Daikin's Policy

and Comprehensive Actions on the Environmental Impact of Refrigerants

Daikin is constantly mindful of the environmental and climate change impact of our products, and we are committed to delivering cost-effective solutions to meet these challenges.

For example, we have a long history of continuously and regularly improving the energy efficiency of our air conditioning and heat pump products as well as extensive experience in adopting refrigerants with a lower environmental impact.

Solving the global environmental challenges will require innovation and various pathways to provide environmentally progressive solutions. To reduce the environmental impact of a refrigerant throughout its lifecycle, we constantly evaluate various aspects comprehensively to select the appropriate refrigerant for each application. Daikin also proactively adopts new-refrigerants with the least environmental impact, and Daikin fully supports the historic 2016 Kigali Amendment to the Montreal Protocol for a global phase-down of hydrofluorocarbons (HFCs) in total global warming potential (GWP) volume.

Daikin's Direction for Mainstream Refrigerants

R-32

R-32

R-32, R-1234ze(E), R-1233zd(E), Other HFOs, HFO blends

R-32, CO_2

R-32

R-32, R-407H, HFOs, HFO blends, CO_2, Hydrocarbon

Residential

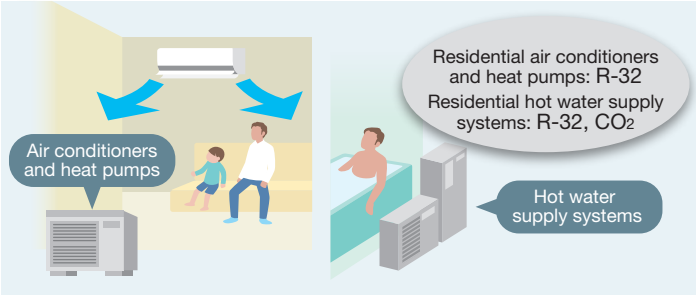
Commercial, Industrial

Note: Other refrigerants not listed above are also applied in products outside of Daikin's portfolio.

Daikin Products in Everyday Life and

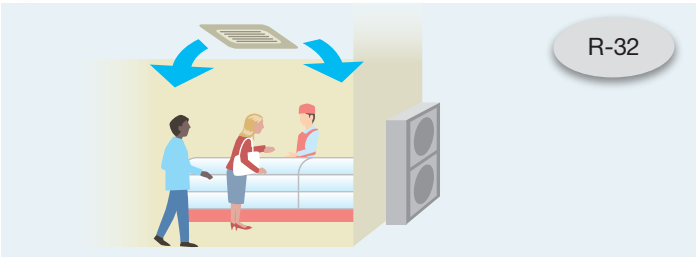
Daikin products are used throughout our daily life in homes, retail establishments, offices, hotels, factories, distribution warehouses, ships, and many other spaces.
Since the usage of equipment differs depending on the space and environment, it is important to select the refrigerant accordingly.

1 Residences



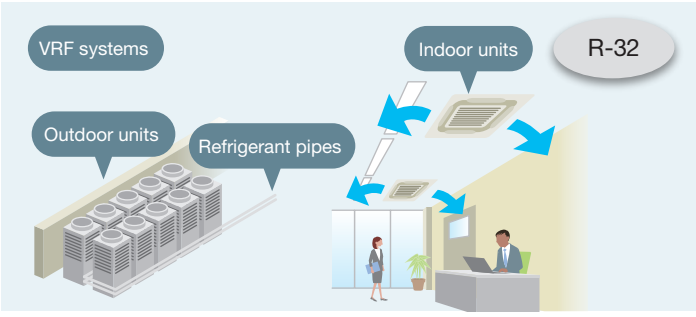
Daikin has identified R-32 as a beneficial refrigerant for residential air conditioners and heat pumps, and has been launching R-32-products into the worldwide market.
For residential hot water supply systems, we consider it is appropriate to use R-32 or CO_2 depending on the needs of the system. We keep proactively developing products to meet different needs.

2 Shops



Daikin has identified R-32 as a beneficial refrigerant for commercial air conditioners and heat pumps, and has been launching R-32-products into the worldwide market.

