Background information on the webinar series:

„Strategic considerations on the wider use of low-emission systems refrigeration and air-conditioning technology in Central and South America April 2021“

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On behalf of: Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety of the Federal Republic of Germany

Content

1 Executive Summary

Currently, about **15% of the electrical energy consumed worldwide is used for air conditioning and cooling**. The stock of air conditioning systems, which consume two-thirds of electrical energy, is expected to triple by 2050, according to a projection by the International Energy Agency.

In 2016, the widespread phase-out of greenhouse-impact hydrofluorocarbons (HFCs), which are mainly used as refrigerants, was agreed internationally under the Kigali Amendment to the Montreal Protocol. And in 2017, the Kigali Cooling Efficiency Programme (K-CEP) was launched, which aims to increase energy efficiency.

This is of particular importance because indirect emissions from electricity generation cause significant emissions. At the same time, the cost savings associated with the energy savings provide an important incentive for the implementation of the measures.

The use of modern, newly developed, almost emission-free refrigeration plants and systems can also contribute to other sustainability goals.

Refrigeration and air conditioning systems have a long service life, not least in developing and emerging countries. The goal must therefore be to exploit all energy-saving and air-cleaning potential in new investments and refurbishments.

Unlike electricity, thermal energy can be stored easily. Buildings, warehouses and even supermarket refrigeration systems can therefore be operated depending on the load situation in the electricity grid if controlled appropriately. This can reduce the need for electricity generation capacities. In addition, the power demand of the refrigeration plants and thus the price for the provision of electrical power can be reduced by skilful utilisation of the storage capacity.

As long as the control energy is obtained from fossil fuels, the CO_2 emission reduction is particularly high.

Energy saving and the phase-out of halogenated refrigerants must be advanced in harmony. Both cannot be implemented without investments in plant technology.

A bundle of measures is necessary for this. This includes, in particular, the creation or further development of the necessary political and economic framework conditions, appropriate industrial and trade capacities, targeted education and training, as well as comprehensive information, motivation and public relations work by all relevant actors. For the improvement and expansion of education and training, programmes for the establishment and maintenance of appropriate facilities as well as special curricula are required.

Targeted economic incentives (funding programmes) can achieve rapid market penetration. An attractive programme requires clear technological requirements that are easy to administer.

In order to achieve the broadest possible impact, market-based instruments, especially contracting, should be used.

The use of modern information and communication technology can play an important role in this - especially in view of the current Corona pandemic.

2 Background

The consequences of global climate change are becoming more and more tangible and increasingly threaten important livelihoods worldwide. Their containment and the limitation of the global temperature increase to 1.5 °C require additional efforts worldwide to reduce greenhouse gases.

The use of refrigeration and air conditioning technology is regularly identified as a field of action with high climate protection potential. It contributes with the

- indirect emissions of carbon dioxide from electricity generation and the direct
- emissions of refrigerants - especially synthetic refrigerants - due to leakage during their production, storage, transport, use in refrigeration systems and disposal.

contribute significantly to the increase in the concentration of these substances in the Earth's atmosphere.

According to a recent study by the International Energy Agency (IEA) and the United Nations Environment Programme (UNEP), there are currently 3.6 billion refrigeration plants worldwide. About 10 new systems are added every second. Due to the energy required to drive the systems, about 10 % of the electrical energy consumed worldwide is currently used for air conditioning and about 5 % for refrigeration - mainly of food.

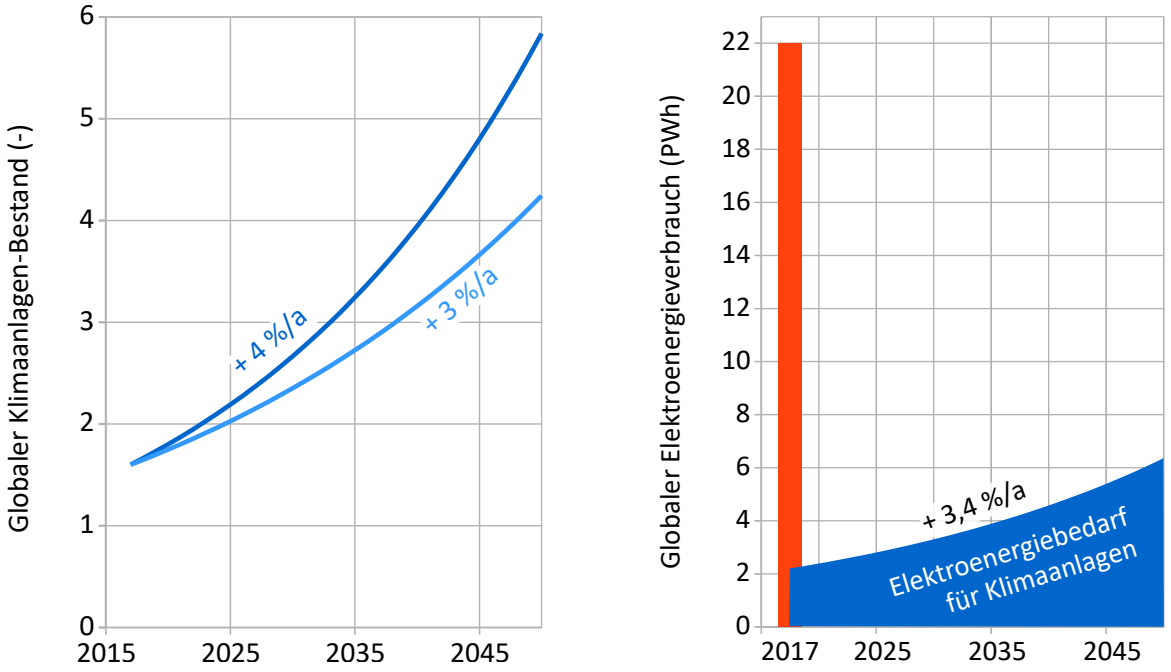

Figure 1: Global air conditioning inventory and electrical energy demand (IEA, 2018)

According to the International Energy Agency, consumption for air conditioning is expected to triple by 2050. If no countermeasures are taken, indirect and direct emissions will almost double by 2050.

