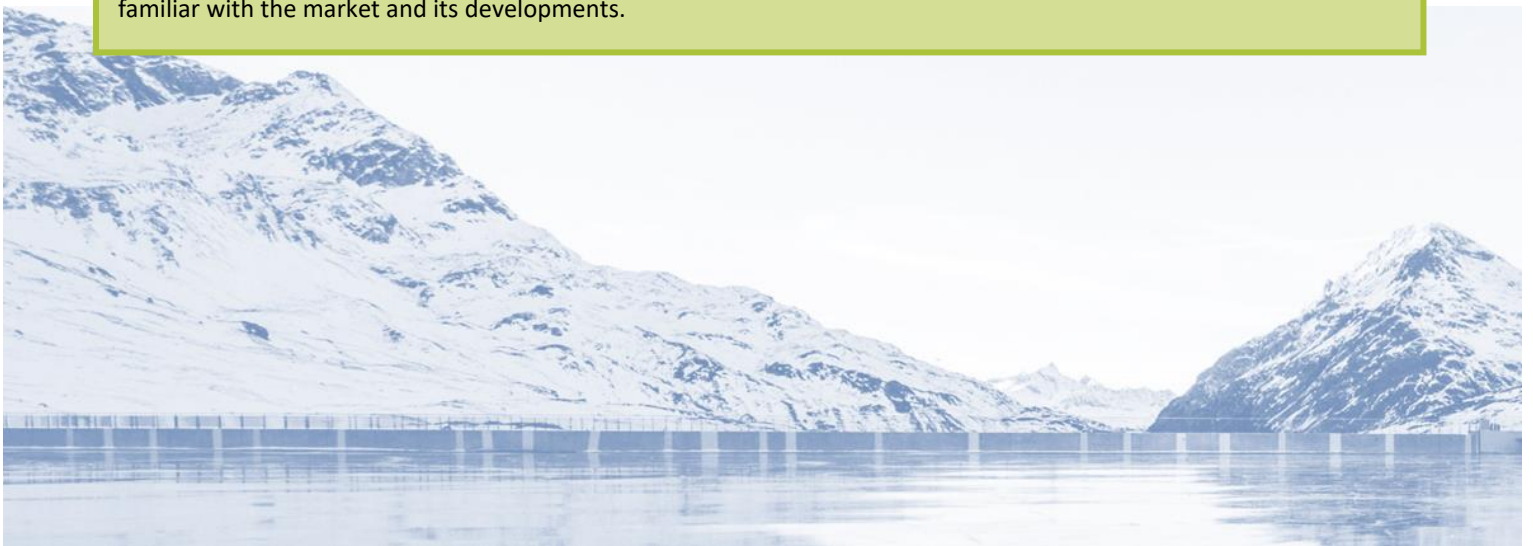
Chemical Formula	Name	Code	Global Warming Potential (GWP)	Ozone Depletion Potential (ODP)
SYNTHETIC REFRIGERANTS				
CFCs	Chlorofluorocarbons		Very high	High
HCFCs ¹⁾	Hydrochlorofluorocarbons		Very high	Very low
HFCs ¹⁾	Hydrofluorocarbons		Mostly high	Zero
HFOs ^{1,2)}	Hydrofluoroolefins		Low	Zero
NATURAL REFRIGERANTS				
HCs ¹⁾	Propane, Propene, Isobutane	R290, R1270, R600a	Negligible (3,2,3)	Zero
CO ₂	Carbon dioxide	R744	Negligible (1)	Zero
NH ₃	Ammonia	R717	Zero	Zero
H ₂ O	Water	R718	Zero	Zero
O ₂	Air		Zero	Zero

1) refrigerant groups, no specific GWP or ODP mentioned due to variations within the group

2) have an environmental impact and therefore have to be reported acc. to the F-Gas Regulation

WHY IS THIS RELEVANT FOR YOU?

While a phase-out of HCFCs has been largely achieved, these regulations remain relevant for the EU to prevent markets from returning to employ them. It's therefore crucial for you to consult with a professional service provider who is well familiar with the market and its developments.

