

Environmental initiatives throughout the product life cycle



1

Manufacturing

2

Sales & supply

Daikin's efforts to reduce its environmental impact start as early as the manufacturing stage, comprising of:

Research & development

Procurement

Assembly

While expanding its sales and supply activities, Daikin is working hard to raise awareness among its affiliates and their customers to help protect and conserve the environment:

Sales activities

Logistics



3

Use

4

End of life

Environmental efforts don't stop once Daikin Europe N.V. has sold its products. Throughout its entire product range, Daikin Europe N.V. shows the same pioneering concern for reducing the global warming impact caused by energy use and potential refrigerant emissions:

Residential

Commercial

Industrial

Proving its concern for the environment, Daikin Europe N.V. is among the first manufacturers in the industry to set up voluntary take-back schemes across Europe:

Recycling schemes

3 Use

Residential

Commercial

Industrial

Environmental efforts don't stop once Daikin Europe N.V. has sold its products. Throughout its entire range of products, Daikin shows the same pioneering concern for reducing the impact caused by energy use and potential refrigerant emissions, both of which contribute to global warming.

What is Daikin doing to decrease global warming impact during product use?

1. Raising the energy efficiency of our products is a safe and immediate way to reduce their global warming impact. The following pages contain examples of energy efficient, award winning, Daikin cooling and heating products.
2. At the same time, refrigerant emissions must be avoided, since refrigerants only contribute to global warming if released into the atmosphere. The European F-gas regulation will contribute to this goal, as it requires regular inspection of air conditioning and heat pump systems, as well as the certification of installers and service technicians.
3. And of course, we are also pursuing research efforts into the use and potential applications of low GWP refrigerants or natural refrigerants such as ammonia and carbon dioxide (CO₂). Although alternative refrigerants may have a lower GWP compared to the HFC refrigerants used today, there still are a number of obstacles to be overcome, such as safety. Therefore, it will not be easy to use these refrigerants on a wide scale in the near future.

⁴ GWP: Global Warming Potential of 1kg of fluorinated greenhouse gas relative to 1kg of carbon dioxide over a period of 100 years. R-410A, R-134a and R-407C are fluorinated greenhouse gases with a GWP of respectively 1975, 1300 and 1652.5 (values used by the European F-gas regulation).



➔ In 2008, Daikin launched the industry's first VRV® system using CO₂ as refrigerant.



Daikin Altherma high temperature honoured for renewable energy source technology

The Daikin Altherma high temperature system was honoured twice at the Rushlight Awards 2009. The Rushlight Awards encourage the development of clean technology and improving environmental standards, by recognising leading organisations throughout the UK and Ireland that have furthered environmental awareness, technology and innovation. Daikin was presented with the overall Rushlight Natural Energy Award – for the most significant overall contribution to renewable energy technology – as well as the Ground & Air Source Power Award. The latter category recognises the Daikin Altherma high temperature system as the most important single contribution to renewable energy technology in 2009.

Why are heat pumps better for the environment than traditional heating systems?

Heat pumps are an excellent answer to the so-called 20/20/20 objectives of the European Union: 20% less energy consumption, 20% reduction of CO₂ equivalent emissions and achieving a share of 20% renewable energy sources in the European energy mix, all by 2020.

1. Heat pumps consume less energy

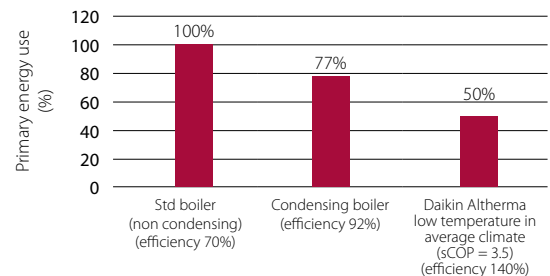
Because heat pumps can generate more heating or cooling energy compared to the energy they consume, their efficiency is excellent. This yields considerable energy savings compared to traditional fossil fuel based heating systems. The comparison below (based on measurements of the Daikin Altherma heat pump at the Daikin Energy Saving House) shows that the primary energy use can be substantially lower compared to a fuel oil or gas boiler system.