Carbon dioxide is long-lived. After 1 000 years, 15 to 40 % of the emitted CO_2 is still in the atmosphere. The goal must therefore be to significantly reduce CO2 emissions as quickly as possible.

The extensive phase-out of greenhouse-effective hydrofluorocarbons (HFCs), which are mainly used as refrigerants, has been agreed internationally under the Kigali Amendment to the Montreal Protocol. In Europe, between 2016 and mid-2019, prices of key refrigerants have increased by 600-800%. This will accelerate the transition to environmentally neutral refrigerants in Europe. This process will continue in developing countries, including as the two global refrigerant manufacturers scale back production for conventional HFC refrigerants, increasing prices everywhere.

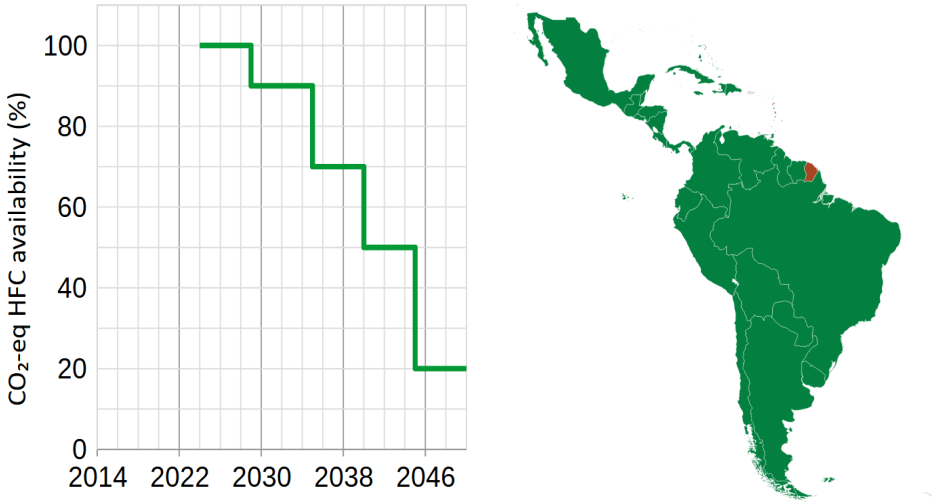

Figure 2: HFC availability in Central and South America
According to the Kigali Amendment to the Montreal Protocol (UNEP, 2016)

Not least as a result of the BMU's Refrigeration Systems Promotion Programme, systems developed in Germany have managed to enter the market that significantly reduce energy consumption, can use renewable energies, operate without HFCs as refrigerants and can thus even be emission-free. The following refrigeration systems and combinations are possible:

- Compression systems with electric motor drive provide both cooling and heating; when designed with brine circuits, cooling and heating can be stored with little effort for time-delayed use (dark periods);
- Sorption refrigeration systems are driven by solar heat, CHP waste heat or other process waste heat; the electricity for the control and circulation pumps can be provided by small photovoltaic systems and battery storage.

Such plants and systems can thus contribute significantly to achieving global climate protection, air pollution control and sustainability goals.

Considerable potential for the application of innovative refrigeration technology is seen in Central and South America.

3 Aims of the webinar series

The technical solution possibilities, resulting potentials for climate protection and air pollution control as well as possible models for supporting the dissemination of innovative and combined cooling systems are to be presented and discussed. For this purpose

- identify the relevant actors (formally responsible, drivers, promoters),
- identify the necessary new capacities, including technical advice, information, motivation and best practices, and
- existing funding opportunities in the countries of application

shall be pointed out.

Furthermore, additional opportunities for better networking and cooperation between the actors are to be created.

Originally, it was planned to address the topic comprehensively with many relevant actors from the fields of politics, finance, governmental and non-governmental organisations, associations within the framework of a two-day strategic workshop in Panama City. Unfortunately, this was not possible due to the Corona pandemic. The number of individual topics and speakers therefore had to be significantly reduced.

4 Refrigeration

The globally dominant technology for the technical provision of cold is the cold vapour compression process, which is mainly electrically driven:

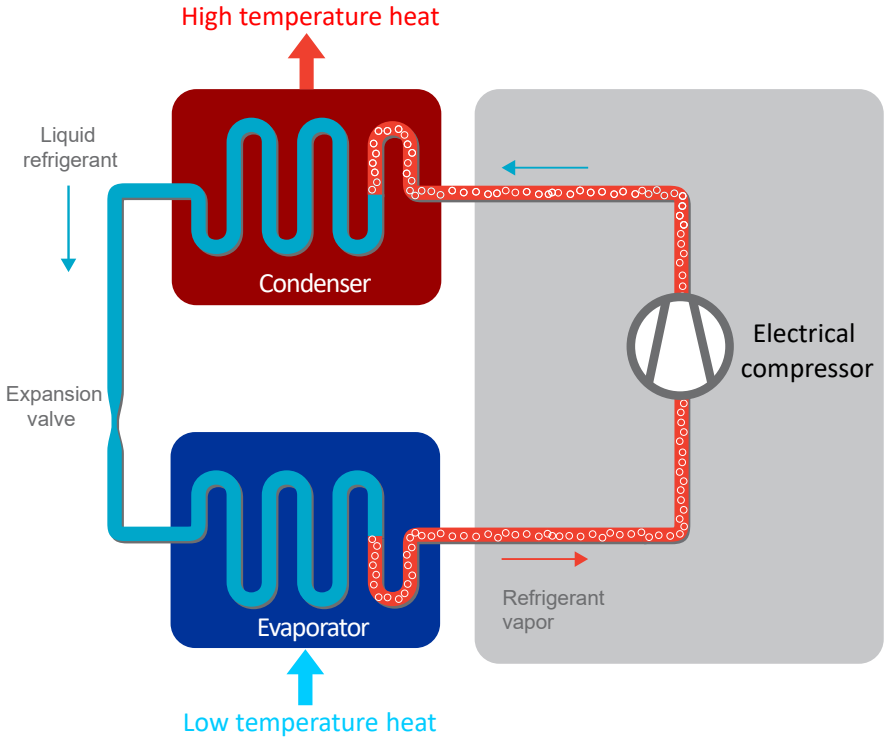

Figure 3: Flow diagram of an electrically driven refrigerating machine

A thermal drive via solar heat, waste heat or a gas heating system is also possible, but the technology is less widespread. It is more difficult to control and thermally sluggish in its reactions to