3 Buildings (individual spaces)

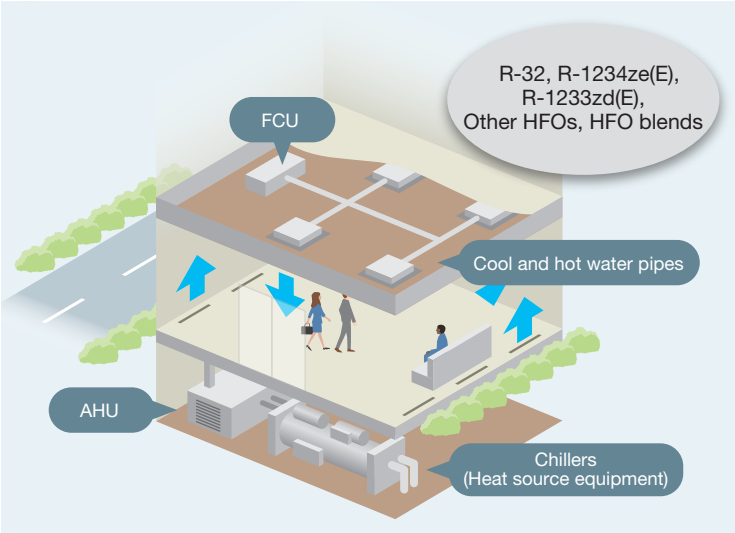


Multi-split packaged air conditioners for commercial buildings that use variable refrigerant flow enable a connection of multiple indoor units to outdoor units and individual climate control settings for each zone. Daikin has identified R-32 as the most appropriate refrigerant for this type of equipment.

Their Refrigerant Choice

: Direction of future refrigerant selection

4 Buildings (large spaces)



Chilled/hot water generated by a chiller and heat pump passes through the pipes in a building and enters terminal units such as Air Handling Units (AHU) and Fan Coil Units (FCU) to cool/heat air. Chillers are typically located in the mechanical room or on the roof. It is important to select appropriate refrigerants that are suitable for various compressor types and applications depending on system and capacity.

5 Refrigeration (Cold chain)

Daikin provides a diverse product line-up for all aspects of the entire cold chain that covers food production and processing, transportation, storage warehouses and stores. Since there are a wide variety of applications and temperature ranges, it is important to select the appropriate refrigerant for each equipment.

Key Considerations for Refrigerant Choice

At Daikin, we assess four basic factors when making the best balanced refrigerant choice for each application: safety, environmental impact, energy efficiency and cost-effectiveness.

Daikin's View: Evaluation Index of Refrigerant Selection (common for all application)

Safety

A refrigerant must be safe to use through the entire lifecycle of the equipment. This includes transport, storage, installation, use, servicing, recovery and recycling.

This means that possible hazards such as toxicity or flammability characteristics, as well as the risk of human error, must be evaluated for each type of application. While non-flammable and low-toxicity refrigerants may have safety benefits, they may not be ideal from an environmental point of view. In addition, some refrigerants may be acceptably safe for one type of equipment but not sufficiently safe for others. Thorough risk assessments are therefore needed for each application.

Environmental Impact

A core consideration in refrigerant choice is its environmental impact. This impact includes a refrigerant's ozone depleting potential (ODP*1) and its potential global warming impact: this is expressed as its CO_2 equivalent, which is the refrigerant quantity multiplied with its global warming potential (GWP*2). Heat transfer capacity and heat exchange efficiency of refrigerants are also important characteristics that result in reductions in refrigerant quantity and allow more compact equipment design. Environmental considerations also include the impact of the refrigerant production process and a refrigerant's potential to be recycled and reused.

Energy Efficiency

Daikin carefully considers a refrigerant's potential to improve the energy efficiency of its equipment in both cooling and heating functions across an extreme range of climate conditions including very hot and very cold environments. This is an important consideration as energy consumption for cooling, heating and refrigeration has a substantial impact on the total energy consumption of buildings and countries. Depending on how electricity is generated in each country, its efficient use also has a large indirect impact on climate change by reducing CO_2 emissions. Therefore, energy efficiency is critical in choosing the right refrigerant for a given application.

Cost-Effectiveness

It is important to provide consumers access to affordable solutions for their homes and businesses. In addition, in order to reduce the environmental impact, cost-effectiveness should be considered in terms of dissemination. For instance, is the refrigerant easy and inexpensive to install and maintain? Does the refrigerant allow for compact cost-efficient designs to minimize investment costs? Does a refrigerant contribute to reducing overall system operation and maintenance costs? Is recycling of the refrigerant feasible and cost-effective? Would possible risk mitigation measures be cost-effective? These are factors to consider when selecting cost-effective refrigerants.

**1 ODP: "Ozone-depleting potential"– A value indicating the intensity of ozone layer destruction by various substances based on the ODP of CFC-11 as a standard.*
**2 GWP: "Global warming potential"– A value indicating the degree of contribution to global warming of various GHGs based on CO_2 as a standard. (Example: R-410A: 2,090, R-32: 675)*

Daikin's Challenge in Achieving a Sustainable Refrigerant and Equipment Lifecycle

In addition to refrigerant selection, how a refrigerant is managed through its lifecycle, including recovery and reclamation, is also very important. And while we strongly support the Kigali Amendment, and the effort to phase down HFCs in CO_2 equivalent, GWP is not the only measure for evaluating refrigerants, even within the Kigali framework. A comprehensive approach, including leakage prevention, recovery, reclamation and destruction is required. We will also continue to improve the energy efficiency of each of our products to reduce their overall environmental footprint.

