

FAQ about R-32

Is R-32 a safe refrigerant ?

R-32 belongs to the category of lower flammable refrigerants (class 2L in ISO817 standard), therefore, it can be safely applied in a wide range of air conditioner and heat pump applications. Instructions from the manufacturers of R-32 equipment and from the suppliers of R-32 refrigerant cylinders must be followed, as is the case for any type of refrigerant.

R-32 will not ignite if the concentration level in a room stays below the lower flammable limit. International and European safety legislation and standards such as IEC60335-2-40 and ISO5149 define guidelines to remain well below the lower flammable limit in case of accidental leakage.

What are the specific environmental and energy usage benefits of R-32?

R-32 has significantly lower Global Warming Potential (GWP) – one third that of R-410A. This means the refrigerant charge amount can be reduced by 10 to 30% over R-410A and the CO₂ equivalent refrigerant charge (kg x GWP) can be drastically reduced. Also, compared with R-410A, R-32 transfers a larger quantity of heat-per-unit amount, producing greater efficiency, and requiring less electricity to operate.

As an installer/service technician, do I need other tools to install R-32 equipment?

It is particularly important to check that manifolds, leak detectors and recovery pumps are permitted to be used for R-32. Tools are available on the market which are permitted for dual use, suitable for both R-32 and R-410A equipment. If you are in doubt, check with the tool supplier. For recovering R-32 you need an approved R-32 recovery cylinder.

Is R-32 a good refrigerant for high ambient climate conditions?

R-32 has better capacities and efficiencies than R-410A, this is even more so at high ambient temperatures.

What is Daikin's approach regarding next-generation refrigerants?

Daikin believes our industry can reduce the global warming and energy consumption impact of air conditioning, cooling, and heat pump equipment by transitioning away from refrigerants with high Global Warming Potential (GWP) and which requires more energy to operate. Because of HFC refrigerant's widespread and growing use around the world, a conversion to refrigerants that have a lower GWP rating is essential.

Why is Daikin advocating R-32 as the next generation refrigerant?

Daikin believes R-32 is the most balanced refrigerant solution to replace R-410A or R-22 that can mitigate the global warming impact of residential and commercial air conditioners and heat pump equipment. It has several advantages over other alternatives:

It requires less energy to use (as compared to R-410A, the most commonly used refrigerant today), and it is easier to recycle. There is no perfect alternative refrigerant applicable for every kind of application, so it is necessary to use the most suitable refrigerant for each application. However, Daikin believes R-32 is the best, next generation refrigerant for many applications.

Why is Daikin offering the free access for certain patents worldwide at this time?