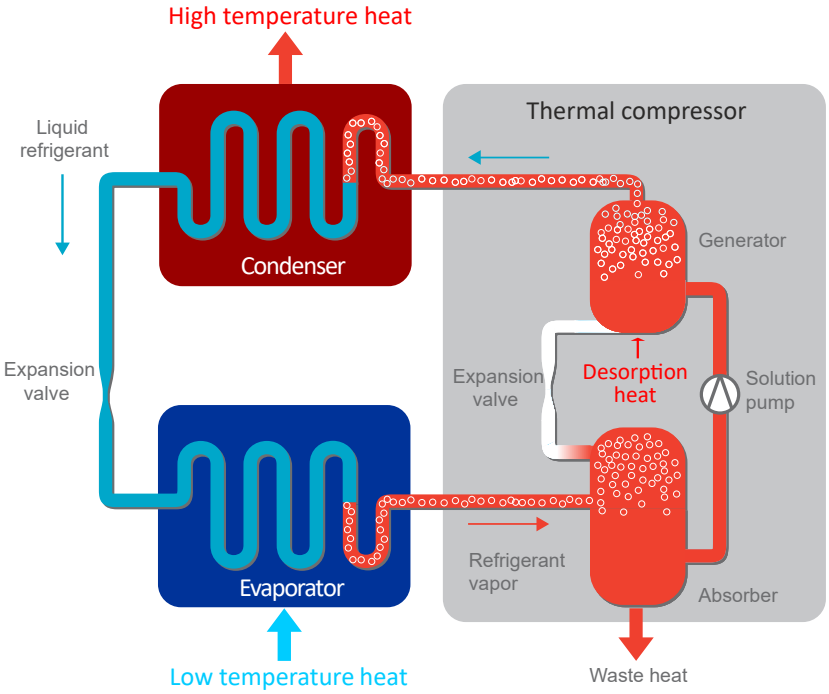

Figure 4: Flow diagram of a thermally driven refrigerating machine (absorption machine)

load changes. Therefore, it is often used for the "base load" and supplemented by easily controllable compression equipment. The economic viability of sorption plants also depends on the costs of heat procurement.

Types of refrigeration systems - direct and indirect

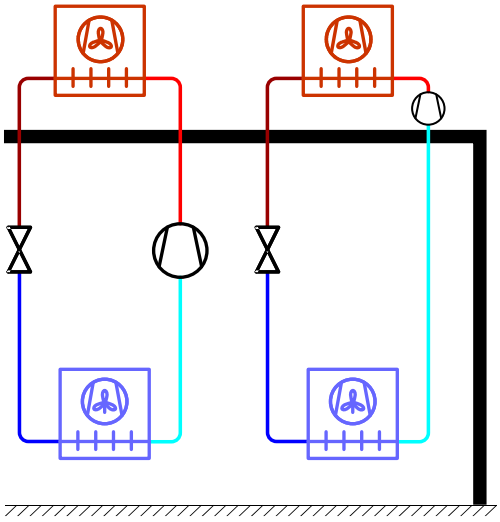

Figure 5: Installation situation of direct systems

Components and systems can be installed both inside and outside a building in direct systems. This means that the refrigerant lines are long and require a large refrigerant charge. In the event of leaks of (in the past very greenhouse-effective refrigerants), large quantities can thus escape. - In the past, the energy efficiency of such systems was low due to simple control technology and small heat exchanger surfaces.

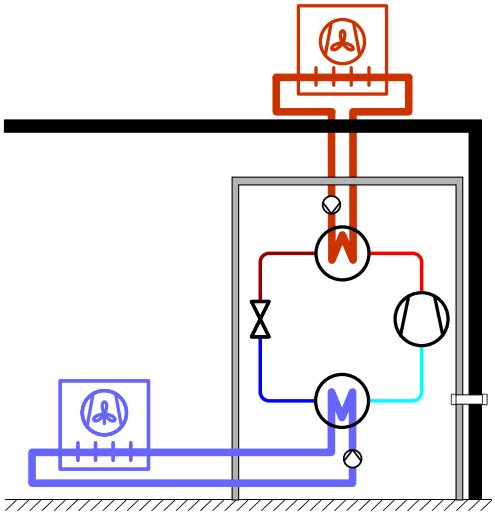

Figure 6: Installation situation of indirect systems

Indirect refrigeration systems work with additional refrigerant circuits and pumps through which heat is absorbed or released. This allows for short refrigerant lines and low charge quantities. When using capacity control and large heat exchanger surfaces, the energy efficiency of such systems can be very high. In addition, they can be operated with flammable/toxic refrigerants and be housed in encapsulated enclosures.

Position in the energy system

Unlike electricity, thermal energy can be stored easily. Buildings, storage rooms and even supermarket refrigeration systems can therefore be operated depending on the load situation in the electricity grid if controlled appropriately. This can reduce the need for electricity generation capacities. In addition, the power demand of the refrigeration systems can be reduced by clever utilisation of the storage capacity. If the electricity tariff includes a capacity price (kW) in addition to the energy price (kWh), the proportional costs for this can be significantly reduced.

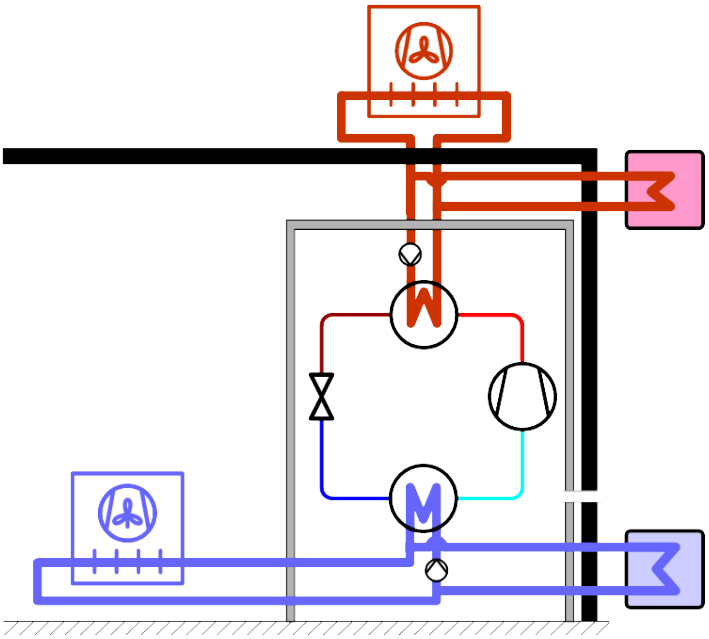

Figure 7: Indirect system with cold and heat accumulator

Especially for the supply of urban areas with extensive infrastructure (settlements, industry, commerce, trade and services), the provision of district heating and cooling can bring great efficiency and cost advantages compared to individual supply systems. For example, waste heat from electricity generation can be used for heating and cooling as needed.