Action on Refrigerant and Goals

1 Role as a Refrigerant Manufacturer

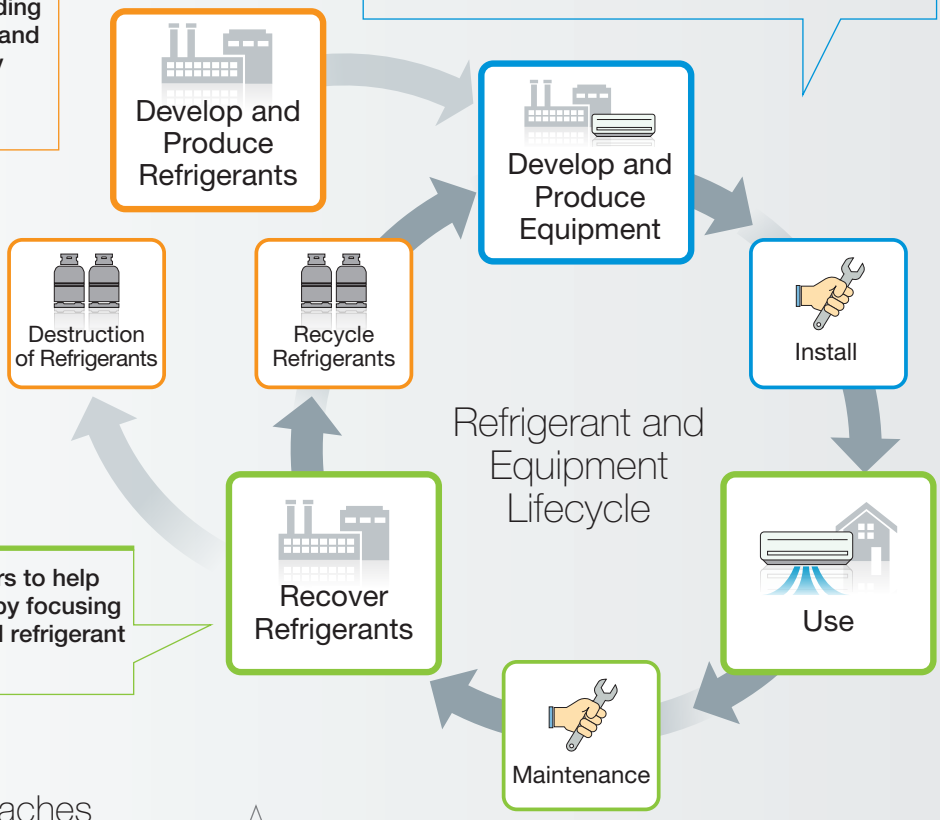
Daikin commits to utilizing and providing refrigerants that meet diverse needs and aims to achieve an environmentally conscious refrigerant lifecycle by reclamation and recycling.

2 Role as an Equipment Manufacturer

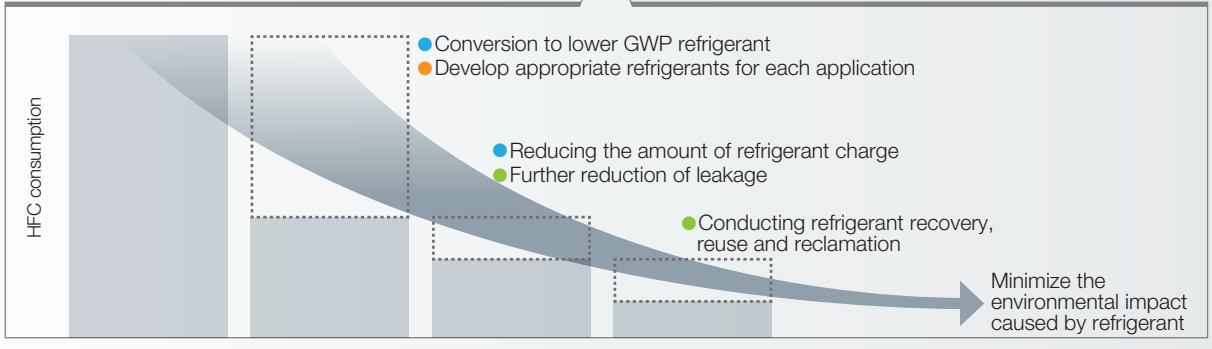
Daikin continues to improve the energy efficiency of equipment and systems, and to select optimal refrigerants that meet various needs.

3 Collaborating with Other Stakeholders

Daikin works with related stakeholders to help achieve a self sustainable approach by focusing on refrigerant leakage prevention and refrigerant recovery.