2. Heat pumps reduce CO₂ emissions

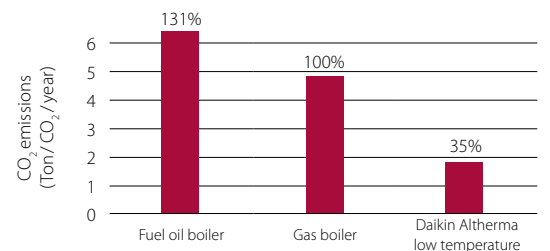
Since heat pumps consume less energy than traditional heating systems, they also generate less CO₂ emissions. Thus, heat pumps can contribute to reducing the impact of global warming. The comparison below shows that a Daikin heat pump can generate 65% less CO₂ emissions than a fuel oil boiler (based on measurements at the Daikin Energy Saving House).

3. Heat pumps use renewable energy sources

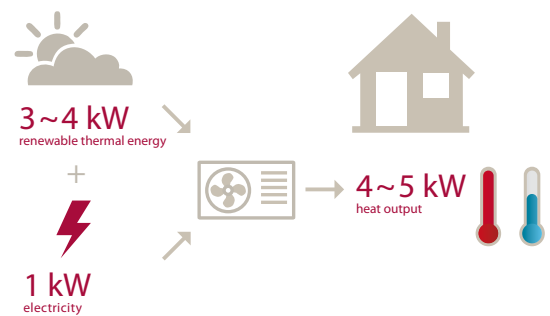
Heat pumps use energy from renewable sources: from the ground, from water or from the ambient air. These energy sources are renewable and inexhaustible. Of course, heat pumps also need energy to function (mostly electricity), but increasingly this electricity can also be generated from renewable energy sources (solar energy, wind energy, hydropower, biomass). The Directive on the promotion of energy from renewable sources – published in June 2009 – intends for final energy consumption in the European Union to include a 20% share of renewable sources. A noteworthy aspect of the Directive is its recognition of air and water as renewable energy source, and heat pumps as a technology for exploiting it. As a result, the way is open for local governments to stimulate heat pump technologies via awareness campaigns and various incentive schemes.



Comparison of primary energy use between conventional boilers and Daikin Altherma low temperature. Result is for Daikin Altherma low temperature in average climate (Strasbourg). Application: underfloor heating - floating setpoint: 35°C.



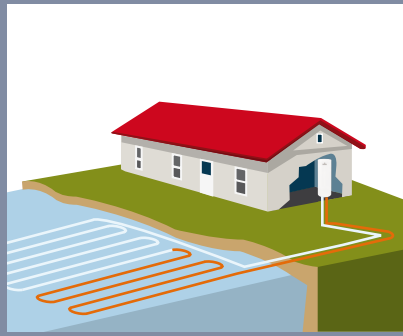
Calculation data: Country: Belgium, Power generation emission: 276g of CO₂/kWh, Gas emission: 202g of CO₂/kWh, Gas boiler efficiency: 90%, Fuel oil boiler emission: 268g of CO₂/kWh, Efficiency fuel oil boiler: 90%



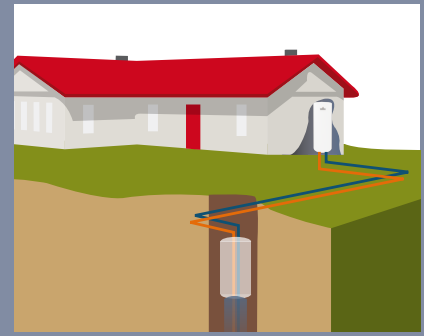
By making use of renewable energy sources, heat pumps can deliver 4 to 5 times more heat energy than the electrical energy they consume.



Aerothermal heat pump



Hydrothermal heat pump



Geothermal heat pump

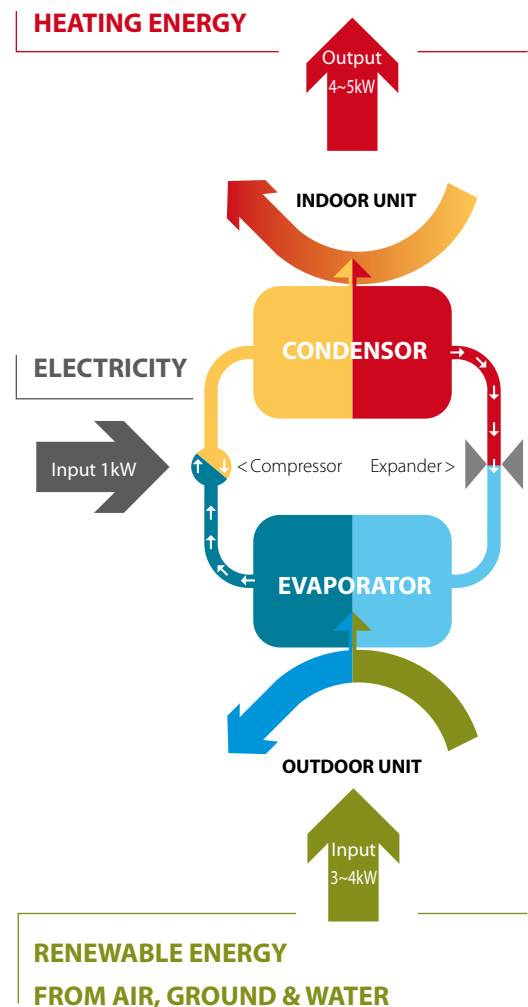
Heat pumps: the right energy saving, low carbon choice