A major barrier to the widespread use of these systems is the reluctance of market participants to connect to district heating and cooling networks. These obstacles can hardly be overcome by creating economic incentives alone. Other instruments must take effect here.

In Germany and a number of Member States of the European Union, spatial development plans are an important instrument to enable and promote the development and implementation of such concepts. In addition, in Germany, for example, there is the possibility under municipal law to exercise a connection and use obligation. In any case, the provider has a monopoly position. Acceptance is therefore ultimately only achieved if the centralised supply is also economically advantageous for the subscriber.

5 Further innovative technical solutions

Passive measures to reduce the cooling demand

The energy demand of refrigeration systems can be further reduced, especially with building physics measures such as insulation and shading.

Intelligent monitoring of refrigeration and air conditioning systems

A monitoring system was awarded the German Refrigeration Prize for a simple, interactive and cloud-based monitoring system.

The system detects and reports deficiencies and defects in the refrigeration process or a lack of refrigerant long before temperatures in cold rooms rise. Based on the transmitted measurement series and their representation in the log(p), h diagram, remote diagnoses can be made and service measures planned with little effort. The monitoring system carries out short and long-term measurements to monitor the performance and error messages of refrigeration systems. By means of thermodynamic calculations, critical system conditions are detected at an early stage and the operator is warned by SMS or e-mail. In this way, corrections can be initiated before problems arise. The system is cloud-based, so that error analysis can be carried out remotely, regardless of location. The collected data also helps to optimise refrigeration systems and thus increase energy efficiency. Thanks to a "plug and play" procedure, CoolTool monitoring can be connected to any refrigeration system, regardless of the manufacturer or refrigerant used.

WebDiagnose von Kälte- und Klimaanlagen

Refrigeration systems normally work reliably, but at some point contamination or wear can lead to higher energy consumption or malfunctions. Usually, in the event of a fault, a system analysis is carried out on site before measures can be taken.

In the context of the German Refrigeration Award 2918, an award was given to a company cooperation that had developed the tool "WebDiagnosis" to solve such problems quickly and effectively. This enables a technician to identify malfunctioning components via remote diagnosis and determine what work is actually necessary on site. In this way, unnecessary trips are avoided and maintenance work is carried out as needed. The WebDiagnosis system creates a "transparent system": All system data is available live in a cloud for remote diagnosis, while a fault management system automatically sends warning messages in case of abnormalities during operation. Indirectly, refrigerant loss can also be detected in this way. In parallel, the tool keeps a service and maintenance logbook for each connected system part. New and existing systems can be equipped with the necessary hardware. No additional software is required for access, as the data is visualised using a browser. The service partner can also access different properties via the internet portal.

6 Sustainability aspects

The use of modern, newly developed, almost emission-free refrigeration plants and systems can not only contribute significantly to achieving global climate protection and emission reduction goals, but also sustainability goals.

In 2015, the United Nations adopted the 2030 Agenda, a total of 17 goals for a better world. The fight against poverty and hunger, the improvement of the quality of life and access to modern forms of energy are at the forefront of these goals. Innovative refrigeration technology can also contribute to achieving these goals.

Especially in developing countries with high solar irradiation, the combination of sorption refrigeration systems with solar collectors or photovoltaically driven compression systems opens up the possibility of refrigeration in the first place and thus also the chance to improve food and health security.

Overall, refrigeration technology is of global importance for food preservation as well as for room air conditioning.

Refrigeration and air-conditioning systems have a long service life, not least in developing and emerging countries. The goal must therefore be to exploit all energy-saving and air-cleaning potential in new investments and renovations. Otherwise, the high climate and air pollution will remain for a very long time, or so-called "stranded investments" will quickly arise in the event of stringent implementation of future demanding specifications.

7 Political and economic framework conditions

The political framework conditions include legal regulations in the areas of

- climate protection,
- Energy (priority for the feed-in of renewable energies, specifications for permissible energy demand or energy conservation),
- air pollution control (especially gradual limitation of the use of HFCs),
- spatial planning, e.g. heating and cooling plans, connection and use obligation,
- Taxes and finances.

The economic framework conditions include, in particular, subsidy programmes and other incentive systems. Of particular importance are market-driven concepts such as "contracting" (see point 9.), because they can also function without state subsidies. But here, too, it is helpful to flank the application of such instruments, e.g. to minimise certain risks such as the failure of contractual partners (district heating or cooling supply from an industrial plant).

8 National and international promotion programmes

Targeted economic incentives (support programmes) are particularly effective:

Funding within the framework of the National Climate Initiative (NKI)

In Germany, funding is provided in particular for stationary refrigeration and air-conditioning systems as well as heat pumps that are operated with non-halogenated refrigerants if the systems are newly constructed or installed or if the refrigeration unit is newly constructed but the refrigerant system (water, brine, air distribution system) remains in place;

In the design of the programme for the promotion of refrigeration and air-conditioning systems with non-halogenated refrigerants, it had proven successful to initially orient the promotion towards the total reduction of greenhouse gases (indirect, direct emissions). After the relevant experience had been gained, it was then possible to specify technological requirements that were easy to administer.

From 2008 to the end of 2020, more than 3,500 refrigeration and air conditioning systems in companies and residential buildings were subsidised with around 223 million euros.