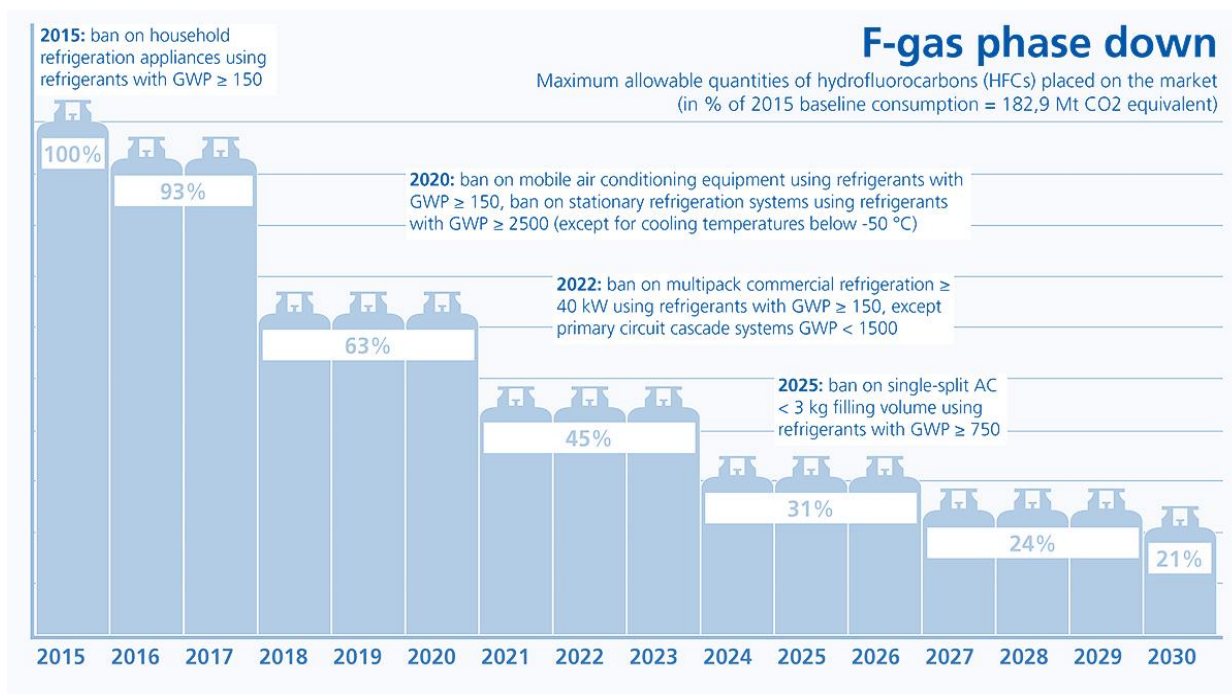


F-GAS⁵ REGULATION

PHASING DOWN HFCs

The F-gas regulation is the main legislative driver to phase down direct greenhouse gas emissions from RACHP equipment in the EU. For new **refrigeration (R)** appliances, refrigerants with a GWP > 2500 in centralized equipment such as in retail stores won't be allowed from 2020 onwards, appliances >40kW with refrigerants with a GWP > 150 are being banned in commercial refrigeration from 2022 onwards. For **air conditioning (AC)**, refrigerants such as HFCs in moveable air conditioning units with a GWP >150 will be banned from 2020 onwards, whereas split units that contain up to 3kg of refrigerant with a GWP > 750 will only be banned from 2025 onwards. For **heat pumps (HP)**, there is no clear target yet defined under the F-Gas regulation. However, to achieve the climate targets which are defined under the Paris Agreement, the industry needs to develop the application of low GWP refrigerants for heat pumps.

FIGURE 2 F-GAS PHASE DOWN ACCORDING TO THE F-GAS REGULATION, SOURCE: GEA GROUP (WWW.GEA.COM)



WHY IS THIS RELEVANT FOR YOU?

To comply to the EU regulations, you must ensure only refrigerants below the defined GWP value are used in your store equipment. The list below shows different refrigerants and their ODP as well as GWP value. It's recommended to use natural refrigerants as they have no environmental impact. If you would like to know which refrigerant is in your current equipment, have a look at the type label of your appliance or reach out to your local technical service.

⁵ F-gases are fluorinated gases which have higher global warming potentials than natural refrigerants

EU ECODESIGN DIRECTIVE

MINIMUM ENERGY EFFICIENCY STANDARDS (MEPS)

The objective of the EU Ecodesign Directive is to minimise greenhouse gas emissions in the whole life cycle of a product, from the development phase to the recycling / disposal phase. However, most of the indirect emissions are caused in the phase in which consumers use the product. Therefore, energy consumption is a key parameter to be looked at during product development. As low efficiency products are banned gradually from the EU market, producers must follow Minimum Energy Efficiency Standards (MEPS) in which minimum values for efficiencies are defined for different product groups. **Fehler! Verweisquelle konnte nicht gefunden werden.** shows MEPS for Split and Room AC globally.

WHY IS THIS RELEVANT FOR YOU?

By choosing energy efficient appliances you do not only decrease your electricity bill but also decrease your carbon emissions.