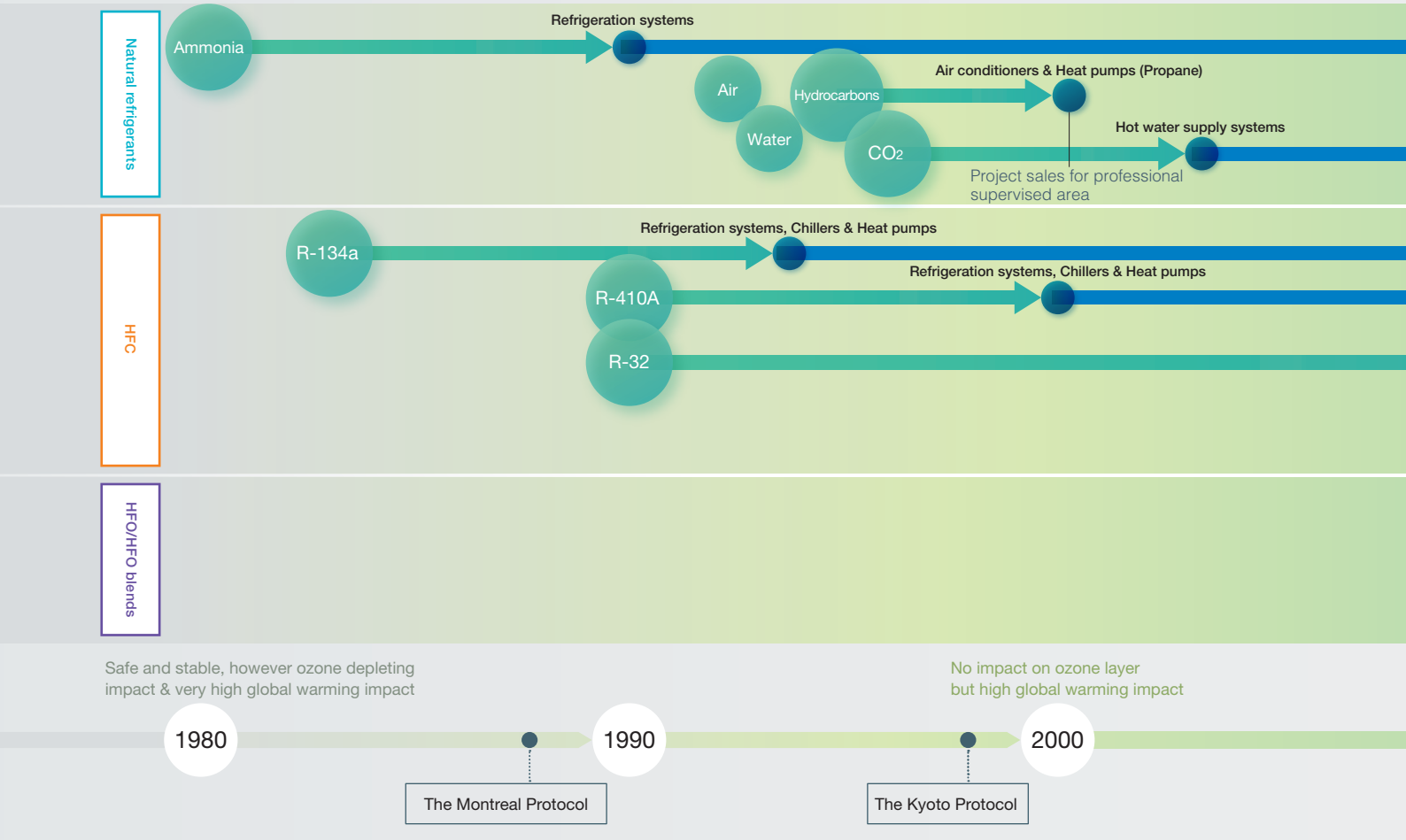
Comprehensive approaches toward HFC phase down



Daikin's Expertise in Reducing Environ Heating and Refrigeration Equipment

Daikin has a nearly 100-year history of global innovation leadership and experience reducing the environmental impact of cooling, heating and refrigeration technology, as well as a unique position and expertise that comes from both manufacturing equipment and refrigerants. We have been conducting forward-looking research and development, and assess various refrigerants to select the appropriate refrigerant for each application.