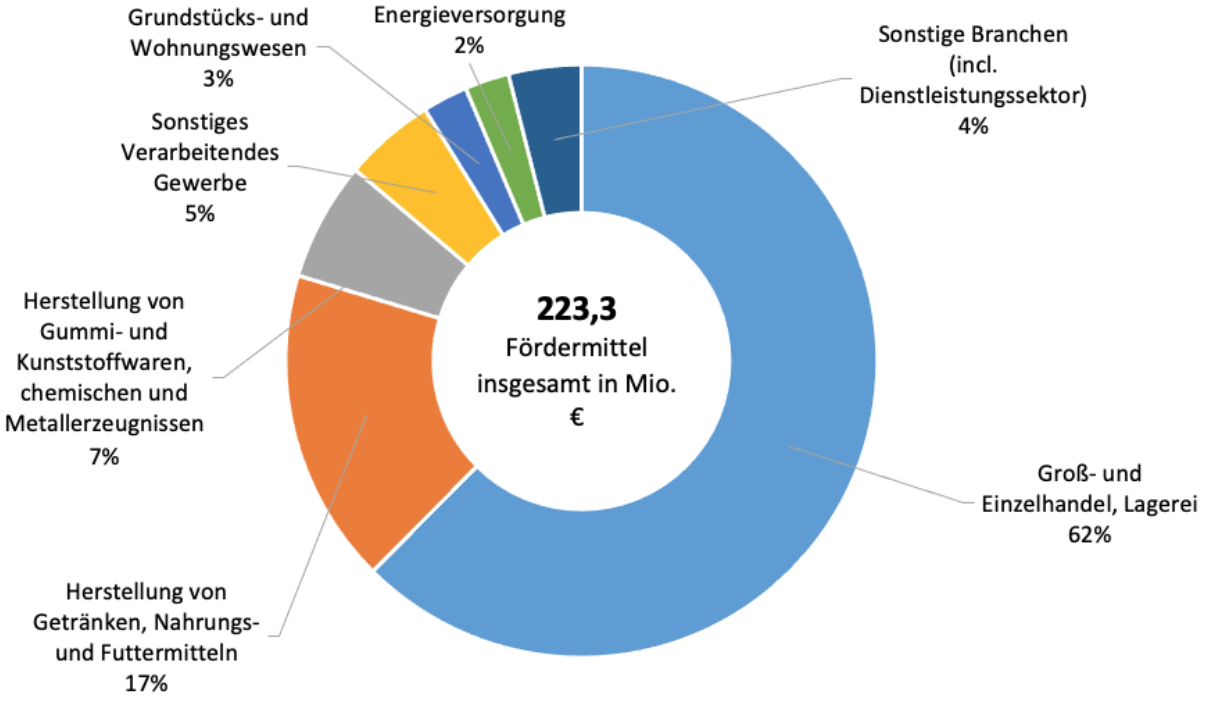

Figure 8: Refrigeration and Air Conditioning Directive of the Federal Ministry for the Environment: Share of subsidised installations by sector (2008 - 2020)

In the period from 2015 to 2017 alone, the new systems avoided around 34,000 t CO_2-äq per year. Cumulatively over 15 years, this is around 505,000 t CO_2-äq, 77 % of which is the result of the reduction in CO_2 emissions. About 23 % are avoided leakages of fluorinated refrigerants.

It should be noted from the authors' point of view that an emission factor of 530 gCO2/kWh was calculated according to the 2016 energy mix. It is expected to decrease to 413 gCO2/kWh by 2030. However, due to the feed-in priority of renewable energies, almost exclusively natural gas and hard coal-fired power plant capacities at the medium-voltage level will be taken off the grid as long as electricity is not exclusively fed in from renewable energies. For these, the emission

factor is significantly higher. Therefore, as long as fossil energy sources are included in the electricity mix, highly energy-efficient refrigeration plants make a significant contribution to climate protection.

The subsidy efficiency varies considerably between the plant types. It amounts to about 11 kg CO_2equ/Euro over a period of 15 years.

It can be assumed that without the subsidy, investment in modern refrigeration technology would decrease significantly. Another positive effect is that the vast majority of applicants continued to invest in climate protection and efficiency after the funding.

https://www.bundesanzeiger.de/pub/de/amtlicher-teil?0&year=2020&edition=BAnz+AT+30.11.2020

The regular awarding of the German Refrigeration Prize has proven to be a particularly cost-effective funding instrument. Three first to third prizes were awarded in each of three categories. Manufacturers and suppliers of the award-winning solutions use this successfully for their acquisition - also abroad. Details can be found in the Best Practice Archive.

Other promotion programmes in Germany

Mini CHP programme

From 2008 to 2020, mini CHP systems were also promoted, initially up to 50 kWel and from 2012 up to 20 kWel. Both subsidy programmes could be used in combination with sorption systems. This has also contributed to the development of plant combinations in this output range.

Electricity savings check for low-income households

The nationwide Electricity Saving Check programme brings together social and energy policy goals. It is funded by the National Climate Protection Initiative of the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety. It is a joint project of the German Caritas Association and the Federal Association of Energy and Climate Protection Agencies in Germany.

The electricity savings check is a free offer for recipients of social benefits and low incomes. Formerly long-term unemployed people, who are trained as electricity saving assistants, visit the households, replace energy guzzlers and thus reduce energy costs by an average of 174 euros per year. In addition, each household saves 240 kg CO_2/year. If the refrigerator or freezer is more than 10 years old and can save at least 200 kWh/year, the purchase of an efficient refrigerator can be supported with a 100 euro voucher. In this way, the household can save another 109 euros/year and another 184 kg CO_2. The project is thus a win-win-win for all involved:

- Households with low incomes save unnecessary electricity costs and receive additional comfort through new energy-saving products.
- Formerly long-term unemployed people are reintegrated into everyday working life.
- The climate benefits from simple CO_2 savings through low-investment measures and the climate protection goals of the German government are supported or implemented.

