DAIKIN

# Environmental activities report

Daikin Europe N.V.
EMEA region • 2023

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Term covered: Financial year 2022: from 1 April 2022 to 31 March 2023
Daikin Organisations Covered: Daikin Europe N.V. group and its consolidated subsidiaries
If you are interested in reading about the environmental and other CSR activities of Daikin worldwide, please visit : www.daikin.com/csr/index.html



# M

## Message from Daikin management

Cooling, heating and refrigeration products contribute to higher quality lifestyles and economic growth and are a key part of today's society. However, the resulting growth of electricity consumption and refrigerant emission causes concerns due to their environmental impact, such as climate change.

At Daikin, we believe that a company cannot grow its business unless it contributes to solving environmental problems. We therefore develop and promote products and solutions that use energy-efficient technology and refrigerants with lower global warming potential.

In the spirit of the Paris Climate Agreement and the Sustainable Development Goals of the United Nations, the worldwide Daikin group formulated a long-term vision to reduce lifecycle greenhouse gas emissions by 2050, aiming to achieve net zero greenhouse gas emissions, and has specified concrete mid-term goals to be achieved by 2025 and 2030. Last fiscal year 2022, using 2019 as the baseline, Daikin globally achieved a 14% reduction compared to a business as usual scenario.

Daikin Europe N.V. together with its subsidiaries, contributes to these global Daikin goals by taking various actions in the European, Middle East and African region. This report presents you with examples of environmental initiatives taken in our factories, our research and development centres, and our sales, service and supporting organisations. We therefore would like to thank all Daikin employees in every region for their contributions and we hope you enjoy reading this report.

***Toshitaka Tsubouchi,***
***President***
***Daikin Europe N.V.***

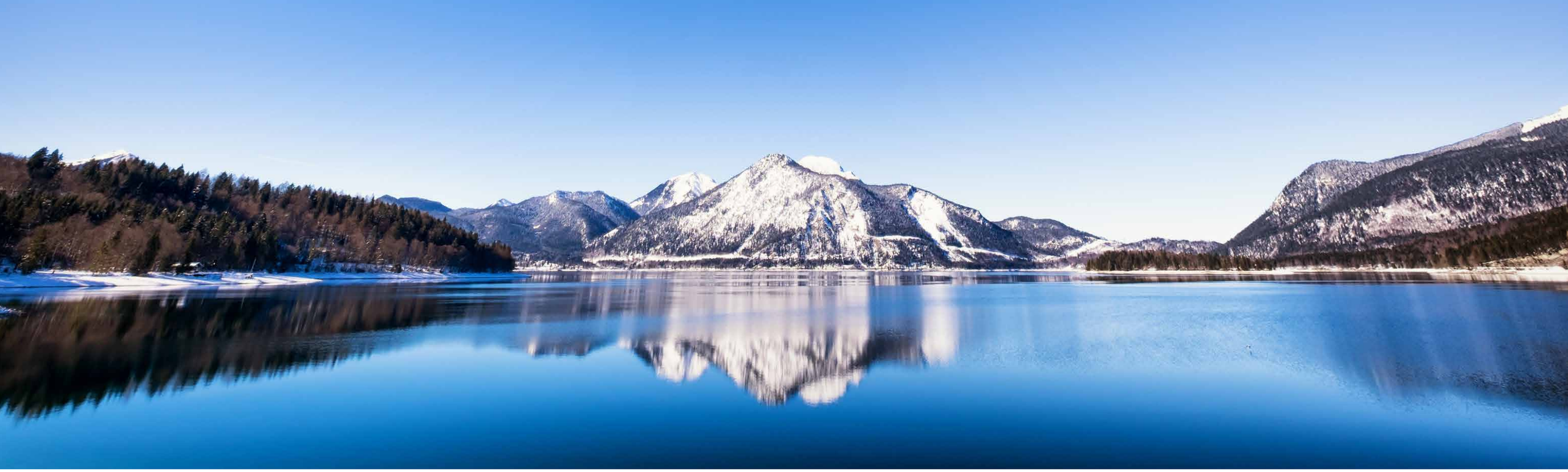
***Masatsugu Minaka,***
***Chairman of the Board***
***Daikin Europe N.V.***

***Martin Dieryckx,***
***General Manager***
***Environment Research Centre***
***Daikin Europe N.V.***

# M

Mission

Air is essential to our existence. It has always been Daikin's mission to make the air we breathe and live in the best possible. Our innovative products and solutions are designed to improve people's health and well-being, to support the food cold chain from farm to fork, and to reduce the environmental impact of heating and cooling.



# Daikin Europe N.V. at a glance

KEY FACTS & FIGURES

Active in

**129**
**Countries**

Sales & Production

**52**
**Entities**
Across Europe, the Middle East and Africa
+Asia, Oceania, Americas for refrigeration business.

**14**
**Production plants**
Manufacturing close to market needs.

People

**13,710**
**Employees**
At your service every day.

**86**
**Nationalities**
A diverse and committed workforce.

Financials

**5.21 billion €**
**Consolidated Turnover fiscal year 2022**

# A

## About Daikin Europe N.V.

**The perfect climate**
Daikin Europe N.V. is a leading provider of heating, cooling, ventilation, air purification and refrigeration technology for residential, commercial and industrial purposes. Our solutions are essential for modern day life, their applications are unlimited. We provide healthy and comfortable indoor air in all kinds of buildings, we make sure food and vaccines are stored and transported safely, and we cool data centres and retail cabinets worldwide.

**Solutions for Europe, the Middle East and Africa**
Established in 1973, Daikin Europe N.V. is a subsidiary of the Japanese company Daikin Industries Ltd. We design, manufacture and market solutions for the European, Middle East and African (EMEA) region and beyond. Today, the group has over 13 000 employees and is active in 129 countries. We can rely on a strong network of installers and partners thanks to 50 years of innovative product and business development. We continuously expand our portfolio and network, which includes refrigeration providers Zanotti, Hubbard, Tewis and the AHT group.

**Manufacturing close to market needs**
Together with Daikin Applied Europe, we have 14 manufacturing facilities in the EMEA region which produce heating, cooling, ventilation and refrigeration products as well as compressors. They are based in Austria, Belgium, the Czech Republic, Germany, Italy, the Kingdom of Saudi Arabia, Spain, Türkiye, the United Arab Emirates (UAE), and the United Kingdom, with a brand-new heat pump factory to open in Poland in 2024.

# D

## Daikin and the UN Sustainable Development Goals

The Sustainable Development Goals (SDGs), defined by the United Nations in 2015, are a set of 17 global development goals which aim to improve a broad set of societal issues such as poverty, health, education, energy, global warming and gender equality. Through our business activities, Daikin contributes to many of these SDGs. We contribute to a sustainable society by creating new value in making people and spaces healthy and comfortable, while reducing climate impacts.



For three years in a row, Daikin Europe Ostend N.V. obtained the SDG Champion label as part of a programme set out by VOKA, the Flemish Chamber of Commerce, and UNITAR, the United Nations Institute for Training and Research. The label is awarded to companies that make a significant contribution to the United Nations' Sustainable Development Goals.

## How we contribute to a healthier and more sustainable society


### Creating the perfect climate for societal and economic growth

Heating and cooling technologies have been essential in the development of mankind. In many regions around the world, societal and economic growth would simply be impossible without them. Our state-of-the-art solutions help create healthier living and working spaces for people, protecting them from extreme temperatures and stimulating both their well-being and productivity. In addition, our refrigeration cold chain solutions prevent food waste from farm to fork and ensure safe transport and storage of life-saving medicines.


### Developing innovative technology for a carbon-neutral future

As a leading manufacturer we use our extensive know-how to develop advanced technologies that help our customers save energy and make the switch to carbon-neutral heating and cooling solutions. Furthermore we contribute to a circular economy of refrigerants by stimulating their recovery and reuse.






# H

## How we contribute to sustainable cities and communities

Daikin Europe N.V. continues to expand its business focus to encompass the entire lifecycle of residential, commercial and industrial markets. Below we have selected a number of projects that exemplify how our solutions contribute to more sustainable buildings, cities, communities, and cold chains, aligning with SDGs 3,9 and 11.

**UNITED KINGDOM**

### Partnership for innovative net-zero technologies

Daikin Europe N.V. entered a pioneering collaboration with the Greater Manchester region in the United Kingdom to implement low-carbon retrofitting trials in approximately 1,000 homes, contributing to reduced carbon emissions. The partnership is the first of its kind between a UK city-region and Daikin and positions Greater Manchester as a testbed for innovative net-zero technologies and services.