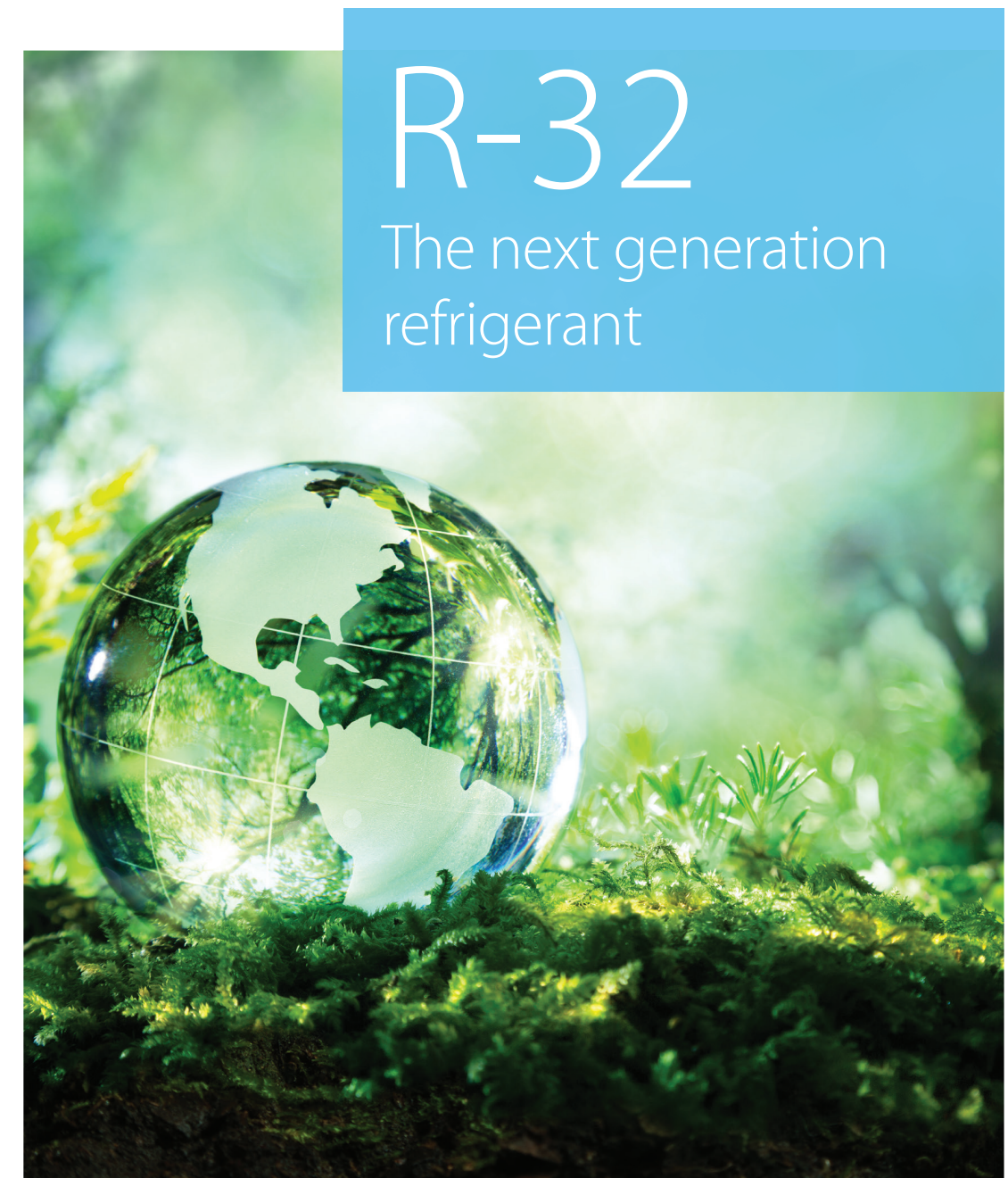
Daikin believes reducing the global warming impact of air conditioners, cooling, and heat pump equipment cannot be achieved by just one company. We believe free access for certain patents will encourage the industry to immediately adopt this environmentally-advanced technology. Because many countries are today considering ways to mitigate climate change, Daikin decided it is important to promote the conversion to R-32 as a way to improve the environmental profile of air conditioners, cooling, and heat pump equipment.

How will this decision benefit Daikin?

Daikin and other companies can accelerate the development of air conditioners, cooling, and heat pump equipment using R-32. These efforts will not only have a positive impact on mitigating global warming, but will also help ensure sustainable growth of the industry worldwide.

What will be the impact on Daikin's business?

R-32 units are today sold in more than 40 countries. As the industry will benefit and expand, we can expect our business to expand globally. In the U.S., one of the world's largest market, will be a major step toward the development of R-32 products. In Europe, where R-32 air conditioners were first introduced in 2013, this action can help meet the gradual phase down of HFC consumption required by the EU F-gas legislation. It can also help meet the GWP limit of 750 for single split air conditioners with a refrigerant charge below 3 kg much earlier than required (legal deadline is 2025). In emerging countries, we expect some countries will revise their regulations and standards to align with those of developed countries.



Go green with Daikin!

