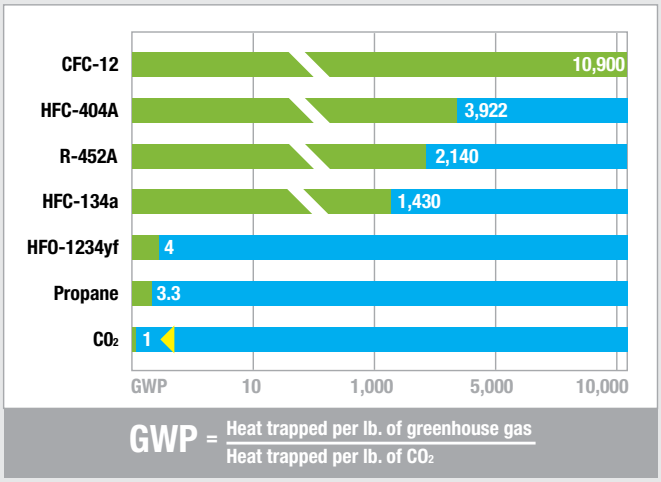
Naturally *Sustainable*

Natural refrigerant technology responds to the shipping industry's drive for sustainable refrigerated transport solutions. Among all the natural refrigerant alternatives, none presents a better solution for shipping lines than carbon dioxide (CO_2), which is used in the NaturaLINE® container refrigeration system from Carrier Transicold.

CO_2 is a non-ozone depleting refrigerant and addresses today's concerns about the global warming potential (GWP) of common hydrofluorocarbon (HFC) refrigerants. CO_2 is part of a small family of natural refrigerants found in the natural environment.

Environmental Impact of Refrigerants



GWP = Heat trapped per lb. of greenhouse gas / Heat trapped per lb. of CO_2

CO_2 compares very favorably against the current contemporary container refrigerants, HFC-134a and HFC-404A, as well as many other refrigerants.

(Source: UNFCCC Fourth Assessment Report and published manufacturer data.)

The Baseline in GWP

CO_2 has a global warming potential of one, making it a baseline against which all other refrigerants can be measured. With the NaturaLINE unit, concerns about refrigerant leaks diminish, as CO_2 simply returns to the atmosphere rather than a discharge of high GWP compounds.

Although other refrigerants – synthetic and natural – have been suggested as alternatives to today's HFCs, CO_2 has strong environmental and pragmatic attributes. For example, HFO-452A, a hydrofluoro-olefin (HFO) based refrigerant touted as a substitute for R-404A, has a GWP of 2,140, which is 50 percent higher than today's R-134a and more than 2,100 times higher than CO_2. Other alternatives, such as HFO-1234yf and propane, bring concerns about flammability.

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CO_2 Makes Sense

Governments and environmental advocacy organizations are considering regulations around HFC refrigerants due to concerns about global warming potential. In 2014, the European Union passed its directive on fluorinated gases, known as F-gases, with restrictions aimed at phasing down the use of HFCs beginning in 2015. Also in 2014, the U.S. and China agreed to work together to phase down the consumption and production of HFCs. G-20 leaders followed by expressing their own support for an HFC refrigerant phase-down.

The U.S. Environmental Protection Agency has proposed a time frame for banning current refrigerants in motor vehicle air conditioning systems as part of its Significant New Alternatives Policy (SNAP) program. For a variety of new and retrofit retail food refrigeration applications, the SNAP program also proposes listing R-404A and R-134a as unacceptable. These refrigerants are also used in transport refrigeration.

When it comes to low GWP, CO_2 is one of the best and most practical refrigerant alternatives for container refrigeration applications. To improve their environmental profiles and stay ahead of regulatory developments, shipping lines will find the NaturaLINE unit with CO_2 refrigerant to be the naturally sustainable choice.

GWP is an estimate of how much a given mass of gas will contribute to global warming – also called the greenhouse gas effect. Traditional synthetic refrigerants, when released into the atmosphere, can act as heat-trapping greenhouse gases because of their molecular complexity.

The NaturaLINE unit has been validated by UL Environment as having a 95 percent recyclability rate, joining Carrier's PrimeLINE® unit as the only container refrigeration units to achieve recyclability validation.

CO_2 REFRIGERANT FUNDAMENTALS

- GWP of one, the lowest global warming potential of all potential refrigerant alternatives
- Non-ozone depleting
- Nonflammable and nontoxic at low concentration (ASHRAE 34 safety classification A1)
- Protected against phaseouts, taxes and F-gas regulations
- Cost-effective, available worldwide, requires no special disposal
- Efficient

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