Picture: Masatsugu Minaka (Chairman Daikin) and Andy Burnham (Mayor of Greater Manchester)

**SPAIN**

### A luxury historic rehabilitation LR15

LR15 rehabilitates a beautiful building of classic Madrid architecture dating from 1921. This project consists of 11 luxurious residences. Preserving its protected facade and classic style, Daikin's Altherma R32 technology ensures comfort while contributing to the sustainability of this historic structure.



**NORWAY**

### The world's first fully electric and autonomous container ship with zero emissions

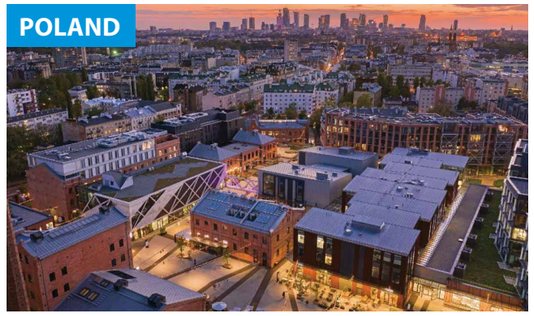
The YARA Birkeland is the world's first fully electric and autonomous zero-emission container ship. The battery-powered ship will avoid around 40,000 diesel-powered truck journeys a year, thereby significantly reducing NOx and $CO_2$ emissions. Energy efficiency is key for all equipment on the ship. Daikin will provide cooling installations for various ship rooms. Our VRV air-to-air solution was selected for its energy efficiency and its smaller footprint compared to other considered options.

**UAE**

### Leading Dubai hotel saves almost 50% of energy in hot water production

Taka Solutions, a leading energy service company in the United Arab Emirates, contracted the DAIKIN UAE team to install an energy-saving system for hot water generation at Fairmont the Palm, a luxury four-star hotel and resort located in Palm Jumeirah, Dubai. The system was entirely redesigned, using Daikin's energy-efficient heat pumps. Measurements by Taka Solutions recorded annual energy savings of close to 50% compared to the previous hot water system.

**POLAND**



### 19th-century distillery turned into state-of-the art office complex

For the Centrum Praskie Koneser M&N, a historic 19th-century vodka distillery was transformed into a multifunctional office complex in Warsaw, Poland. The building achieved the prestigious **Green Building Certificate BREEAM Excellent** thanks to a wide range of Daikin solutions, including Chiller, VRV and Sky Air units.

**FRANCE**

### Innovative technology for top environmental performance

Arteparc Innovallée is a business park encompassing six office buildings and spanning 30,000 $m^2$ in the Grenoble valley in France. For the Arteparc commercial complex within Innovallée, Daikin's mini-VRV 5 S series not only offers flexible zoning, but also uses R-32 as a refrigerant, substantially reducing the park's project's carbon footprint when compared to competing solutions using R-410A. The compact and silent VRV outdoor units further contribute to the project's environmental objectives. To ensure long-term efficiency, a centralised control system facilitates effective energy management and optimisation.

**BELGIUM**

oPEN LAB Genk
Leading the Transition to
Positive Energy Neighbourhoods

### Transforming existing homes into an energy-positive community

The oPEN Thor Living Lab in Genk, Belgium, will transform an existing residential area into an energy-positive community. Supported by the EU Horizon 2020 oPEN Lab, the project is led by EnergyVille, a partnership between several Belgian Universities, research institutes and industry representatives. By contributing to such pilot projects with residential heat pump solutions, Daikin helps lay the groundwork for a carbon-neutral society, addressing the need for sustainable home renovations in the coming decades.

This project has received funding from the European Union's Horizon 2020 Research and Innovation Framework Programme under Grant agreement N°. 101037080.

**UNITED KINGDOM**


### Travel the world at the BBC Earth Experience

UK BBC Studios, Moon Eye Productions and Live Nation have built a 360-degree audio-visual experience centre at Earl's Court, London. The ground-breaking new attraction immerses visitors in the extraordinary diversity of the seven continents and features narration from David Attenborough. Daikin is the major sponsor of the centre and has installed customised air handling units and a VRV5 Heat Recovery heat pump, that offer comfort levels and healthy indoor air quality for each visitor.

**ITALY**

### District cooling for new green neighbourhood

Daikin supplied water-cooled centrifugal chillers for a large-scale district cooling project in Milan, Italy. It is part of a redevelopment project for an entire neighbourhood encompassing about 500 homes. The installed chillers feature inverter technology, ensuring energy consumption aligns with actual cooling needs. The units integrate remote monitoring and control capabilities through DaikinOnSite , enabling performance analysis, smart maintenance scheduling, and preventive measures to ensure stable operation.

**GERMANY**

### State-of-the-art distribution centre for family-owned business

Environmental protection and sustainability are central elements in the corporate philosophy of CLAGE, a family-owned company based in Germany. This was also reflected in the choices the company made for its brand-new distribution centre in Lüneburg. To minimise its ecological footprint and at the same time create a highly comfortable working environment for its employees, the family-owned company opted for Daikin's energy-efficient heat pumps and ventilation units.

**ROMANIA**


### Future-proof workplaces Oregon Par

Oregon Park provides sustainable offices designed to meet the needs of the target tenants while being flexible and adaptable to accommodate future workplace trends. All three buildings in the complex were designed with a specific focus on low energy consumption, to which Daikin contributed with its centrifugal chillers. The development is rated **BREEAM Excellent** for sustainability, with Daikin's contribution of centrifugal chillers.

**SPAIN**

### Landmark tower obtains LEED Gold certification

The Caleido Tower, a prominent and iconic building located in the Business District in Madrid, Spain has obtained **LEED Gold certification**. Part of this achievement can be attributed to the use of Daikin solutions, featuring water-cooled and air-cooled inverter chillers, air-handling units, VRV, VAM heat-reclaim ventilation and BACnet gateways making the connection with the Building Management System. The outstanding efficiency, minimal refrigerant charge, and customised characteristics of the air-handling units were key factors to the tower's exceptional green building rating.

# D

## Daikin's Environmental Vision 2050

In 2018 Daikin globally established its Environmental Vision 2050, a plan that lays the groundwork for the company to reach net-zero greenhouse gas emissions by 2050 across the entire lifecycle of our products. We have set out a clear mid- to long-term roadmap aiming to reduce net greenhouse gas emissions by at least 30% in 2025 and 50% in 2030, compared to emissions without measures (business as usual scenario), with 2019 as the base year.

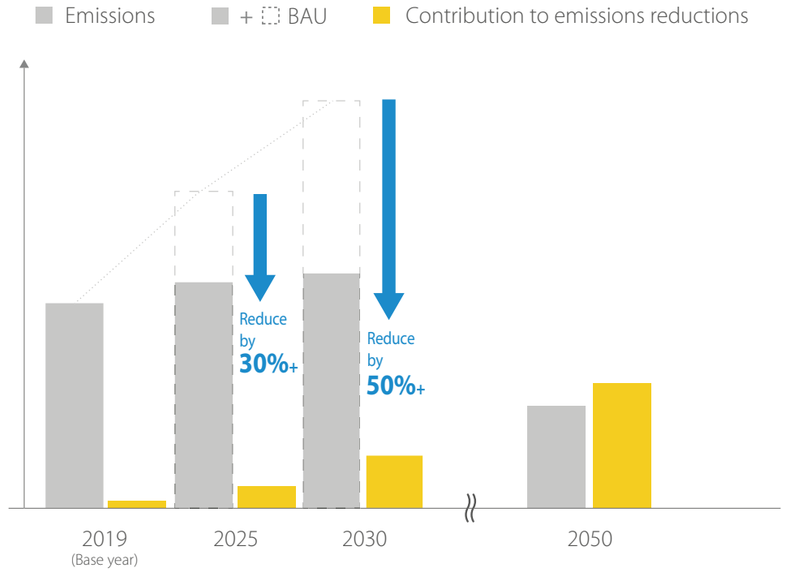


## Our roadmap

Our climate roadmap and our related targets are illustrated in the graph below. Taking 2019 as the base year, our aim is to reach at least 30% lower net greenhouse gas emissions* in 2025 compared to a Business as Usual (BAU)** scenario, and a 50% reduction in 2030. In fiscal year 2022 Daikin globally already achieved a reduction of 14% compared to BAU.

(*) Net greenhouse gas emissions refer to emissions minus avoided emissions and other contributions.