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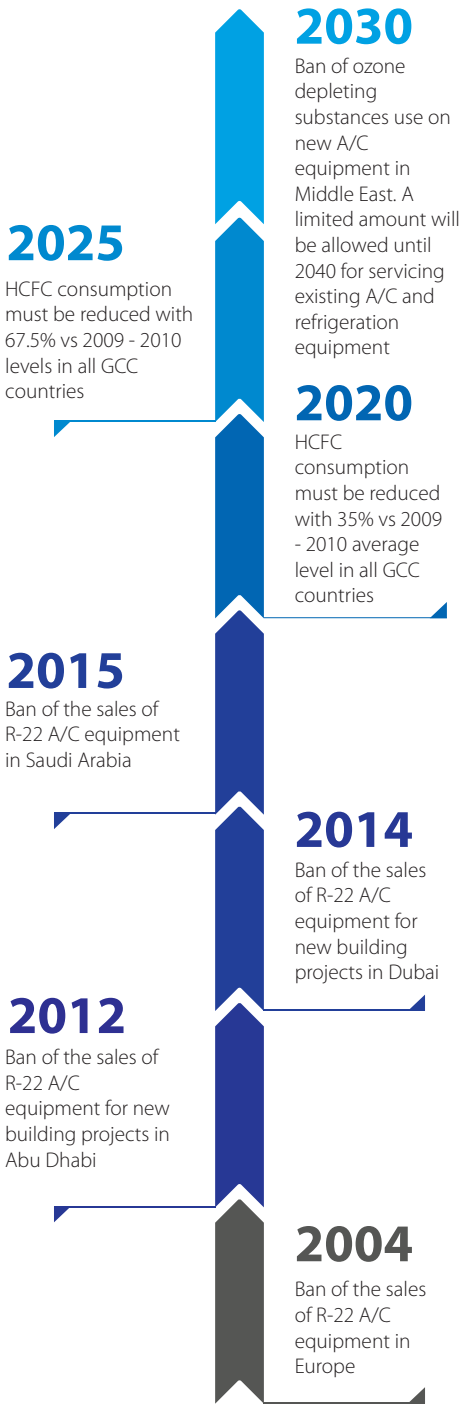
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Ahead of legislations

As a market leader, Daikin aims to develop systems that improve indoor comfort levels while having low environmental impact, with energy efficiency and refrigerant choice as key factors. With this vision in mind, Daikin launched the first worldwide air conditioners with R-32 refrigerant in Japan end of 2012 were several millions of units have been installed since.

Meanwhile, R-32 models have also been introduced in other countries such as Australia, New Zealand, India, Thailand, Vietnam, Philippines, Malaysia, Indonesia and as a first, in Europe, in 2013. In GCC, the first high ambient split units were launched in May 2015.



In 1987, the international community agreed under the Montreal protocol to phase out ozone depleting substances to nearly zero by 2030. As a consequence, the A/C market started to move away from ozone depleting HCFCs refrigerants, such as R-22, towards HFCs.

However, the HFCs conventionally used as alternatives for HCFCs have a high global warming potential (GWP) and as such a negative impact on climate change. As such in recent years, some legal developments have been undertaken in some regions to restrict the use of these substances as well. These actions were followed by an agreement in 2015 by the international community to initiate discussions to include the control of climate change inducing HFCs under the Montreal protocol. As a consequence, today, the A/C market is moving again, now towards refrigerants with a lower GWP.

What is R-32?

The chemical name for R-32 is difluoromethane. It is already used for many years as a component of the refrigerant blend R-410 (50% R-32 and 50% R-125). Daikin and other industry players recognize today that there are several advantages of using R-32 in its pure form instead of R-410 or other types of blends. It is considered the most balanced next generation refrigerant for residential and commercial air conditioners, cooling and heat pump systems.

	R-22	R-410A	R-32
Composition	Pure R-22 (no blend)	Blend of 50% R-32 + 50% R-125	Pure R-32 (no blend)
GWP (Global Warming Potential)	1,810	2,087.5	675
ODP (Ozone Depletion Potential)	0.05	0	0

Compared to the refrigerant R-410A, the Global Warming potential of R-32 is only one third (GWP is 675 for R-32 compared to 2,088 for R-410A), while it allows for a much smaller refrigerant volume or higher energy efficiency.

As a single component refrigerant, R-32 is also easier to recycle and reuse, which is another environmental bonus.

In addition, R-32 is easy to handle for installers and service technicians as it can be charged in both liquid and gas phase and working pressures are similar to R-410A. There is also no need to worry about fractionation or glide problems as R-32 is not a blend refrigerant.

