

Using CO2 to green SA's cooling systems

Cooling plays a vital role in daily life, from cooling people in office buildings and hospitals, to cooling products like food and data. Cooling is necessary in our modern society but it also consumes a vast amount of energy.



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Fossil fuels, according to the [European Commission](#), generate 84% of the EU's heating and cooling, while only 16% comes from renewable energy. As the world's population continues to grow, so too will the need for cooling, and the European Commission is predicting that the demand for space cooling in the EU will increase by 70% by 2030. The EU is taking action, supported by engineering companies like Danfoss - a supplier of engineering technologies focused on climate and energy-efficient solutions.

The company is focused on developing and implementing energy-efficient and sustainable cooling solutions, including using natural refrigerants like CO₂, while simultaneously helping to tackle global warming.

A history of cooling

CO₂ was being used as a refrigerant as early as 1850, but was replaced in 1928 by chlorofluorocarbons (CFCs). They were considered to be a safe, non-flammable, non-toxic and inexpensive coolant for use in air conditioners and refrigerators. Fifty years later, scientists established that CFCs were contributing to the depletion of the ozone and the reaction from countries around the world was to sign the Montreal Protocol, to phase out the production and use of ozone-depleting substances.

By the early 1980s, hydrofluorocarbons (HFCs) and hydrochlorofluorocarbons (HCFCs), were replacing CFCs as a coolant in refrigerators and air conditioners. While they were believed to be less damaging alternatives, scientists proved that they are powerful greenhouse gases that contributed to climate change. CFCs, HCFCs and HFCs are known as F-gases, which, according to the European Commission, have a global warming effect up to 23 000 times greater than CO₂.

The world takes action

In October 2016, 197 countries adopted the Kigali Amendment to the Montreal Protocol, to cut the production and consumption of HFCs, which have a high Global Warming Potential (GWP). GWP measures the heat-absorbing ability of a gas over a specific timescale, compared to carbon dioxide. The lower the GWP, the more climate-friendly the gas. The

value of various HFCs and HCFCs is usually in the thousands, while climate-friendly alternatives are lower; the GWP of CO₂ is one.

Under the amendment, all countries over the next three decades will gradually reduce HFCs by more than 80%, replacing them with alternatives that are more environmentally-friendly. By the end of the century it is estimated that this world-wide commitment could prevent up to 0.5° C in global warming. The EU is taking the lead in limiting emissions, while also focusing on innovation, particularly in natural refrigerants.

Natural refrigerants

“When it comes to climate change, CO₂ is usually regarded as a major problem, however, as a refrigerant it has proven to be reliable, efficient and environmentally-friendly,” says Roy Naidoo, refrigeration and air conditioning sales manager of Danfoss sub-Saharan Africa. “With a GWP of one it causes no ozone depletion, which means that CO₂ can be used to cool people and products safely and without negatively affecting the planet's climate.”

Danfoss has joined a UN initiative called Sustainable Energy for All, which aims to increase access to affordable and sustainable cooling solutions throughout the world.

South Africa is changing

“Forward-thinking retailers in warmer climates, like South Africa, can switch to CO₂ solutions and save up to 20% on energy bills. Compared to traditional HFC refrigerants, the effect of CO₂ on the climate is up to 4,000 times less. So, not only will these retailers save on costs, but they will dramatically reduce cooling-related emissions,” says Naidoo.

While the country is behind Europe in adopting sustainable cooling solutions, Danfoss says it's working with a leading local retailer to implement a cost-effective CO₂ refrigeration solution that is compliant with the increased environmental requirements of today – and tomorrow.

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