(**) Business as Usual (BAU) refers to emissions in case of normal business growth without the implementation of countermeasures.




## Where we are today

| | 2020 | 2021 | 2022 | 2025 target |
|---|---|---|---|---|
| Reduction rate of net greenhouse gas emissions (compared to BAU with 2019 as base year) | -7% | -10% | -14% | -30% or more |

# Focus areas related to greenhouse gas emissions

## SCOPE 1, 2 and 3 category 1

Under the Greenhouse Gas Protocol, scope 1 and 2 refer to direct and indirect emissions caused by own activities, such as manufacturing. Scope 3.1 includes the emissions from purchased materials. Together, they account for less than 2% of Daikin's total lifecycle greenhouse gas emissions.

### Decoupling our factory growth from our emissions

Our first step is to decouple the growth of our manufacturing output from the resulting growth of our emissions. We focus on reducing the carbon intensity in our manufacturing plants, for example by improving energy efficiency, using low-carbon electricity and minimising refrigerant emissions during the assembly process. As a next step, we will explore with our suppliers how the climate impact of materials can be further reduced. By 2030, all Daikin equipment manufacturing sites aim to achieve net-zero greenhouse gas emissions.

## SCOPE 3 categories 11 and 12

These emissions emanate from the energy use and refrigerant impact of sold products during their use (3.11) and the refrigerant impact of sold products at their end-of-life (3.12). Together, the use and end-of-life phases of our sold products account for approximately 98% of our total greenhouse gas emissions.

### Helping our customers to reduce product lifecycle emissions

The lion's share of Daikin's carbon emissions are generated during the use and end-of-life phases of our products, in particular from the energy they consume and the refrigerants they contain. While customers may focus to reduce the carbon intensity of the electricity they consume, it is our role to reduce the energy impact by providing energy-efficient products and solutions, using state-of-the-art technologies such as inverters and heat recovery. We also provide end-users with tools to monitor and manage their energy consumption and support our service partners to ensure proper installation and maintenance, resulting in continued efficient operation. At the same time we take various initiatives which reduce the impact of refrigerants by minimising the risk of emissions, lowering the Global Warming Potential (GWP) and stimulating proper recovery, reuse or destruction practices.

## SCOPE 4 and other contributions

Scope 4 refers to avoided emissions that occur as a result of the use of a product or service. Heat pumps are a good example of this. They drastically reduce the climate impact of heating buildings when compared to fossil fuel-based boilers. Another example is the use of reclaimed refrigerant instead of virgin material. Our long term vision is for these scope 4 avoided emissions, together with other contributions such as offsetting to become larger than our scope 1, 2 and 3 emissions by the year 2050.

### Promoting low-carbon technology

As a leading manufacturer of heat pumps, we play a crucial role in the decarbonisation of both new and existing buildings. Simply put, with every heat pump that is sold to replace a fossil fuel driven boiler, we are avoiding greenhouse gas emissions throughout the entire lifetime of the equipment. These avoided emissions will further increase as homeowners and businesses make the switch to low-carbon electricity.

### Creating a circular economy for refrigerants

The recovery and reuse of refrigerants contributes to a circular economy and may also avoid the emissions emanating from the production of virgin refrigerants.. Daikin is the driving force behind a circular economy for refrigerants by cooperating with governments and business stakeholders towards solutions for recovery, recycling, reclamation and reuse.

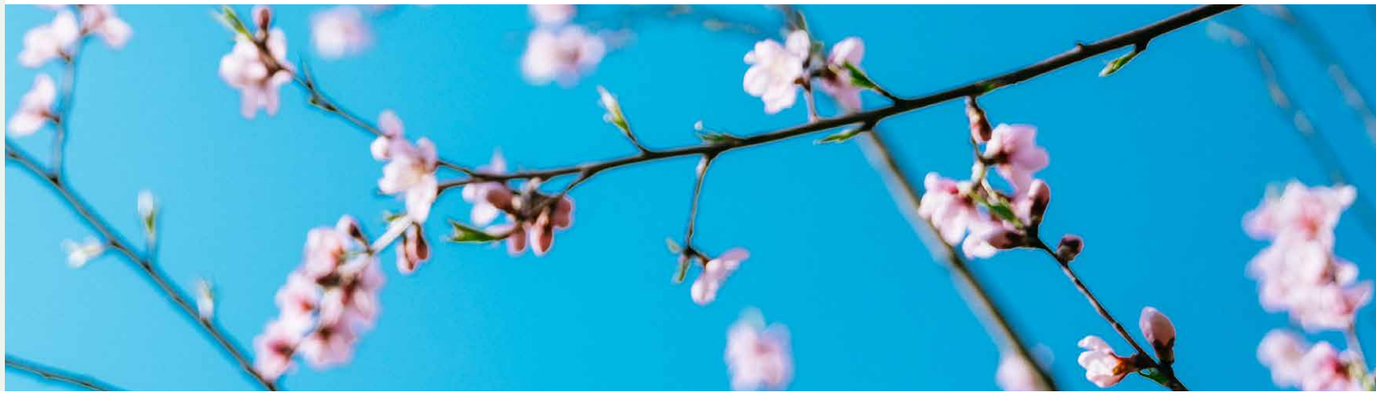
Daikin endorses the recommendations of the Task Force on Climate-related Financial Disclosures (TCFD) and publishes an annual report on its global greenhouse gas emissions supported by 3rd party certification. Daikin has been A Listed by the Carbon Disclosure" Project (CDP), an international environmental non-profit organisation that operates a global environmental information disclosure system for companies and local governments.

Each year, Daikin global greenhouse gas emissions are verified by Bureau Veritas Japan CO Ltd., an independent professional services company that specialises in quality, environmental, health, safety and social accountability. The table below shows the results for the fiscal year 2022.

| Global Daikin Group | Greenhouse gas emmissions [$tCO_2eq.$] | Boundary |
|---|---|---|
| Scope 1 | 559,736 | • $CO_2$ from energy use, HFCs and PFCs:<br>GHG emissions through business operations of four production bases of Daikin, eight production subsidiaries within Japan and 58 overseas production subsidiaries<br>• $CO_2$ from non-enery use, $CH_4$, $N_2O$, $SF_6$ and $NF_3$:<br>GHG emissions through business operations of four production bases of Daikin |
| Scope 2 (location-based) | 611,527 | |
| Scope 2 (market-based) | 474,835 | |
| Scope 3 (Category 1, 11 and 12) | 308,285,680 | Categories 1, 11 and 12 of Scope 3 GHG emissions accounted and reported in line with the GHG Protocol's 'Corporate Value Chain (Scope 3) Accounting and Reporting Standard within the boundaries defined by Daikin for each category. |

The breakdown of Scope 3 emissions are as follows.
Category 1: 4,701,417 $tCO_2eq.$ | Category 11: 257,498,139 $tCO_2eq.$ | Category 12: 46,086,124 $tCO_2eq.$

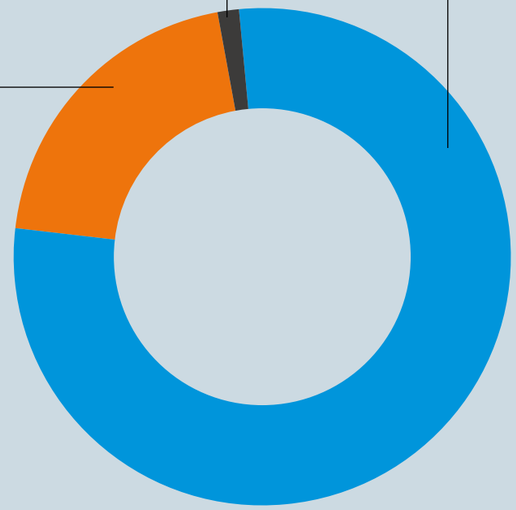
Link to the statement: www.daikin.com/-/media/Project/Daikin/daikin_com/csr/new/pdf/environment/verification-pdf



# Distribution of Daikin greenhouse gas emissions globally over the entire equipment lifecycle

(scope 1/2/3)

**<2% from production and procurement of materials**
Scopes 1, 2 and 3 category 1



**19% from refrigerant emissions of sold products during their expected lifetime including end of life decommissioning**
Scope 3, categories 11 and 12

Refrigerant emissions are calculated as follows:
GWP values x emitted quantity

- Average annual leakage rates are based on market data such as logbooks.
- For end of life emissions, due to insufficient market data, worst case scenario at 0% recovery is assumed. By collecting more market data in cooperation with our service network we aim to update the calculation.