The successful programme has been running since 2008. 374,200 households have been advised, 618,110 t of CO_2 have been saved and more than 7,700 energy-saving helpers have been trained.

https://www.caritas.de/glossare/stromspar-check

Federal Ministry of Economics and Technology

The Federal Ministry for Economic Affairs and Energy supports companies, municipalities and homeowners in saving energy in a variety of ways.

https://www.deutschland-machts-effizient.de/KAENEF/Navigation/DE/Foerderprogramme/foerderprogramme-energieeffizienz.html

Funding within the framework of the International Climate Initiative (IKI)

The International Climate Initiative (ICI) is one of the most important instruments of the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) for international funding of climate protection and biodiversity. The IKI operates in the context of the United Nations Framework Convention on Climate Change (UNFCCC) and the Convention on Biological Diversity (CBD). It finances climate protection and biodiversity conservation in developing countries, emerging economies and countries in transition. IKI has committed to over 750 climate and biodiversity projects in more than 60 countries with a total funding volume of over 4.5 billion euros (2008-2020).

The partner countries are supported with IKI funds to implement and ambitiously develop the Nationally Determined Contributions (NDCs) anchored in the Paris Climate Agreement. This also includes measures to adapt to climate change and increase resilience to unavoidable consequences. In the area of biodiversity, the IKI supports partner countries in achieving the goals of the CBD in order to counter the dramatic loss of natural livelihoods worldwide. With its activities, the IKI also contributes to the implementation of the United Nations' 2030 Agenda for Sustainable Development with its 17 Sustainable Development Goals (SDGs).

Projects that are implemented in one of the following four funding areas are eligible for support:

- Mitigation of greenhouse gas emissions
- Adaptation to the impacts of climate change
- Conservation of natural carbon sinks, with a focus on reducing emissions from deforestaion and forest degradation (REDD+)
- Biodiversity conservation

https://www.international-climate-initiative.com/de/ueber-die-iki/foerderinstrument-iki

Examples of some international actors

Low Emissions Development Strategies Global Partnership (LEDS GP)

The Partnership aims to advance climate-resilient low emission development and support transitions to a low-carbon economy through coordination, information exchange and coop-eration among countries and programs working to advance low-emission economic growth.

LEDS GP delivers support i. a. through its regional platform, the Latin America and the Carib-bean Partnership (LEDS LAC). One target is to strengthen support for low-emission climate-resilient development in all regions,

https://ledsgp.org/?loclang=en_gb

Latin American Development Bank CAF

An important player in the field of climate protection in Latin America is the Latin American Development Bank CAF (Corporacion Andina de Fomento) - Banco de Desarrollo de América Latina. The aim of the development bank is to promote sustainable development and regional integration through financing. This includes public and private sector projects in Latin America as well as technical cooperation and other specialised services.

https://de.qaz.wiki/wiki/CAF_%E2%80%93_Development_Bank_of_Latin_America

KfW in Latin America and the Caribbean

KfW Development Bank, on behalf of the Federal Government, is focusing on protecting the environment and climate, as Latin America is an important partner in international climate policy matters. E. g. renewable energy is promoted. In 2019, KfW Development Bank made new commitments in the Latin America/Caribbean region amounting to around EUR 8.6 million.

https://www.kfw-entwicklungsbank.de/International-financing/KfW-Development-Bank/Local-presence/Latin-America-and-the-Caribbean/Peru/

9 Market-based financing models

Apart from state subsidies by lowering the interest rate, paying subsidies and reducing taxes, contracting is the most important market-based instrument. The aim is to reduce energy consumption and energy costs.

A distinction is made between two main models

- energy supply contracting (the most widespread, accounting for over 80% of applications) and
- energy-saving contracting.

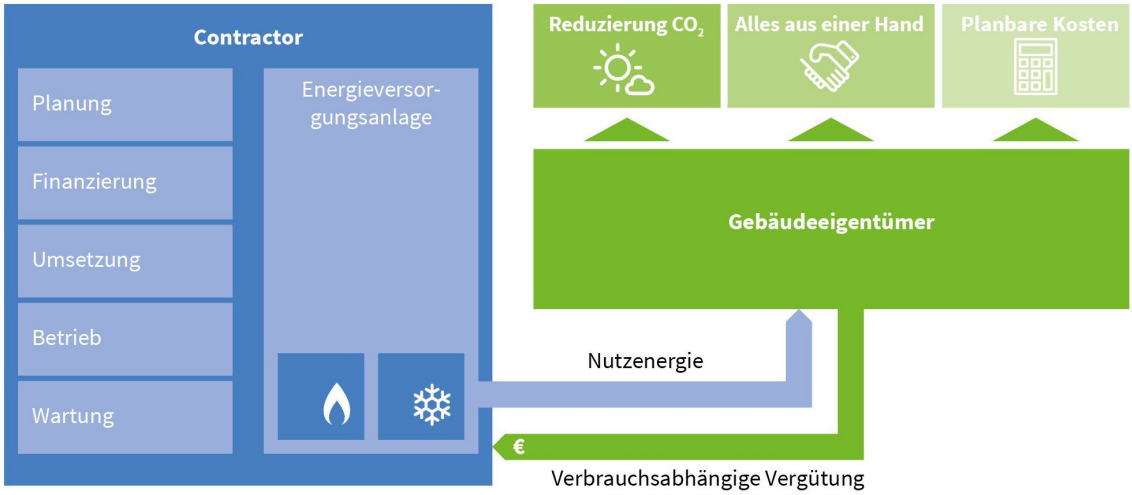

Figure 9: Schematic representation of energy performance contracting (ELC) - Source: dena

In addition to these two models, there are also mixed forms and modified models. These include, for example, technical facility management and financial contracting, as well as "intracting" as a public sector model.

The Technical Rule "GEFMA 540:2007-09 Energy Contracting - Success Factors and Implementation Guidelines, Edition 2007-09" contains information on the design of contracting agreements.