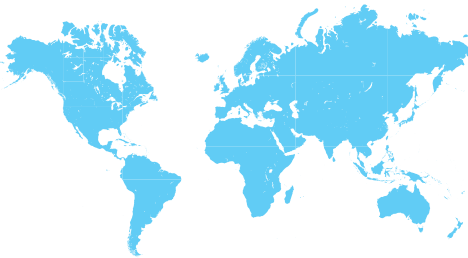
Key Characteristics

R-32 is a next generation refrigerant that addresses a range of environmental considerations in a balanced manner.

- ✓ R-32 does not deplete the ozone layer, unlike R-22
- ✓ R-32 has a GWP of 675 - about one third of R-410A
- ✓ With R-32, the energy efficiency of the equipment can be higher compared to R-410A or it can be kept at the same level but with a more compact model size
- ✓ Easier to reclaim, recycle and reuse and no need to worry about composition changes in case a leakage occurred in the equipment

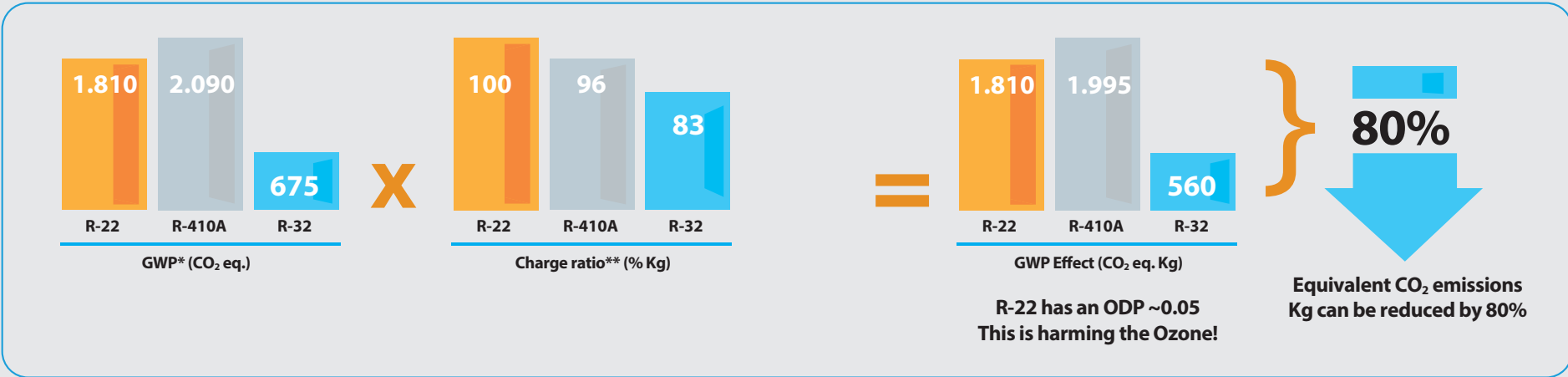
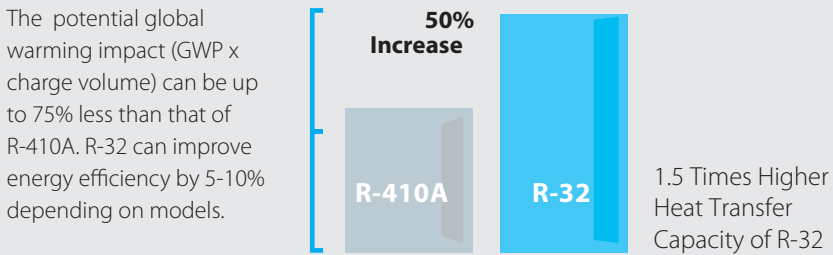
Worldwide Usage

R-32 is currently being used in about 15 million air conditioning units (estimated May 2016) in more than 40 countries worldwide, including Japan, India, Australia, Thailand and several other Asian, Middle East and European countries. In GCC, more than 10,000 units were sold in Oman and the UAE, as of June 2016.



Environmental Benefits of R-32

One of the important features of refrigerants is their heat transfer capacity. R-32 possesses about 1.5 times higher heat transfer capacity than R-410A, which means that its charge volume can be up to 30% smaller, depending on the model design. This in addition to the lower GWP of R-32 results in a strongly reduced potential global warming impact.



* Based on IPCC 4th report
** Based on charge ratio on 18 class for FTD, FTS and FTKM 50 Hz series.