Calculation method:
Refrigerant charge amount x Annual leakage rate X Product lifecycle X Global Warming Potential* X Sales volume
**+** Refrigerant charge amount x Global Warming Potential x (1 - recovery rate**)

**79% from energy use of sold products during their expected lifetime**
Scope 3, category 11

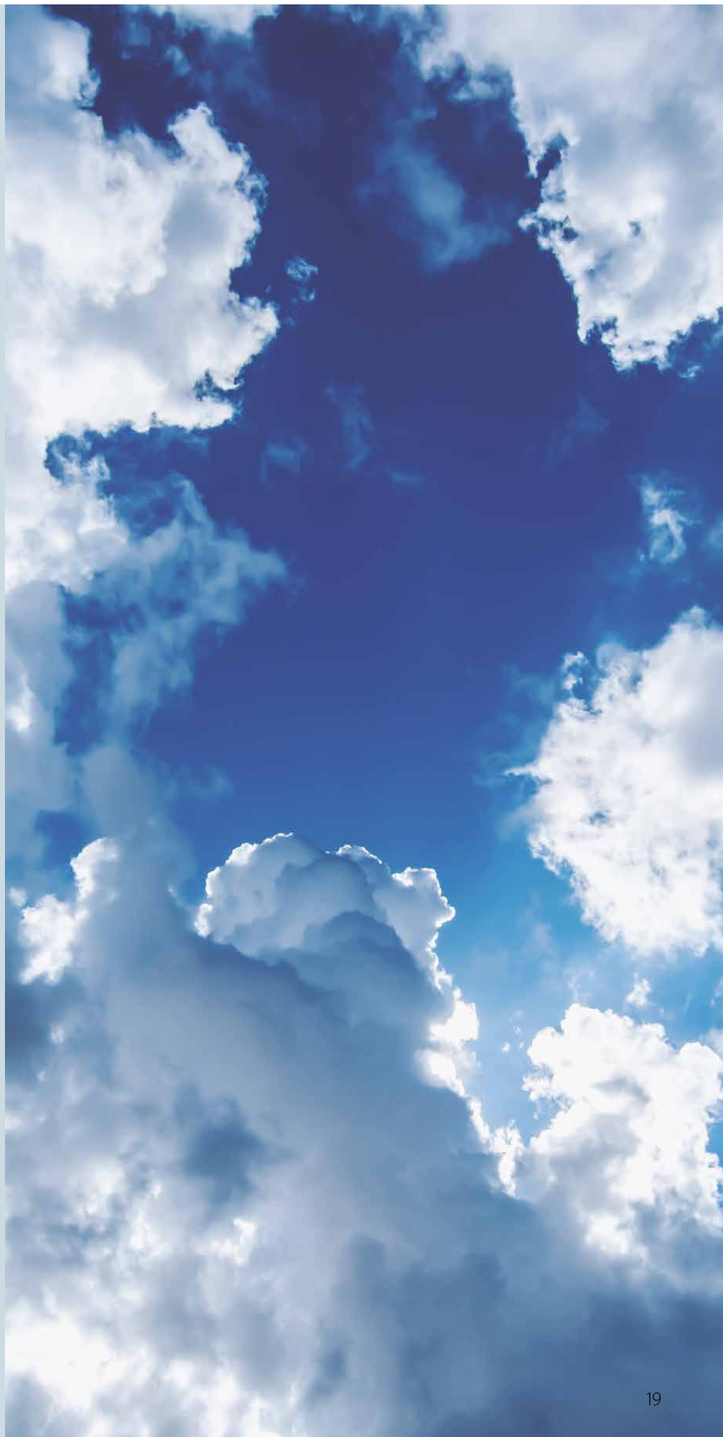
There are 2 factors that influence this value: the amount of energy used by the product and the carbon intensity of the energy used on site. For the energy related carbon intensity, calculations are based on IEA and EU Ecodesign reports.

Calculation method:
Annual energy consumption X Product lifecycle X Electricity or Fossil Fuel emission factor X Sales volume

* According to IPCC 4th Assessment Report values
**Set to 0% conservatively due to insufficient market data

Based on Daikin global figures, fiscal year 2022
More detailed information on the calculation method can be found in the Daikin Industries Ltd. Sustainability Report 2023






**All Daikin equipment manufacturing plants aim to achieve net-zero greenhouse gas emissions by 2030.**

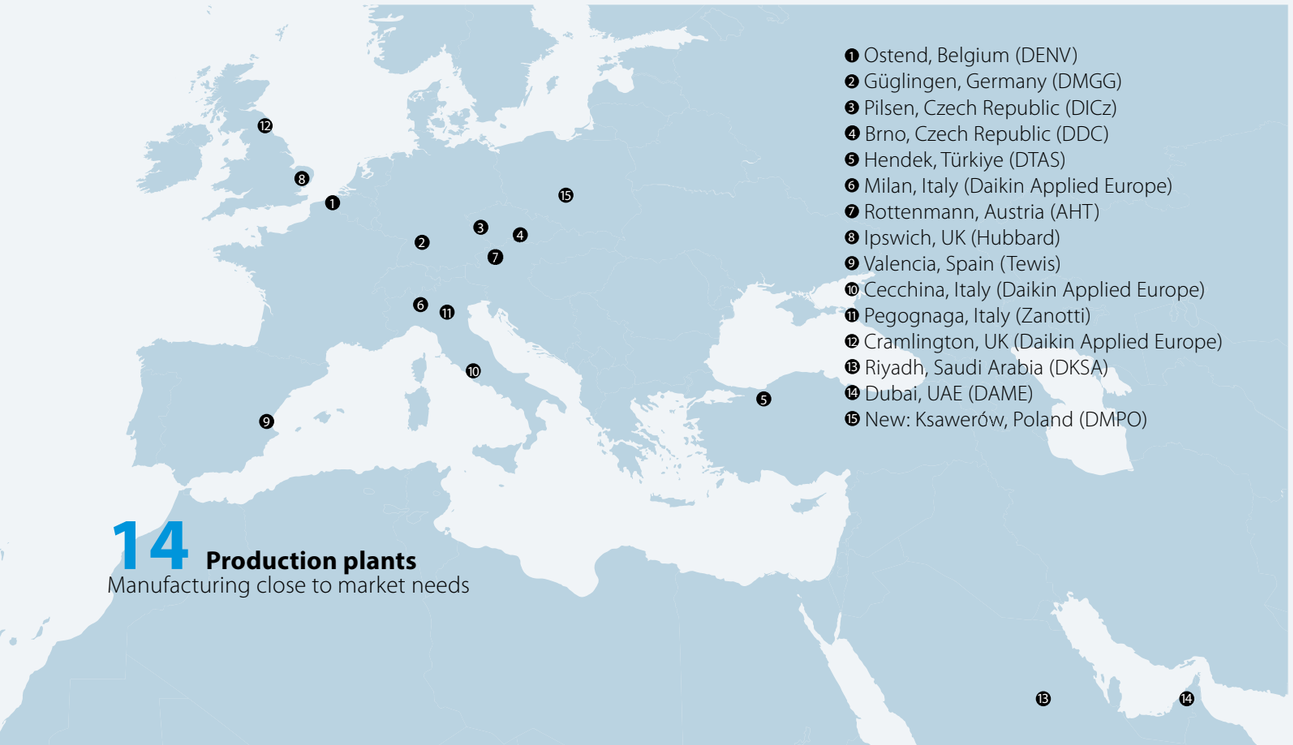
# E

# Environmental initiatives at our manufacturing plants

## DAIKIN Green Heart Factory Programme

Since fiscal year 2005, Daikin utilises in-house standards for evaluating manufacturing plants on their environmental performance such as greenhouse gas emissions and water usage. Assessments are conducted every two years. Four stages of certification were established: platinum, gold, silver, and bronze. In 2021, Daikin set the bar higher and upscaled the assessment criteria of the Green Heart Factory programme. In the 2022 assessment round, with these stricter criteria, two factories in the EMEA region achieved bronze status, being the Daikin Europe factory in Belgium and the Daikin factory in Türkiye.