What are heat pumps and how do they function?

Heat pumps are highly energy-efficient, all-in-one heating and/or cooling devices. In heating mode, they extract thermal energy from the ambient air (so-called aerothermal heat pumps), from water sources (hydrothermal heat pumps) or from the ground (geothermal heat pumps), and 'pump' it into buildings. In cooling mode, they do the opposite. Some heat pumps are also equipped with a function to provide domestic hot water.

Inside the building, the generated heat or cold can be distributed directly to the indoor air, or indirectly via a water circuit (floor heating systems, fan coils, radiators). Thus, all kinds of heat pump types are offered on the market: water to air, air to water, ground to water, water to water, air to air etc. Daikin has ample experience with all of these heat pump types.

The energy transfer in heat pumps occurs via a substance called 'refrigerant' that circulates through a closed circuit of pipes and heat exchangers in an evaporation and condensation cycle. During this cycle, heat is transferred from one area to another: in evaporation mode, the refrigerant absorbs heat, whereas in condensation mode, the refrigerant releases heat. By doing so, heat pumps can transfer heat from the ground, water or outdoor air, lift the temperature to a higher level and bring it inside a building (or vice versa in the case of cooling). With the units, commercially available today, it can be done even at outdoor temperatures down to -25°C .



Raising consumer awareness of energy-saving measures in heating and cooling

Daikin leaves no stone unturned to make consumers aware that everyone can contribute to a cleaner world. Thus in its brochures, manuals, and other sales literature, Daikin gives ample recommendations how to optimise the use of its units in both heating and cooling mode. An example of that pioneering care are the “We care icons” that have now become a recognisable item in all Daikin sales catalogues.

We care icons

Daikin units incorporate many different features, including energy saving ones. Consumers are informed on these features via icons in product catalogues. These “We care icons” indicate those product features that have an impact on reducing energy consumption. Many of our units integrate some of these features.



ENERGY EFFICIENCY

Daikin units are energy efficient and economical.



ECONO MODE

This function decreases the power consumption so that other appliances that need large power consumption can be used. This function is also energy saving.



MOVEMENT SENSOR

The sensor detects whether someone is in the room. When the room is empty, the unit switches to economy mode after 20 minutes and restarts when a person enters the room.



FAN ONLY

The air conditioner can be used as fan, blowing air without cooling or heating.



ENERGY SAVING DURING STANDBY MODE

If the room is empty for 20 minutes, the system shifts the set temperature by ± 2 degrees to reduce the consumption.



TWO AREA INTELLIGENT EYE

The air flow is sent to a zone other than where the person is located at that moment. If two people are detected in the room, the movement sensor, together with the comfort mode (cooling directed at the ceiling, heating directed at the floor), will see to it that the air flow is projected away from the occupants. If no people are detected, the unit will automatically switch over to the energy-efficient setting.



NIGHT SET MODE

Saves energy, by preventing overcooling or overheating during night time.



INVERTER TECHNOLOGY

Inverter compressors continuously adjust compressor speed to actual demand. Fewer power-consuming starts and stops result in decreased energy consumption (up to 30%) and more stable temperatures.

Residential applications

The following pages showcase Daikin Europe N.V.'s award winning products for residential, commercial or industrial use. Daikin Europe N.V. won a number of awards for products that limit the impact on the environment.

1. Air to air heat pumps

Daikin Emura:

Top design and extreme efficiency go hand in hand

Launched in 2009, the Daikin Emura all-in-one room comfort system combines superior design, comfort and energy efficiency in a stylish wall mounted unit. Beneath the subtle yet sleek design, is advanced Daikin technology: a residential split heat pump system that heats, cools, ventilates and dehumidifies. Daikin Emura is equipped with Daikin's energy-saving inverter technology. Moreover, an intelligent eye switches the system to stand-by when the room is empty for more than 20 minutes, thereby saving on energy consumption. The result: extreme energy efficiency and absolute room comfort in a package that adds refinement and top design to any interior.