EU ENERGY LABEL

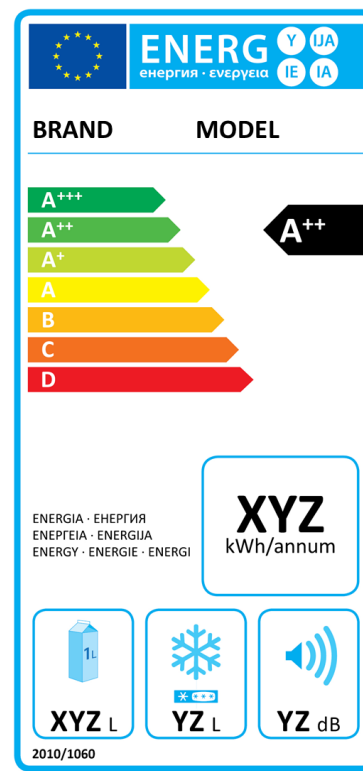
ENVIRONMENTAL INFORMATION OF YOUR APPLIANCES

This is a mandatory regulation that requires that all units in many appliance classes have the EU Energy Label. This provides information on energy consumption, noise levels, and other features of the appliance. It provides a level of comparison within the market for you to make an informed choice. The greener the rank, the lower the running costs and the more your carbon emissions go down.

WHY IS THIS RELEVANT FOR YOU?

Information on the energy efficiency of your appliance enable you, the consumer, to distinguish between efficient and less efficient products and help you in your decision-making process when investing in new equipment. Keep in mind, the more energy efficient your appliances are, the less you will have to pay for energy consumption over the equipment lifetime.

FIGURE 3 SAMPLE FRIDGE ENERGY EFFICIENCY LABEL



ODS AND F-GASES

FOUNDING FATHER OF EUROPEAN REFRIGERANT REGULATIONS

In the early 90th of last century, The Netherlands was one of the first countries in the world with national legislation to reduce ODS and later on also F-gas emissions. The policy was based on four pillars: technical requirements for improved tightness of RACHP equipment; periodic (preventive) maintenance and leak checking; certified competence of personnel and management systems of companies; standard bookkeeping of refrigerant inventory and consumption/leakage, and of maintenance records. The Dutch technical requirements have been introduced in European standard EN 378.

Today, the EU ODS and F-gas Regulations are implemented in Dutch legislation, in a slightly “easier” way than the original Dutch version. There are two legal documents (BRL 100 and BRL 200), specifying the certification requirements for companies and personnel respectively, where the training, examination and certification activities are left to commercial parties, under formal accreditation framework.

HYDROCARBONS AND CO₂

PRACTICAL GUIDANCE SUPPORTING A LEVEL PLAYING FIELD

Two fully revised Dutch standards NPR 7600:2020 and NPR 7601:2020 have recently been published. The NPR 7600:2020 (Application of flammable refrigerants in refrigeration systems and heat pumps) and NPR 7601:2020 (Application of CO₂ as refrigerant in refrigeration systems and heat pumps) are available via Dutch Standardisation Organisation NEN (in Dutch language only). These NPRs are written by working groups from all sector parties (including manufacturers and end-users) under a consensus model, thus “for and from the industries concerned”. NPRs contain detailed requirements and guidance covering the whole life cycle, from design until end-of-life.

It is allowed to deviate from the measures indicated in these standards, as long as an equivalent level of health, safety and environmental protection is achieved, proven by a specific risk assessment.

The NPR 7600 applies to all systems with a charge size limit above 150 grams of flammable refrigerant (and anticipates to future change of this charge limit), both for new installations and for expansions and modifications of existing installations. Compared to the 2013 version, the scope of NPR 7600:2020 has been extended from hydrocarbons (A3) only, to all flammable refrigerants including HFOs and R32, but excluding ammonia. By extending the scope, this fills the vacuum for flammable halogenated refrigerants (F-gases), particularly those not covered by the EU F-gas regulation, creating a level playing field for all flammable refrigerants.

The NPR 7601:2020 (Application of CO₂ as refrigerant in refrigeration systems and heat pumps) plays a similar role as NPR 7600, and applies to all systems with a charge size limit above 10 kg of CO₂ refrigerant, both for new installations and for expansions and modifications of existing installations.

WHY IS THIS RELEVANT FOR YOU?

Since 2007, NPR 7600 and NPR 7601 have been formally anchored in Dutch environmental legislation (the so-called Activities Decree), giving these NPRs the force of law. This Activities Decree contains provisions for installations with a content of 5 kg hydrocarbons or more, or 10 kg CO₂ or more; in general, all installations irrespective of charge size limit are subject to the general duty of care for the owner/user, as required by the Activities Decree. An interesting element of this Decree is that installations up to 100 kg of hydrocarbon refrigerant can be operated, on the basis of compliance with the NPR; above 100 kg, a specific permit from the authorities is required.



AMMONIA

UNIQUE APPROACH FOR AMMONIA AS REFRIGERANT

Already in 1999, the CPR 13-2 “Ammonia, application as a refrigerant for refrigeration systems and heat pumps” was published. At that time, this CPR 13-2 was already based on the European standard EN 378 at that time and followed its logical structure. In 2005, the CPR 13-2 was fully converted into the PGS 13 (PGS = Publication Series on Hazardous Substances).