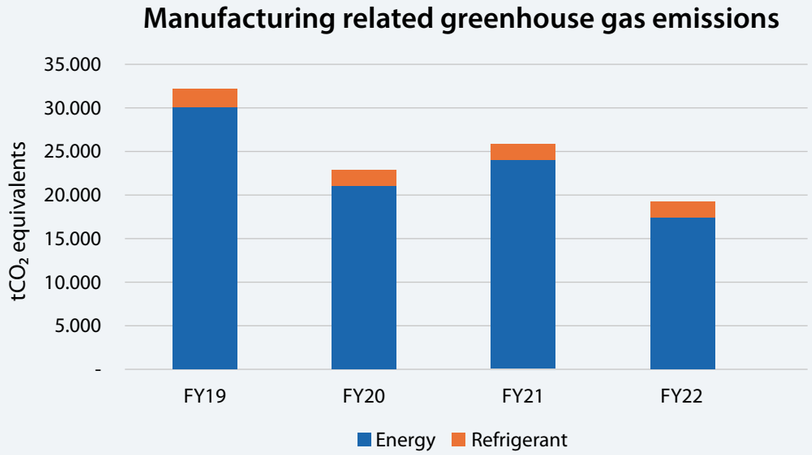
In all of us, a green heart




**14 Production plants**
Manufacturing close to market needs

## Decoupling our factory growth from our greenhouse gas emissions

Current initiatives at our factories focus on decoupling the growth of our manufacturing output from the related greenhouse gas emissions caused by energy consumption and refrigerant charging processes. Several measures are taken to enhance energy savings, use low-carbon electricity and to minimise refrigerant emissions.
The graph below shows the progress since fiscal year 2019 and includes all Daikin Europe and Daikin Applied Europe factories except for the recent factories in the UAE, the Kingdom of Saudi Arabia and the future factory in Poland.
Between fiscal year 2019 and 2022, Daikin Europe sales turnover increased with more than 50%, while the greenhouse gas emissions from Daikin Europe and Daikin Europe Applied factories were reduced by approximately 40%.




Factories covered: all Daikin Europe and Daikin Applied Europe factories, except for the recent factories in the UAE and the Kingdom of Saudi Arabia
FY means fiscal year from 1 April to 31 March

# Environmental initiatives at our manufacturing plants

## AUSTRIA

The AHT factory in Austria has installed a solar power plant with a total capacity of 1.95 MWp in three steps. Installation was completed in May 2023. With this solar power plant, a total of 1, 800 kWh of electricity will be produced, of which 1,500 kWh will be used by Daikin Austria itself and 300 kWh will be fed to the grid. 20% of total power consumption of Daikin Austria will now be covered by the installation.

**European Heat Pump Award 2023 in the People's Choice Category**

Daikin Austria also undertook an exceptional industrial heat pump project for the AHT factory in Rottenmann. This project features a heat pump cascade with a total installed heating capacity of 1,200 kW, catering to the heating needs of the production facility, office building, and domestic hot water demand. The heating system includes a Daikin heat pump system, a 50,000 litres buffer storage for heating water, a new efficient gas boiler, a new heating distributor and an intelligent heating control system. Before the replacement, heating was provided by gas only. After the installation, gas consumption is estimated to be reduced by 5,000 MWh annually, resulting in a $CO_2$eq. reduction of approximately 900 tonnes annually.

## UAE


Daikin Middle East and Africa installed a solar plant with close to 1,000 solar panels, meeting more than 80% of energy demand. The plant has a capacity of 0.52 MWp.

## BELGIUM

Daikin Europe's factory in Belgium added 0.44 MWp photovoltaic panels on the roof in 2011, which cover approximately 3% of electricity consumption. The remaining needs are covered by sourcing green electricity. Daikin Europe joined the local district heating network project called **Warmtenet Oostende** in 2019, providing offices and production facilities with sustainable heating from a nearby waste treatment plant.



## TÜRKIYE

Daikin has installed a solar power plant at its production site in Sakarya with a total capacity of 7.84 MWp in two steps. In July 2020, 5.78 MWp was installed, with an additional 2.06 MWp installed in July 2023. The company estimates that in the fiscal year 2023 approximately 85% of the factory's total electricity consumption will be covered by the installation.

At the same factory in Türkiye, Daikin also introduced a closed water cycle for the performance testing of combi boilers. This enables annual water savings of 1,750 tonnes.

## GERMANY

Since January 2023, Daikin Manufacturing Germany GmbH is sourcing 100% green electricity. Following the acquisition of a neighbouring company, a heating system with two Daikin heat pumps and floor heating was installed in the production hall and social rooms, covering over 7,000 $m^2$. The replacement of the previous heating installation, which worked on liquified gas, will lead to an estimated reduction of 220 tonnes of $CO_2$eq. per year.

## CZECH REPUBLIC

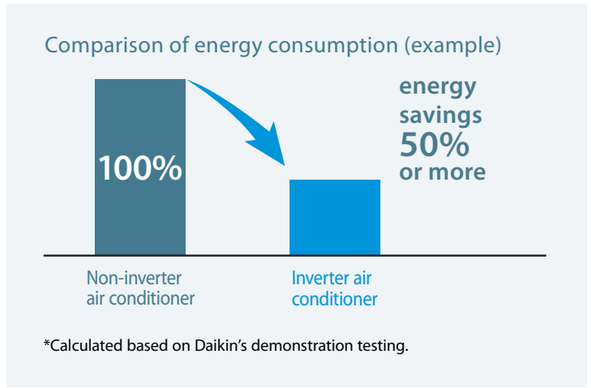
In November 2021, Daikin Industries Czech Republic initiated a project to reuse iron scrap from its production. The project was fully implemented in February 2022, resulting in the reuse of over 80 tonnes of scrap during fiscal year 2022. The metal scrap is collected and transferred to partner company Keytec, which reuses it to produce terminal strip covers which are supplied back to the factory.

# H

# How Daikin enables users to save energy

## Promoting the benefits of inverter technology

Inverter technology enables to control the rotation speed of motors. For example instead of putting energy into starting and stopping a compressor, the inverter adjusts the speed of the motor so that it speeds up or slows down and runs more efficiently over time. The energy saving potential can be 50% or more compared to non-inverter units. The technology can also be applied in fan motors to further improve efficiency and sound levels.




Daikin has been promoting inverter technology throughout the entire industry for many years. Although the technology is now well established in air conditioning and heat pump applications in Europe, its benefits are not sufficiently acknowledged in other regions yet.

### Demonstration project in Morocco


To promote the benefits of inverter technology, Daikin participated in a demonstration project in Morocco, run from end 2019 until 2023 in cooperation with the University of Maryland, Oak Ridge National Laboratory and the Institute for Governance and Sustainable Development. Two inverter air conditioners were installed at a bank branch in Marrakech. Their performance was compared to two non-inverter units that were already operating at the same site.

The results were quite spectacular. Taking into account weather data and different use patterns influenced by the Covid pandemic, the inverter units consumed between 71 and 92% less energy compared to the old non-inverter units. The project also demonstrated that seasonal energy efficiency performance standards are a better reflection of the product energy performance compared to nominal methods. In addition, the older units used an ozone-depleting, high-GWP refrigerant R-22 whereas the inverter models used the non-ozone depleting and lower GWP refrigerant R-32.



## Setting new performance standards for Energy Efficiency

### Why seasonal energy efficiency performance methods matter

Nominal energy efficiency ratios (such as EER for cooling and COP for heating) give an indication of the energy usage when operating at full load at one specific temperature condition. However, a more representative method to evaluate energy performance is the so-called seasonal energy efficiency approach (SEER and SCOP), which is based on multiple ambient temperatures and part-load conditions in cooling and heating mode. As seasonal methods better reflect the energy saving benefits of inverter technology, it is increasingly used in product legislation, certification programmes and building energy performance calculations.

### Introducing new standards for high-ambient temperature environments

In high-ambient temperature regions, there was a lack of an accurate seasonal energy efficiency indicator adapted to local weather conditions. Nominal efficiency methods do not show the real expected efficiency during operation, and existing seasonal methods of moderate climates were not suitable because the outside temperatures can be much higher than 35°C.
Daikin supported the amendment of ISO standards to help calculate seasonal energy efficiency of airconditioners in these regions. The Kingdom of Saudi Arabia was the first to adopt the new ISO amendment and introduce new Energy Labels showing SEER based on local weather conditions in 2021. Moreover, the development of the ISO standard helped in the creation of the United Nations U4E (United for Energy) model regulation which paves the way for establishing minimum energy efficiency and energy labeling programmes in emerging countries worldwide, including in Africa.