Eco-label

The European Eco-label – also known as “the Flower” due to its flower logo – denotes products and services representing the top of their class concerning environmental performance. Products bearing the voluntary eco-label scheme are certified to meet EU-wide environmental criteria, and compliance is verified by an independent test body. The eco-label is available for 28 product groups, including heat pumps. Daikin Europe N.V. was the first in its sector to obtain the Eco-label for Daikin Altherma, emphasizing its ongoing commitment to the environment.



➔ For certified models, please refer to www.daikinaltherma.eu

2. Air to water heat pumps

Energa partners up with Daikin Poland

In early 2010, Daikin Poland began a cooperative venture with Energa – one of Poland’s main energy providers – on a private housing project called ‘Energy Saving House’. The project focuses on various energy-saving solutions. Daikin Altherma has been selected as the only air to water heat pump for the project. Daikin will equip the 600 mostly new residential housing units with Daikin Altherma heat pumps by 2014. This project again illustrates Daikin’s commitment to finding solutions that combat global warming and contribute to an environmentally sustainable future.



UK refurbishment project using Daikin heat pumps wins award

A major refurbishment project involving the installation of Daikin Altherma air to water heat pumps and solar thermal renewable technologies in 60 South Tyneside Housing properties (North East England) won the National Energy Action (NEA) award.

The use of the latest renewable technology combined with improved insulation of walls and roofs means that tenants of these 60 homes can expect to see their fuel bills drop by up to 30%, in turn contributing to massive reductions in CO₂ emissions.

As a first step, a showcase home was opened where both Daikin Altherma heat pumps for heating and hot water, and solar thermal collectors for hot water production were installed. Built in the 1960s and previously heated by a gas-powered boiler, this showcase home has been transformed into environmentally sustainable housing.

Daikin Altherma range wins MCS accreditation

During FY2009, the entire Daikin Altherma product range was accredited by the Microgeneration Certification Scheme (MCS) in the UK. This means that all Daikin Altherma systems are eligible for grant funding under the Low Carbon Buildings Programme (LCBP), offering financial support to homeowners who install a fully integrated Daikin Altherma system.

Commercial applications

Daikin Sky Air® and VRV® represent Daikin's ultimate technology in climate comfort and energy efficiency for small to large offices, hotels and other commercial facilities, providing year-round heating and cooling.

VRV®: Commercial heat pumps for versatile, high level comfort

Daikin's VRV® systems are available as air source, water source as well as ground source heat pumps. They circulate just the required amount of refrigerant volume to the various circuits in a building, allowing different rooms to simultaneously enjoy different temperatures. Daikin's inverter technology allows the system to adjust the power needed to actual requirements, ensuring maximum comfort (temperature fluctuations are minimised) and maximum efficiency (no unnecessary energy-consuming starts and stops). VRV® heat recovery systems also allow diverting exhaust heat from indoor units in cooling mode (which would otherwise be lost) to areas requiring heating, resulting in additional savings.

Perseo and Auros management centres, Milan, Italy

The Italian Galotti real estate group chose Daikin Italy to provide support in designing climate control systems for its new Milan-based Perseo and Auros class A⁴ buildings. Both buildings were designed and built with priority being given to the environment: class A environmental efficiency, integration with renewable energy sources, respect for the environment, reduced winter heating and summer cooling energy losses in order to achieve energy savings, and rational energy use. The installed solutions included Daikin VRV® heat recovery systems that deliver 5.9 kWh/m³ per year for heating. This represents a saving of 50.9%⁵ in total operating costs and drastically reduced CO₂ emissions (less than 4.2 kg/m³ per year).



⁵'A class': the top class in terms of building energy consumption, as defined by Italian law related to EPB (energy performance of buildings).

⁶ Calculated versus the maximum consumption allowed, as stated by the regional law related to EPB.



AWARD

UK authoritative professional journal H&V News grants the Air Movement Product of the Year Award to Daikin UK for its VRV®III Heat Recovery and Biddle air curtains. Product of the year awards are given to those products that excel in innovation and efficiency.