The document reflected a balanced approach between occupation safety and external safety. Recently a completely revised PGS 13 has been completed after 5 years of hard work by a large group of experts from the industries and the government. The revised “New Style” version reflects the current technical state of the art and the full (inter)national legislative framework. A risk-based approach is used, which is completely new, and nothing comparable exists in other countries; even EN 378 is not built on a risk approach.

The result is a 136-page document, with 34 different incident Scenarios, 23 Risk Reducing Targets and 128 Recognized Mitigation Measures.

For each measure, indicators show if it is about environmental/external safety, fire prevention & firefighting, occupational safety and/or fire or disaster mitigation. All new installations must comply with this revised PGS 13; for existing systems, there is an implementation timeframe.

In addition to this PGS 13, above 1,500 kg of ammonia, minimum safe distances to (vulnerable) buildings are required. A quantitative risk assessment (QRA) must only be performed for very large refrigeration systems with more than 10,000 kg of ammonia.

With this PGS, there is one detailed document in the Netherlands where all different authorities (permits, enforcement) can refer to. In many other countries, legislation and enforcement is fragmented across many incoherent laws and documents. Thanks to this, ammonia is the standard in the Netherlands for all industrial applications (e.g. manufacturing facilities) and increasing number of applications for building ACHP, often in combination with secondary systems or cascade systems.

COMPETENCE AND CERTIFICATION OF PERSONNEL AND COMPANIES

UNIFIED APPROACH FOR ALL REFRIGERANTS

For natural refrigerants, safety & environmental legislation (e.g. Dutch Activities Decree) requires specific competencies for the design, installation, maintenance, operation and certification of both individuals and companies. This is regulated by the sector itself in the recently established Foundation Network Refrigeration & Climate (NKK). The certification framework is closely aligned with the existing methodology for F-gases certification according to the European F-gas Regulation.

WHY IS THIS RELEVANT FOR YOU?

A variety of training organisations provide dedicated training (theoretical, practical) for natural refrigerants. You can share this information with your technical service partner in case they aren't aware of natural refrigerants and their application yet.



STIMULATING NATURAL REFRIGERANTS IN THE NETHERLANDS

INNOVATION, DEMONSTRATION, SUBSIDIES AND TAX DEDUCTION

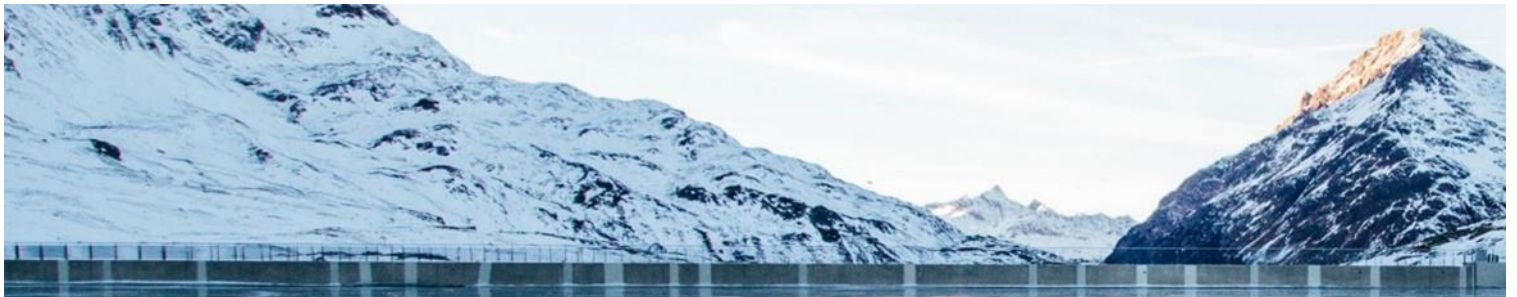
The Energy Investment Deduction of Tax (EIA) aims to make investments on energy efficient refrigeration systems and heat pumps with halogen-free refrigerants (no F-gases) more attractive. There are also subsidy schemes for innovative technology development with natural refrigerants, demonstration projects and precompetitive market introduction, and the development and introduction of heat pumps.

ADDITIONAL INFORMATION

LINKS TO PREVIOUS SECTIONS

Reference to	Link
Hydrocarbons and CO ₂	KNVvk guidance documents for hydrocarbon applications
Hydrocarbons and CO ₂	NPR 7600:2020
Hydrocarbons and CO ₂	NPR 7601:2020
Ammonia	PGS 13:2009
Competence and certification of personnel and companies	STEK certification website

All links can be found on our website: www.refnat4life.eu



The Refrigerants, Naturally! for LIFE project has received funding from the LIFE Programme of the European Union, project number: LIFE18 GIC/DE/001104