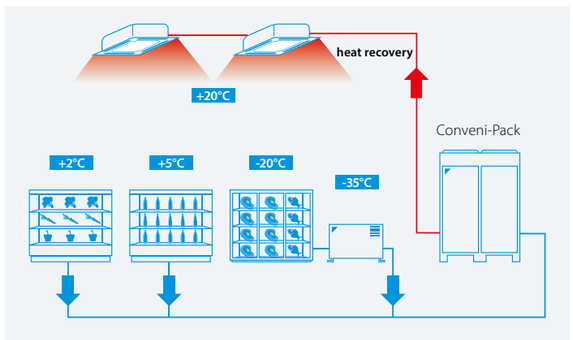
## Demonstrating the benefits of heat recovery

### What is heat recovery?

During cooling or refrigeration mode, heat is extracted from the surrounding room or the refrigerated cabinet. Instead of just releasing that heat to the outside environment, it can be recovered and used for heating purposes, thus contributing to energy savings. Similarly, heat recovery can be applied in the heat exchange between incoming and outgoing air in ventilation systems.

### Analysing heat recovery benefits of Daikin $CO_2$ Conveni-Pack

The Daikin $CO_2$ Conveni-Pack is an integrated solution that combines refrigeration with space cooling and heating needs of convenience shops. Due to this integrated approach, heat recovery from refrigeration cabinets or cold rooms can be used to satisfy the shop's heating needs. As part of the EU LIFE project NaturalHVACR4Life, based on R-744 ($CO_2$) refrigerant, the performance of Conveni-Pack was compared to a non-integrated system where the refrigeration and space heating and cooling would be done by two stand-alone units without heat recovery. The calculation showed the heat recovery technology from the Conveni-Pack contributes to a 17% lower annual energy consumption compared to a non-integrated solution.




Natural HVACR 4 Life is co-funded by the European Union's LIFE programme LIFE18 CCM/BE/001182

# How Daikin enables users to save energy

## Remote control and monitoring

Daikin provides end-users, installers and facility managers with a variety of advanced energy management, remote control and demand response tools and solutions. They have been specifically developed to help them achieve the ideal comfort levels while realising significant energy savings. Below are just a few examples.

**ONECTA**
The mobile ONECTA app allows residential end-users to easily monitor and control Daikin cooling and heating units in their homes. By simply using their smartphone, they can set the perfect indoor comfort levels and optimise the performance of their installation.

**Stand By Me**
The Stand By Me service programme ensures Daikin residential heat pumps keep running smoothly, safely and efficiently during their entire lifetime.

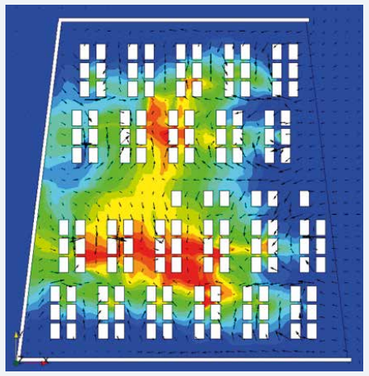
**Daikin Cloud Service**
From our professional portal, installers can activate remote monitoring for our residential, commercial and industrial products, allowing them to supervise their customers' installation on multiple parameters. By changing settings, they can easily and quickly improve comfort levels. From the commercial IoT platform, users are able to monitor energy consumption from all connected VRV units.

**Daikin on Site**
Daikin on Site is the unique solution for remote monitoring and smart maintenance of chiller plants and air handling units in larger buildings. It allows remote operation of the installation and integration of third-party products which provide insight into operational data for enhanced control and reliability and optimised operation and maintenance costs.

## Optimising energy use at on-site installations

Improper installation practices can have a considerable impact on the performance of any equipment. It may result in reduced cooling and heating capabilities, reduced energy efficiency and even system shut downs. Using advanced technologies and real-life demonstrations, Daikin helps its customers to make the right decisions and optimise on-site installation.

**Simulating different options with CFD**
In Bahrain, Daikin Middle East used Computational Fluid Dynamics (CFD) to simulate several optimisation scenarios for the location of VRV outdoor units. The simulation on the right shows a project with 138 VRV outdoor units, where a relocation of units resolved the problem of short circuit due to hot air partially returning back to the suction side. The CFD software was used to simulate how the hot spots on the map could be avoided.



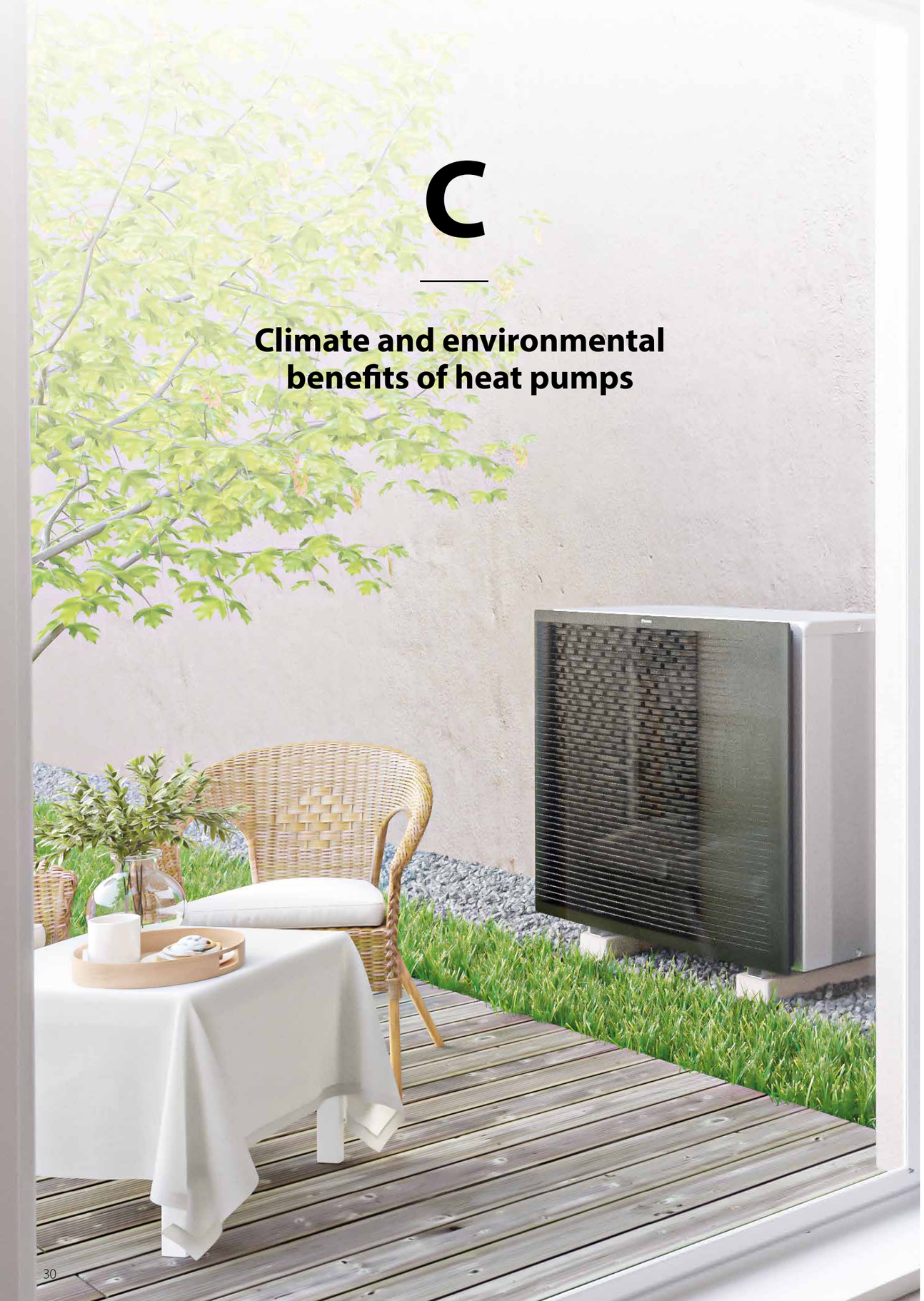
CFD report example showing airflow patterns and temperature distribution of VRV outdoor units

**Improving $CO_2$ Conveni Pack installations through remote monitoring**
As part of the EU LIFE project NaturalHVACR4Life, based on R-744 ($CO_2$) refrigerant, several convencience stores throughout Europe were continuously monitored on multiple parameters including their energy efficiency performance. At one site it was detected that the outdoor units had been improperly installed behind a wall with downward louvers, which prevented the system to properly function. The louvers reflected the warm air from the gas cooler back to the inlet side, thereby increasing the discharge pressure of the system. This resulted in an energy performance drop of 20-25%. A duct branching out of the space was instead connected to avoid this. Current operations are being monitored.