10 Material intensity and resource efficiency potential in refrigeration and air conditioning technology

The number of refrigeration machines and heat pumps in Germany is very high, and the associated energy demand has risen continuously in recent decades:

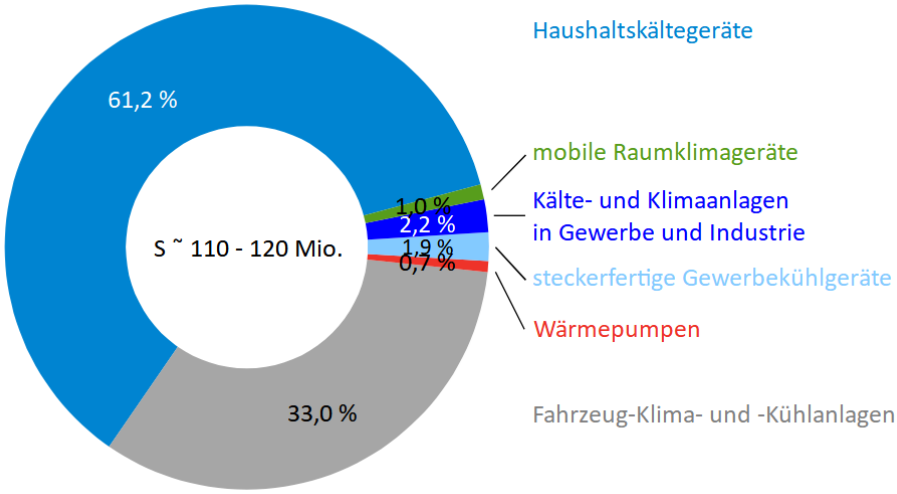

Figure 10: Number of chillers and heat pumps

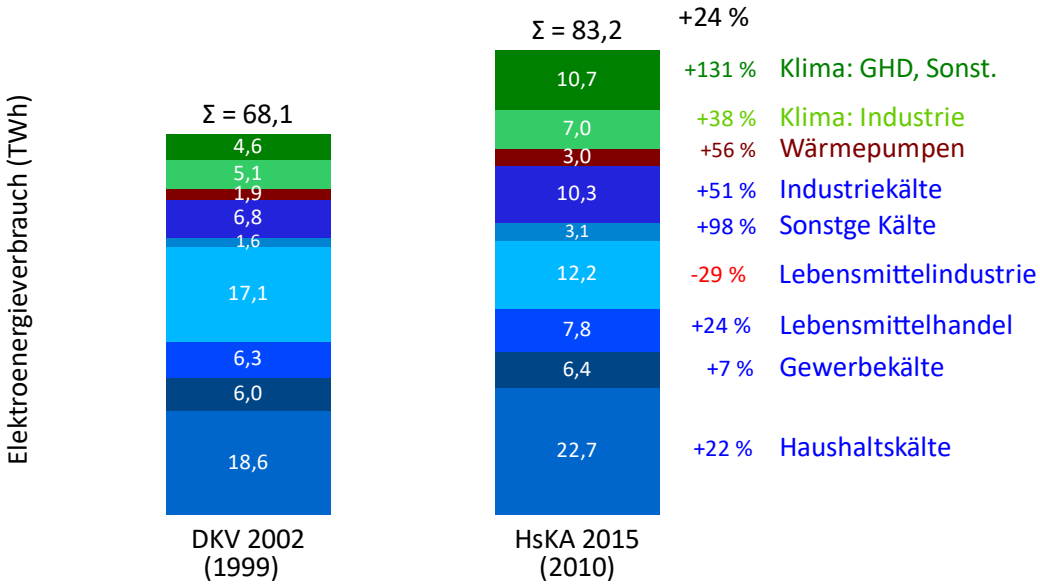

Figure 11: Energy demand for the technical generation of refrigeration (+heat pumps), Germany

Refrigeration systems contribute significantly to global warming with indirect CO2 emissions from electricity generation with fossil fuels. But direct emissions from synthetic refrigerants as a result of leakages and losses during installation, maintenance and disposal also have a negative impact on the climate.

In 2016, the global community decided to phase out the use of synthetic refrigerants that have a greenhouse effect (see Figure 2 for South and Central America). If investments in energy-efficient refrigeration technology are necessary, natural refrigerants (hydrocarbons such as propane as well as carbon dioxide and, for large capacity plants, ammonia) are to be used. In 2017, the Kigali Cooling Efficiency Programme (K-CEP) was launched, which aims to increase energy efficiency in order to limit the global energy demand for the technical provision of cooling, which will continue to rise sharply in the future.

Saving energy and thus costs can be an important driver for the targeted investments, also with a view to implementing the Kigali Amendment and the K-CEP.

Copper refrigerant pipes

The consumption of copper for the production of plants and lines is very high. The available copper resources will be stretched to their limits in the coming decades in competition with electrical applications.

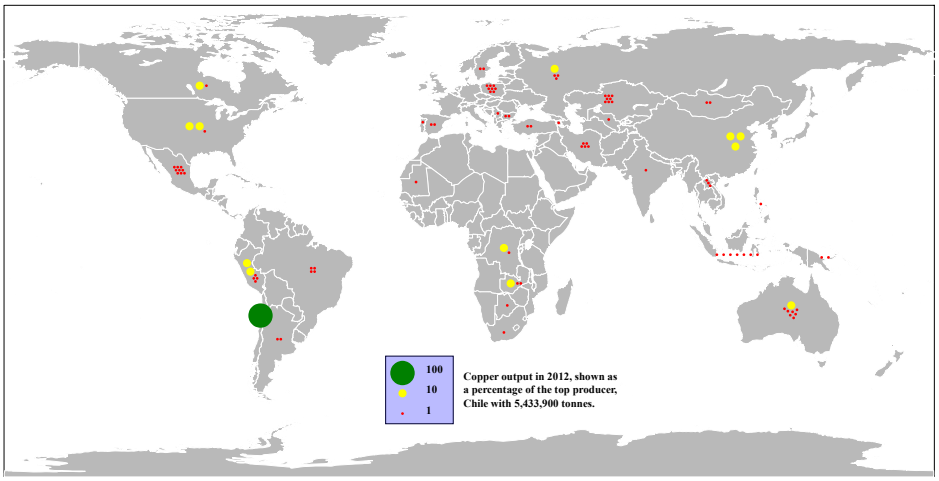

Figure 12: Globally limited number of copper mines

In recent years, it has become apparent that the extraction of copper has already reached a global maximum or is about to do so. Refrigeration technology is thus faced with the challenge of using alternative materials for refrigerant lines in the medium to long term.