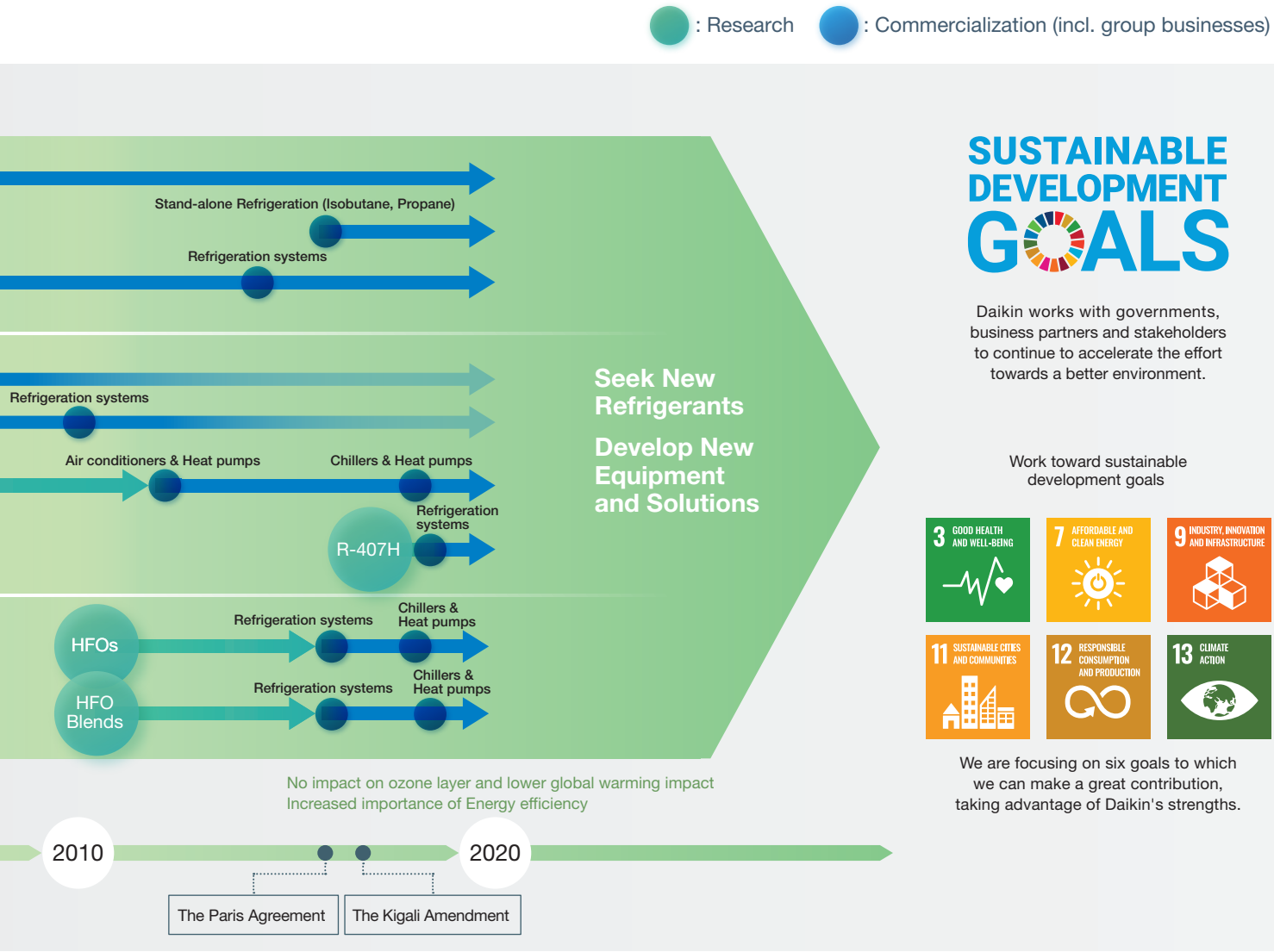
Refrigerant Changes – a History of Continuous Innovations



Daikin's position on the amendment to the Montreal Protocol (the Kigali Amendment)

- Daikin is aligned with the Kigali Amendment for an HFC phase-down under the Montreal Protocol.
- The main tenet of Daikin's policy is "diversity of refrigerants" and reducing impacts through a "lifecycle approach."
- Daikin has identified R-32 as a very beneficial refrigerant for single and multi-split air conditioners, packaged air conditioners and heat pumps. Daikin believes that the transition to R-32 will help to meet both the HFC phase down schedule and the HCFC phase out schedule. Daikin is now in the process of evaluating and identifying suitable refrigerants for other applications.
- To mitigate future global climate change, it is important to take a "Sooner, the Better" approach. As soon as the most balanced and feasible solution for an application is found, Daikin will commercialize and disseminate the technology to contribute to the efforts to mitigate global climate change.