Example of an enclosed installation with downward louvers, preventing proper system functioning

# C

# Climate and environmental benefits of heat pumps





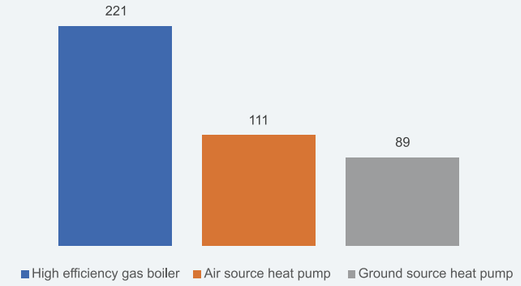
## A key solution to reduce greenhouse gas emissions

Heat pumps are a low-carbon heating technology. According to a recent study by the International Energy Agency (IEA), heat pumps reduce greenhouse gas emissions by at least 20% compared to gas boilers, when running on emissions-intensive electricity and up to 80% in countries with cleaner electricity sources (*).

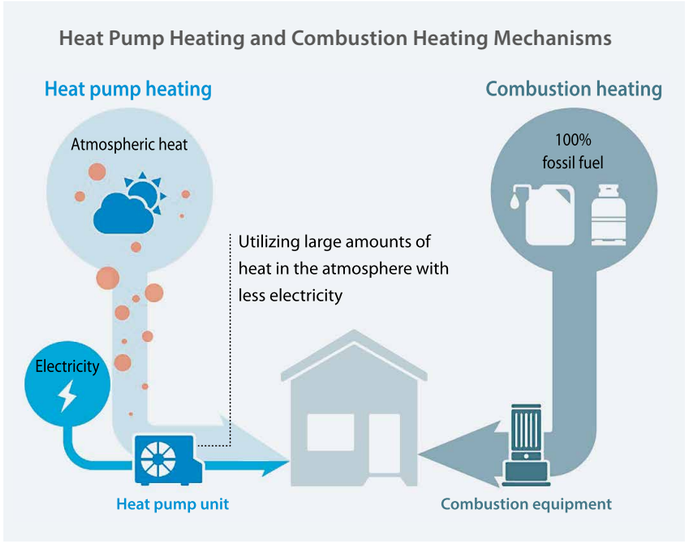
For example, in the European Union the average carbon impact of a heat pump today is about half of a high-efficiency gas boiler, with an even lower carbon footprint potential in the future due to the further decarbonisation of the electricity production. (**)

(*) IEA 2022 report "The future of heat pumps":
The Future of Heat Pumps - Analysis - IEA
(**) Ecodesign Review Boilers, Task 5, Final | July 2019 | VHK for EC

Greenhouse gas emissions in $kgCO_2eq.$ per year and per 1000 kWh net heat demand




Source: Ecodesign Review Boilers, Task 5, Final | July 2019 | VHK for EC




## Renewable energy source technology

Heat pumps make use of renewable energy by extracting thermal energy from the air, water or ground. In addition, heat pumps may also act as a thermal storage battery by flexibly balancing the energy supply and demand, thus contributing to the further deployment of renewable electricity production.

## Cleaner air for everyone

Heat pumps also improve air quality. The same study by the International Energy Agency (IEA), estimates a 15 to 40% reduction in direct emissions of major air pollutants caused by heating in buildings from 2021 to 2030, along with a decrease in other hazards associated with fuel combustion.

# Daikin investments for the future of heat pumps

**Daikin has taken the lead in the electrification and decarbonisation of new and existing buildings in the EMEA region. We are offering a complete range of products for any type of application, and are ramping up investments in both Research & Development and manufacturing capacity.**

## Investing in much-needed capacity and research

Daikin has taken significant strides in promoting the popularity of heat pumps through the enhancement of its product lineup. We now offer the widest product portfolio on the EMEA market. Offering solutions for both new buildings and renovation projects, our heat pumps come in ranges from a few kilowatt heating capacity for small apartments up to several megawatts for district heating and large-scale residential, commercial and industrial applications. Many of our products combine heating, cooling and hot water, offering a complete solution with just one installation.
Today heat pumps are already the most attractive climate mitigation option when compared to fossil fuel-based equipment, regardless of the refrigerant being used. Future refrigerant innovations – contributing to the phase down of HFC refrigerant consumption – will make them an even more attractive solution in this regard. At the same time, we need to keep a close eye on the safety of the full equipment lifecycle and the affordability for end-users.

In Europe, the EU Green Deal has set out an ambitious path to carbon-neutrality, in which heat pump technology will play an essential role. We are taking the lead in expanding the needed heat pump manufacturing capacity. We are constructing a brand new, state-of-the-art manufacturing plant in Poland that is aimed to become operational in 2024, alongside the expansion of our existing factories in other countries.

Render of the new production plant in Ksawerów, Poland


Render of the new EDC research & development center in Ghent, Belgium

Additionally, we are building a new EMEA Research & Development Center in Ghent, Belgium, to create region-specific products aligned with EMEA market needs. The new Development Center is expected to be fully operational by 2024. It aims to become a **BREEAM Excellent** building, providing a workplace for 500 employees.

### Multi +, an innovative European designed heat pump concept.

Daikin's Multi Plus is an all-in-one heat pump system using R-32 refrigerant. With just one air-source outdoor unit, all residential needs are covered: cooling, heating and domestic hot water. This product was a design collaboration between Daikin's EMEA Development Centers in the Czech Republic and Belgium.

### Altherma 4, a milestone innovation that keeps getting better.

Ever since its first introduction in year 2006, the Daikin Altherma hydronic heat pump has been a milestone innovation, providing both heating and hot water for home use. The fourth generation, fully developed by the Daikin EMEA Development Center is the first series based on the non fluorinated refrigerant R-290. The models feature a brand new casing and will be launched in 2024.

# D

# Daikin's Refrigerant Policy

Refrigerants are an indispensable part of the products and the equipment we manufacture. Daikin is taking its responsibility to limit their climate impact throughout the entire lifecycle, from the initial design to the end-of-life treatment.

## What is a refrigerant and what is GWP?

A refrigerant is a heat transfer medium used in air conditioning, heat pump and refrigeration equipment. It circulates in a closed loop inside the equipment and is able to transfer heat by alternating between gas and liquid states.
The potential climate impact is typically indicated by the Global Warming Potential value (GWP). It is a number which expresses the potential impact that a particular refrigerant would have on global warming if it were released into the atmosphere. It is a relative value which compares the impact of 1kg of refrigerant to 1kg of $CO_2$ over a period of 100 years.
The actual impact of refrigerants can be prevented in several ways. First and foremost, by preventing equipment leaks and ensuring proper end-of-life recovery. Choosing refrigerants with a lower GWP value and minimising the charge amount of refrigerant further reduces the climate risk if a leak would occur accidentally.

## Daikin fully supports the Montreal Protocol

The Montreal protocol-Kigali amendment mandates a global reduction in the production and consumption of virgin HFCs expressed in $CO_2$equivalent*. HFC reduction began in 2019 for developed countries which must reduce 85% of HFCs in $CO_2$equivalent by 2036. It starts in 2024 for developing countries (2028 for countries with high ambient temperatures), which have to achieve 80% reduction by 2045 (for high ambient countries 85% by 2047). Daikin fully supports these goals.
In the same vein Daikin Europe N.V supports local legislative measures in the EMEA territory that contribute to these targets. Examples are the EU, UK and Turkish F-gas regulations.

(*) $CO_2$equivalent is a metric measure which multiplies the amount of refrigerant (in kg) with the GWP value.

## How do we select the right refrigerant?

Depending on the application, local climate conditions and safety considerations, we carefully select the most appropriate refrigerant on a case-by-case basis. We use four basic criteria to determine the best possible solution.

**Environmental Impact**
The GWP value is an important but not the only parameter to select a refrigerant. The thermodynamic characteristics of a refrigerant may, for example, result in more compact equipment design, with lower amounts of equipment materials needed in the application. Another important factor is the refrigerant's potential to be recovered and reused.

**Safety**
A refrigerant must be safe to use throughout the entire lifecycle of the equipment. This includes transport, storage, installation, daily use, servicing, recovery, reuse and even destruction.

**Energy Efficiency**
The choice of refrigerants has a significant impact on the energy consumed by the equipment over its entire lifetime. That's why we carefully consider a refrigerant's potential to improve the energy efficiency of the equipment across a wide range of hot and cold climate conditions.