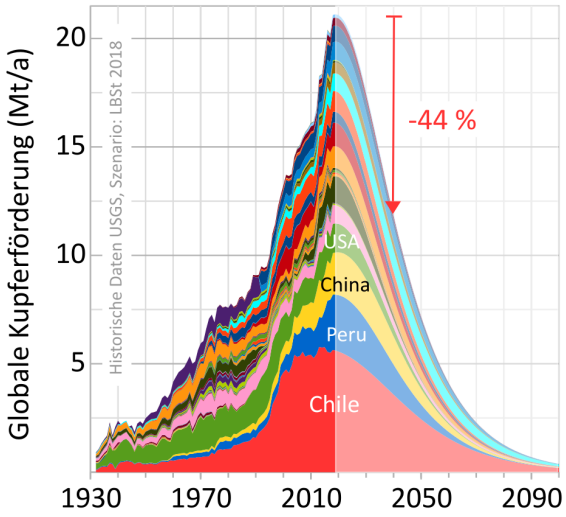

Figure 13: Past and projected future production of copper

11 Take-back, disposal, reuse of materials, status

Disposal of HFC-containing, environmentally harmful refrigeration appliances

Since 2019, a collection rate of 65% for electrical and electronic equipment has been mandatory throughout the EU. This also includes old refrigeration appliances with the refrigerants they contain. When recycling old refrigeration appliances, European minimum standards are to be complied with (CENELEC standards EN 50625-2-3 and TS 50625-3-4). Compliance with these standards ensures that 90 % of the climate-damaging substances contained are removed. In addition, state-of-the-art refrigeration treatment (EU Directive 2012/19/EU) is guaranteed.

The disposal of refrigeration appliances is regulated by the Electrical and Electronic Equipment Act (ElektroG) and the Technical Instructions on Air Quality Control. Further regulations are expected in the future General Administrative Regulation on the Implementation of the Conclusions on Best Available Techniques for Waste Treatment (draft bill of 28.01.2020) and Waste Electrical and Electronic Equipment Treatment Ordinance (draft bill of 16.09.2020).

Sustainable reprocessing of used refrigerants

The first step is the recovery, i.e. the removal and storage of fluorinated greenhouse gases from refrigeration systems. One option is then to recycle them, i.e. to reuse them after a simple cleaning process. Reprocessing involves treatment in such a way that equivalent properties to an unused substance are achieved. However, permanent conversion or decomposition into non-fluorinated greenhouse gases can also take place. The added value of reprocessing lies in the recycling of already used operating materials and an extension of the service life of existing systems. Reprocessed refrigerants are quota-neutral and can contribute to phase-down. - The refrigerants R-404A, R-507A, R-134a, R-410A, R-407C and R-422D can be remanufactured. In 2021, it should be possible to reprocess other synthetic refrigerants relevant to the market (including A2L).

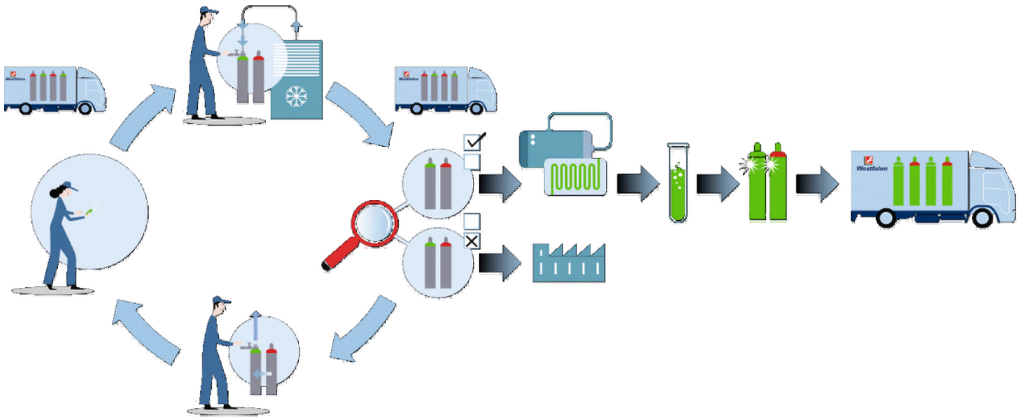

Figure 14: Recovery and reprocessing of refrigerants
(Source: Presentation by Ms Anja Honerpeick, Westfalen AG, at Chillventa 2020)

The legal basis is Regulation (EU) No 517/2014 of the European Parliament and of the Council of 16 April 2014 on fluorinated greenhouse gases and repealing Regulation (EC) No 842/2006.

12 Education and training

The technical progress in refrigeration technology is enormous. In addition, the knowledge and capacities for consultation, planning, preparation and implementation (production and installation) are often insufficient. Manufacturers and craftsmen are not always in a position to carry out systems with high technical requirements (e.g. CO_2 systems in stainless steel or in high-strength copper). As a result, plants are not always built according to the state of the art. This also requires additional activities in education and training, from university education to vocational training. Equally necessary is the provision of special courses geared to the respective target group, both nationally and adapted to the needs of transition and developing countries.

13 Manufacturer

For more information see website

https://www.renac.de/projects/current-projects/low-emission-cooling

14 Best Practices

For more information see website

https://www.renac.de/projects/current-projects/low-emission-cooling

15 Measures for the implementation of additional investments in climate-friendly refrigeration technology.

Energy saving and phase-out of F-gases must be advanced in harmony with each other. Both cannot be implemented without investments in plant technology.

A bundle of measures is necessary. These include in particular

- The creation or further development of the necessary political and economic framework conditions,
- appropriate industrial and craft capacities
- targeted education and training, and comprehensive information,
- motivation and public relations work by all relevant actors.

For the improvement and expansion of education and training, programmes for the establishment and maintenance of appropriate facilities as well as special curricula are required.

Information, motivation and public relations work must be a concern of all actors active in the various fields. It is also important to specifically recruit multipliers and know-how carriers.

The use of modern information and communication technology can play an important role in this - especially in view of the current Corona pandemic.

The results of the workshop will be summarised in a final report. This will also be published on the project website in the near future.

https://www.renac.de/projects/current-projects/low-emission-cooling

DKV can support with the „Working Group Refrigeration“ government bodies, associations, institutions and companies in a variety of ways, e.g. through advice, information campaigns, contacts with companies and an expert database.

Berlin and Rühlow, 5/3/2021

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