mental Impact of Cooling,



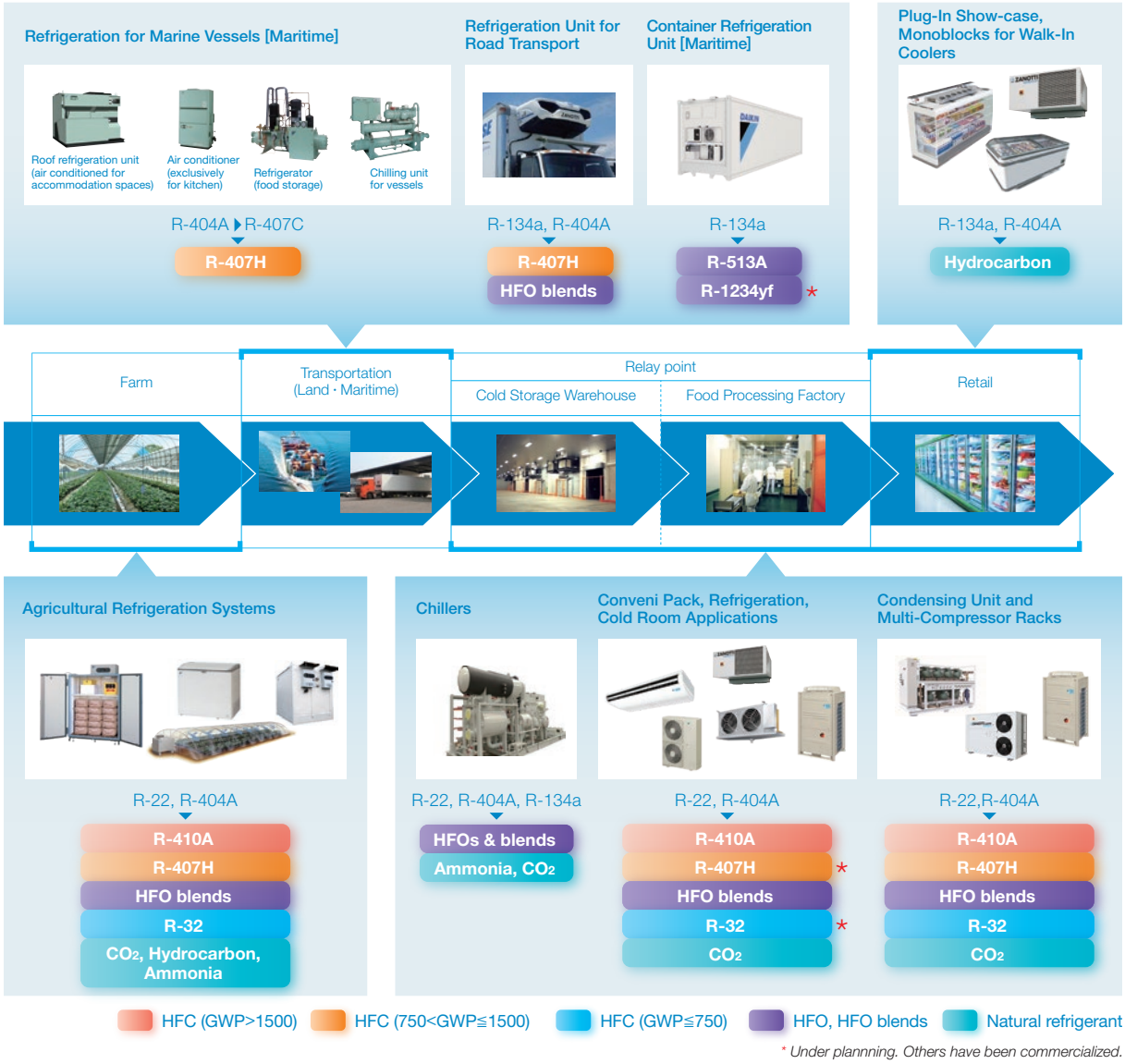
The Kigali Amendment :

The Kigali Amendment is a key step in the evolution of refrigerants to ensure that their use considers their impact on the environment. This landmark agreement mandates a global reduction in the production and consumption of HFCs in CO_2 equivalent. HFC reduction in CO_2 equivalent began in 2019 for developed countries which must reduce 85% of HFCs in CO_2 equivalent by 2036, and 2024/2028 for developing countries, which have to achieve 80% of HFCs in CO_2 equivalent reduction by 2045 or 85% by 2047.

Refrigeration Systems

In order to ensure the stability of the food supply network, Daikin has been developing and selling various types of refrigeration systems used throughout the entire cold chain.
We select the appropriate refrigerants depending upon the application type, temperature range, safety requirements and region. It is also very important to consider reducing total greenhouse gas emissions in the entire lifecycle of the system including energy efficiency.
To further our efforts to mitigate the impact of global warming, Daikin will continue to evaluate and utilize the next best alternative refrigerant solution considering a total assessment of the environment, energy efficiency, safety and cost-effectiveness.
We will also strive to contribute to solving important social issues such as food loss and food waste by supporting a stable cold chain around the world.