➤ Picture taken by Sjef Frijns-Geleen

A Dutch retailer's corporate social responsibility matches Daikin's solution

As part of its CSR policy, a Dutch retailer wished to investigate the purchase of an integrated energy-efficient cooling and heating system in its shops. Through its contacts with Daikin Netherlands, the retailer discovered Daikin's VRV® heat recovery system. A pilot project including two of its shops was set up in late 2009, with a first evaluation early 2010. The pilot project involved the installation of a VRV® heat recovery system, including Biddle air curtains. In order to assess the possible benefits of the above-mentioned installation, the pilot project set-up was compared to a conventional system including separate air conditioning units for heating and cooling, as well as fossil fuel fired air curtains.

Taking into account the fact that the winter of 2009 was one of the harshest in 20 years, the first measured results looked impressive: net savings of 75% for both shops on an annual basis⁶ and a reduction in CO₂ emissions⁷ of more than 70%, compared to the conventional set-up.

⁷ Monitoring during the first quarter of 2010 supports the projected money savings of 75%

⁸ CO₂ emissions based on Dutch CO₂ values (based on values SenterNovem 2007)



"The first results of this pilot project will serve as an example for the rest of the retail industry, and will certainly open new avenues for Daikin's energy-saving products".

Alex Maan, National Accounts Manager,
Daikin Netherlands

► Large commercial and industrial applications:

Daikin chillers: 'air to water' heat pumps in all sizes

Daikin chillers are available in sizes from 5kW to 9MW and are used in many industries: from fish farming, wine processing and agriculture, through pharmaceuticals and food production, to comfort heating and cooling in large buildings. Unique in their precision, power, low operating noise, easy maintenance and low running costs, Daikin chillers represent the sure and safe route to an indoor environment or process application that is comfortable and consistent.

RIVERGATE office center, Vienna, Austria

This new 50,000-m² office center, is located in one of Vienna's most attractive locations: the Danube waterfront north of the city center, close to Danube Island. The office center consist of 2 gates, the first gate contains 12 storeys, the second gate 8 storeys. Daikin Airconditioning Central Europe Handels GmbH delivered over 3 MW of high efficiency water-cooled chillers for this project. For cooling, Daikin suggested two high efficiency water-cooled chillers. Both water circuits operate in series with low delta T and with high efficiency variable flow pumps, further increasing the system's efficiency and control possibilities. For heating, two high efficiency water-source heat pumps extract heat from two sources: the building foundations (geothermal) and Danube river water (hydrothermal). Daikin was proud to contribute to the RIVERGATE project obtaining LEED (Leadership in Energy and Environmental Design) Gold status in the precertification process.



LEED

LEED is an internationally recognised green building certification system to improve building performance related to energy savings, water efficiency, CO₂ emissions reduction, improved indoor environmental quality and stewardship of resources. RIVERGATE is the first building in Austria to be granted this coveted award. Key to RIVERGATE winning the award was the site's excellent transport links, perfect infrastructure, innovative controlled natural light exposure, as well as the extremely efficient cooling and heating solutions provided by Daikin.

► Conveni-pack and ZEAS: condensing units, refrigeration, freezing and heat pump technology offer a total solution

Daikin developed Conveni-pack – an all-in-one freezing, refrigeration and heat pump system – especially for convenience stores. It reduces energy consumption by integrating freezing, refrigeration, heating and air conditioning functions into one system. Conveni-pack reduces annual energy consumption up to 60% compared to conventional systems by utilising the heat exhausted from freezers and refrigerators to heat the shop in winter. The compact solution also allows for maximum installation flexibility, and is ideally suited to be combined with Daikin's ZEAS range of refrigeration condensing units for low and medium temperature applications.

Conveni-pack and ZEAS: complementary money savers for German retailer

A German retailer with a 570-m² large beverage department and a 730-m² food department wanted to upgrade its cooling, refrigeration and heating installation. An analysis comparing the performance of a conventional cascade system of cooling and refrigeration units to a Conveni-pack/ZEAS combination delivered stunning results: projected energy savings of 37% on an annual basis, resulting in 30% less running costs for the Conveni-pack/ZEAS combination. Thanks to heat and condensation recovery, the installation is projected to generate 41% less CO₂ emissions, a very impressive result for such a compact system. The retailer was also impressed with the 'plug-and-play' aspect of the Conveni-pack/ZEAS combination, an important aspect in renovation projects.



Awards won by Daikin's
Conveni-pack:

- › Environmental Product of the Year (UK, 2006)
- › Incentive Award by the German Environment Ministry (Germany, 2009) BMU-Förderpreis "Kälte und Wärme"