**Affordability**
It is our aim to provide cooling, heating and refrigeration solutions that are affordable for home-owners and businesses. This means we need to focus on compact designs, and reduce the costs associated with safety risk mitigation, installation, maintenance and end-of-life recycling of the equipment. This is particularly important to motivate customers to make the switch from fossil fuel-based heating to heat pumps.

The pictures below illustrate a few examples of products sold in the EMEA region along with their refrigerant.

**HFC and HFC blend refrigerants**

R-32

R-134a, R-452A



**HFO refrigerants**

R-1234ze

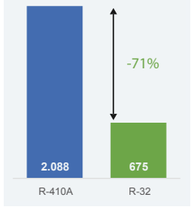
**Non-fluorinated refrigerants ("natural")**

Propane, Ammonia, $CO_2$

# Initiatives at Daikin Europe N.V. group to reduce refrigerant related emissions

In the EMEA region several initiatives are taken to reduce the climate impact of refrigerants. Here are a few examples:

## Developing products with a lower $CO_2$eq. refrigerant charge in our EMEA based Development Centers




A great example is the world's first VRV R-32 heat recovery range. It achieves a 71% reduction in its $CO_2$eq. refrigerant consumption, thanks to its lower GWP value at 675 (compared to R-410A at 2087.5) and reduced refrigerant charge.

Other examples of recent developments that use non-HFC refrigerants are the Zanotti refrigeration monobloc inverter unit for cold rooms using R-290 (propane) and the ZEAS refrigeration condensing units using R-744 ($CO_2$).

## Participating in demonstration projects that showcase the benefits of lower GWP refrigerants to customers, while also assessing the impact on energy efficiency.

Examples are the NaturalHVACR4 Life project, which focuses on the use of $CO_2$ refrigerant (instead of R-410A) in a combined system for cooling, heating and refrigeration in convenience stores. Find out more: www.naturalhvacr4life.eu

Another demonstration project was done for a bank branch in Morocco where R-22 Room Air Conditioners were replaced with high-efficiency Daikin R-32 inverter units, resulting in lower refrigerant impact as well as electricity consumption savings of up to 71%.

## Contributing to expert working groups that update refrigerant related competence and safety standards

Daikin experts contributed to the development of ISO EN 22712 (competence standard) and IEC 60335-2-89 and IEC 60335-2-40 (product safety standards). Further work is done specifically for higher flammable refrigerants, to address both the safe use of the equipment as well as the safety during transport, storage and end of life treatment.

## Stimulating a circular economy of refrigerants

Reusing refrigerants instead of consuming virgin material not only contributes to the Montreal Protocol targets, it also supports the United Nations' Sustainable Goal for a circular economy, and it contributes to reduce emissions by turning waste into valuable material. This is why Daikin Europe N.V. is taking various initiatives, together with its installer and service network, to stimulate the recovery, recycling, reclamation and reuse of refrigerants.



## Creating a circular economy for refrigerants

Daikin is actively promoting and facilitating the development of a circular economy for refrigerants. Recovering and reusing refrigerants instead of consuming virgin refrigerants has many benefits. It not only supports the United Nations Sustainable Goal for a circular economy, it also contributes to the United Nations Montreal Protocol targets (in the case of HFC refrigerants).

| | | |
|---|---|---|
| **Recovery** | = | The refrigerant is removed from the equipment and safely collected in recovery cylinders. |
| **Reuse** | = | Recovered refrigerant is reused for servicing existing equipment or in newly produced equipment. A recycling or reclamation process may be required before a refrigerant can be reused. |
| **Recycling** | = | The refrigerant goes through a basic cleaning process, which includes filtering and drying. |
| **Reclamation** | = | The refrigerant is reprocessed to match the performance of an equivalent virgin refrigerant. |

## A driving force in our industry

Ensuring recovery and proper treatment of refrigerants are essential to reduce emissions from installed equipment, while reuse contributes to a circular economy. Daikin is taking many initiatives to mobilise and co-operate with stakeholders in the industry to achieve sustainable approaches for dealing with refrigerants.

**Retradeables - the first online marketplace for used refrigerants**

Daikin Europe is one of the founding members behind Retradeables, a project in Hungary, Slovakia and the Czech Republic which pilots an online marketplace for used refrigerants. Retradeables is supported by the Life3R project funded by LIFE programme of the European Union (LIFE19 CCM/AT 001226), in partnership with the University of Athens.


**The portable recycling solution**

Daikin offers technicians the R-Cycle Unit, a portable recycling solution which allows technicians to perform a unique cleaning process. It facilitates reuse of refrigerants on-site and increases the market value for further reclamation purposes.

**Reclaim with confidence**

Daikin UK teamed up with partner company A-Gas to provide rapid recovery services to its customer network and to facilitate logistics, thus stimulating reclamation of refrigerants.

**The installer and service network**

With projects called "Simply Green" and "Exceed Clima", Daikin Italy encourages its installers and service network to join the green installer network, which promotes the proper recovery and responsible handling of refrigerants.

**Closing the loop**

Called "LOOP by Daikin", the Daikin Europe factories in Belgium and Türkiye and the Daikin Applied Europe factory in Italy use reclaimed R-410A and R-134a refrigerants to manufacture new VRV and Chiller equipment.

# Local initiatives

NIGERIA

## Daikin inaugurates its first training centre in Nigeria

Daikin has opened its first training centre in Nigeria in collaboration with ETIWA TECH LTD/GTE. This partnership aims to extend Daikin's expertise and knowledge in the market while addressing the growing demand in Africa. The training centre will equip technicians and installers with the necessary skills to promote better air quality, energy efficiency and sustainability.

TÜRKIYE

## Planting trees in Türkiye

In December 2022, Daikin together with the vehicle fleet company, planted 20,000 tree saplings in the area of Izmir under the motto "A Breath from Us". Daikin has already planted 50,000 tree saplings so far through the "Daikin Forest Project".

UAE


## Daikin UAE commits to national goal of achieving net-zero carbon emissions by 2050

Dakin is proud to announce another key milestone in the UAE achieved with the recent signing of the Climate-Responsible Companies Pledge initiated by the UAE Ministry of Climate Change and Environment (MOCCAE). This is in line with Daikin's Environmental Vision 2050 and supports the UAE's Net Zero by 2050 Strategic Initiative and Clean Energy Strategy.

BELGIUM


## Certificate

For three years in a row, Daikin Europe N.V. in Ostend obtained the SDG Champion label as part of a programme set out by VOKA, the Flemish Chamber of Commerce, and UNITAR, the United Nations Institute for Training and Research. The label is awarded to companies that make a significant contribution to the United Nations' Sustainable Development Goals.



# Certificates

## CDP

Daikin supports the ten principles of the United Nations Global Compact. We also endorse the recommendations of the Task Force on Climate-related Financial Disclosures (TCFD). In 2023, Daikin joined the World Business Council for Sustainable Development (WBCSD). Daikin Industries Ltd. received high acclaim as a company excelling in climate change measures and corporate disclosure by its inclusion in the A List compiled by the Carbon Disclosure Project (CDP) for the second consecutive year, an international environmental non-profit organisation that operates a global environmental information disclosure system for companies and local governments.

CDP DISCLOSURE INSIGHT ACTION A LIST 2022 CLIMATE

WE SUPPORT UN GLOBAL COMPACT

wbcsd

ISO Standards are evidence of the ongoing commitments at Daikin Europe N.V.

## ISO 14001:2015

**Environmental Management**

ISO 14001 is the most widely recognised environmental management system standard in the world. It demonstrates commitment to controlling the impact of business activities on the environment. Daikin Industries Ltd. first achieved ISO 14001 certification in 1996, followed by Daikin Europe N.V. in 1998. In past years, several affiliates and production facilities have followed suit.

For an overview of ISO 14001 certified bases, please visit: https://www.daikin.com/csr/environment

## ISO 50001:2011

**Energy Management**

ISO 50001 is the international standard designed to help organisations establish systems and processes necessary to manage energy efficiency, use and consumption. The overall objective of the standard is to reduce the workplace environmental impact, reduce greenhouse gas emissions and energy costs.
At the heart of ISO 50001 is the creation and operation of an Energy Management System (EnMS) that defines energy management and use reduction objectives and puts in place systems and processes to ensure these are achieved.

Interested to know more about Daikin's global sustainability initiatives?
Please visit our website:
www.daikin.com/csr/report

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