Daikin's appropriate refrigerant selection for Refrigeration Equipment

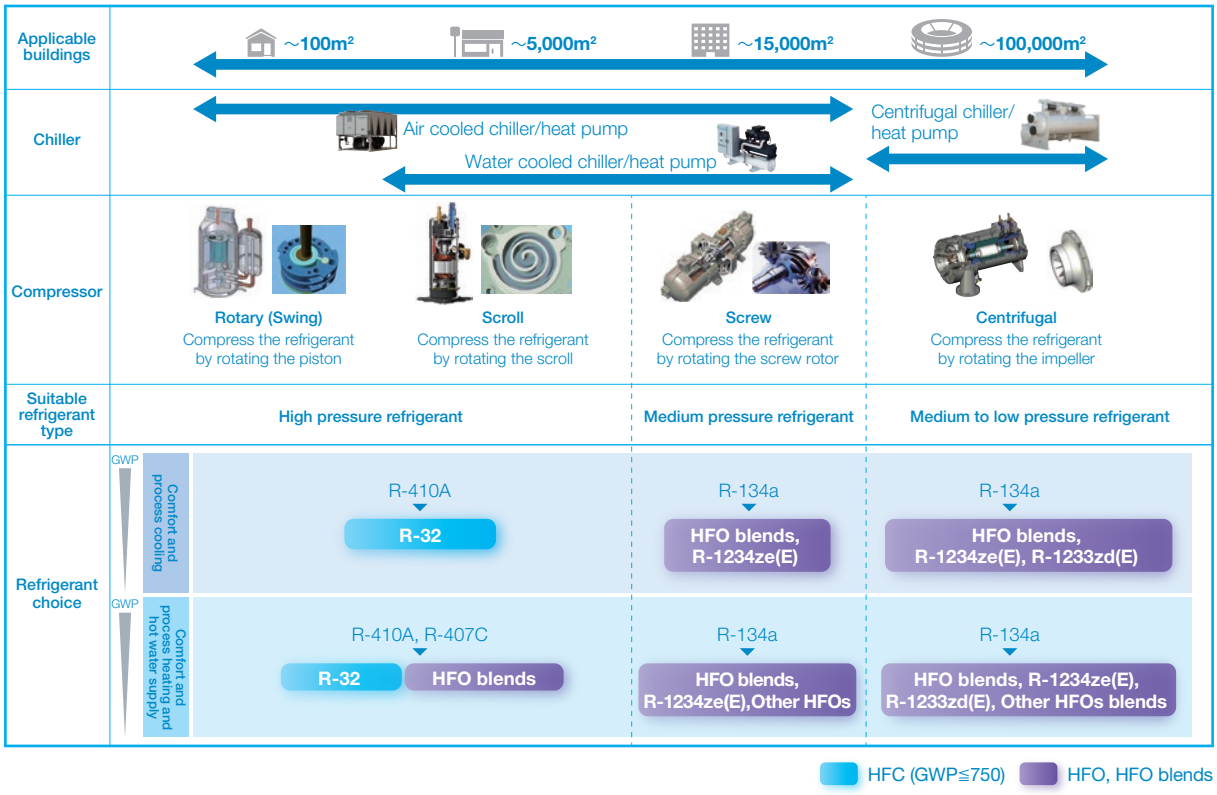


* *Under plannning. Others have been commercialized.*

Applied Products
(Chillers)

For applied products, different types of compressors are adopted to provide suitable solutions in different applications, which include extensive capacity range from several kilowatts to several thousand kilowatts, and a wide temperature range from comfort and process to hot water supply.
In terms of refrigerant selection, we are adopting appropriate refrigerants that are appropriate for each compressor type and application by satisfying both function and performance requirements, while ensuring environmental friendliness and safety.
In addition to considering the impact of the global warming potential of each refrigerant itself, we will maximize our contribution to the mitigation of global warming throughout the product lifecycle by improving our products and service solutions, which can lead to the reduction of refrigerant charge, leakage, and power consumption.

Applied product applications and new refrigerant choices



To further our contributions to the mitigation of global warming in regard to total lifecycle environmental impacts, Daikin will engage in the following undertakings:

〈**Products**〉
- Develop refrigerants and equipment tailored to each application
- Develop new heat exchanger designs that can reduce refrigerant charge
- Improve technologies such as inverter that realize energy savings

〈**Service Solutions**〉

The lifecycle of applied products is relatively longer than other equipment types, thus the maintenance service solution is an important factor to contribute to the reduction of environmental impact.
- Develop sensing technologies that detect refrigerant leakage.
- Provide timely maintenance service and energy-saving system controllers by utilizing remote monitoring of product operating data, in order to keep the product running constantly with high efficiency.

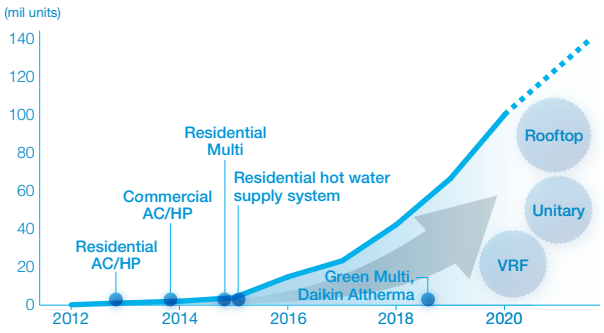
Air Conditioners and Heat Pumps

(Split type and single package type air conditioners and heat pumps, and residential hot water supply systems)

Daikin has assessed various refrigerants—including R-32, blends, natural refrigerants, and HFOs—based on four criteria: overall environmental impact, energy efficiency, safety, and cost-effectiveness. We have utilized many of these refrigerants in selected applications. After examining its key properties, Daikin has concluded that R-32 is a better refrigerant than others for direct expansion type cooling and heating equipment including single package products. We have been launching R-32 products into the worldwide market in many regions.
Daikin was the first to introduce air-conditioning and heat pump technology utilizing the refrigerant R-32, starting in Japan in November 2012. As of March 2025, we have sold approximately 58 million units globally. Together with other manufactures, approximately 370 million units of R-32 equipment are estimated to have been sold globally*1. If all presently used R-410A refrigerant were replaced by R-32, the total CO_2 equivalent impact of HFCs could be reduced by up to approximately 800 million tons-CO_2 compared to business as usual scenarios, along with a significantly reduced amount of indirect CO_2 emissions due to lower energy consumption. This is the equivalent of 50% of the annual carbon absorption provided by the Amazon rain forest. We will continue to challenge ourselves in the technical development of R-32 technology, and contribute to standard making to expand range of our products using R-32.

*1 Daikin's estimation as of March 2025.

Daikin has sold approximately 58 million units of R-32 Residential AC/HP worldwide.
Total 370 million units of R-32 Residential AC/HP have been sold together with other manufacturers.



For residential hot water supply systems, R-32 or CO_2 is used depending on the needs of the system.
Especially in systems that combine the hot water supply with heating, R-32 is more appropriate.
We are proactively promoting the development of a variety of products by selecting suitable refrigerants that meet different needs for various applications.

Environmental Vision 2050

Daikin has formulated its Environmental Vision 2050 to contribute to the resolution of global environmental problems. We aim to reduce greenhouse gas emissions generated throughout our business activities and the entire lifecycle of our products including services to get to net zero emissions by 2050.

Environmental Vision 2050

- We will reduce the greenhouse gas emissions generated throughout the entire lifecycle of our products.
- We are committed to creating solutions that link society and customers as we work with stakeholders to reduce greenhouse gas emissions to net zero.
- Using IoT and AI, and through open innovation attempt, we will meet the world's needs for air solutions by providing safe and healthy air environments while at the same time contributing to solving global environmental problems.

Toward Achieving Environmental Vision 2050

We will create added value in air for the world and achieve net zero greenhouse gas emissions through our products and solutions.

Through products | **Through solutions** | **Through the power of air**

Approach towards net zero greenhouse gas emissions

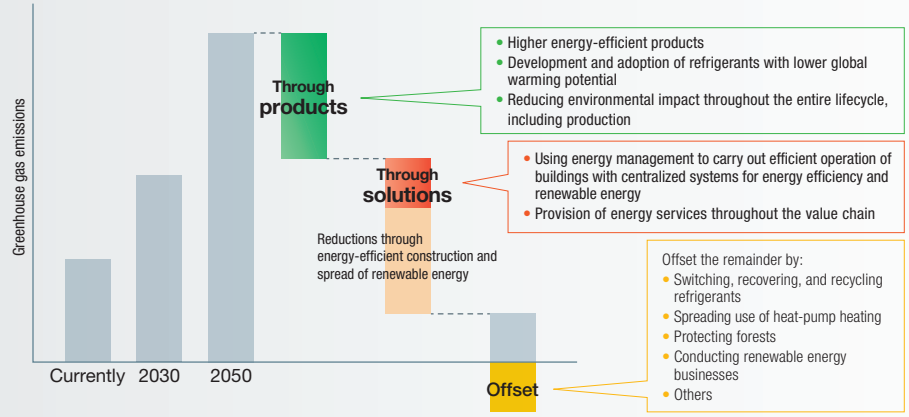
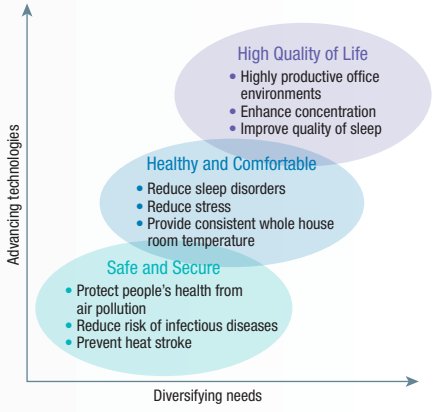


Image: The power of air



If you need more information, you can also check the details on our sustainability website.

https://www.daikin.com/sustainability

Main Contents:

- Daikin's Policy on the Environmental Impact of the Refrigerant
- Environmental Vision 2050
- Sustainability Report

This policy paper contains statements regarding the future plans and strategies of Daikin. These statements are based on judgments made by the Company on the basis of information known at the time. Therefore, readers should refrain from drawing conclusions based only on these statements. The future outlook may be influenced by laws and regulations of each country and technology trends. For these reasons, these forward-looking statements are subject to uncertainty.

DAIKIN INDUSTRIES, LTD.

Inquiries

Corporate Sustainability Office

Osaka Umeda Twin Towers South, 1-13-1, Umeda, Kita-ku, Osaka, 530-0001, Japan

PHONE: +81-6- 6147-9460

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