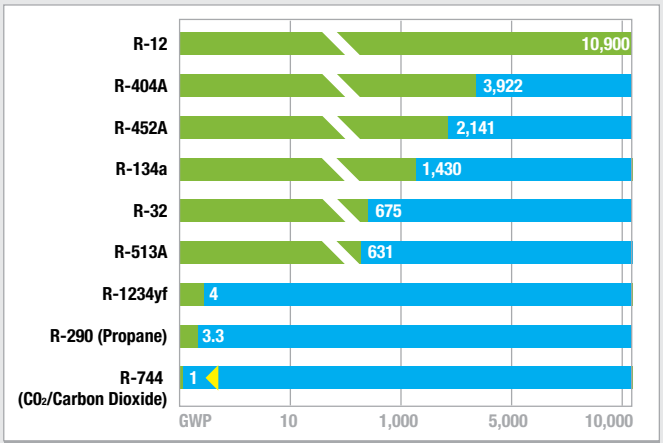
Naturally *Sustainable*

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



$GWP = \frac{\text{Heat trapped per lb. of greenhouse gas}}{\text{Heat trapped per lb. of } CO_2}$

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 1, 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, R-744 (CO_2) has strong environmental and pragmatic attributes. For example, R-452A, a hydrocarbon (HFC)/ hydrofluoro-olefin (HFO) blend refrigerant touted as a substitute for R-404A, has a GWP of 2,141, which is 50 percent higher than today's R-134a and more than 2,100 times higher than R-744 (CO_2). Other alternatives, such as R-1234yf and R-290 (Propane), bring concerns about flammability.

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CO_2 Makes Sense

Governments and environmental advocacy organizations are considering and have passed regulations targeting HFC refrigerants due to concerns about GWP.

The European Union's Fluorinated-Gas (F-gas) regulation has set aggressive timelines for the phasedown of HFC refrigerants. The U.S. Environmental Protection Agency's Significant New Alternatives Policy (SNAP) has placed restrictions on some high and very high GWP refrigerants in certain applications, while also approving use of CO_2 for transport refrigeration. A recent global agreement takes HFC phasedowns further. The 2016 Kigali Amendment to the Montreal Protocol sets phasedown targets for developed and developing countries on a global scale.

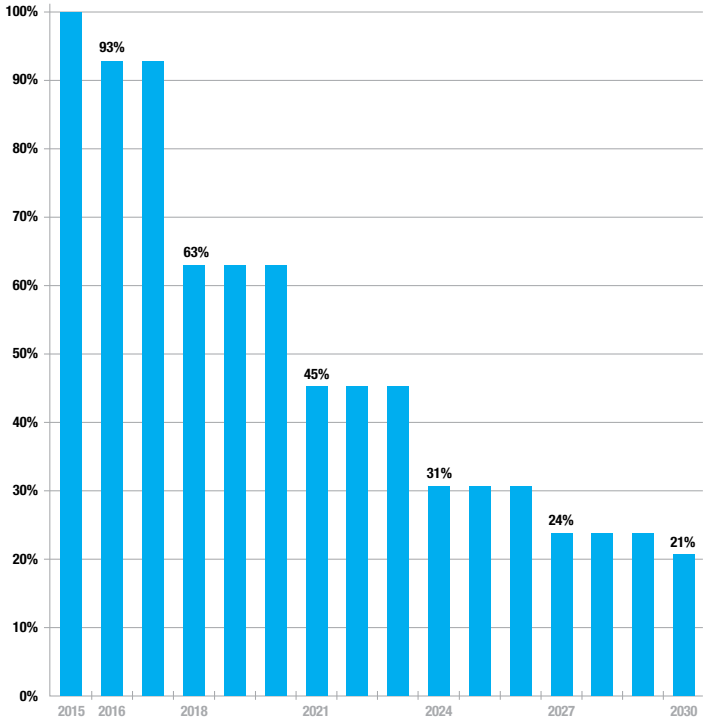
With its carbon-neutral GWP, CO_2 is unaffected by phasedowns of HFC refrigerants. And, the NaturaLINE unit takes customers directly to an end state, bypassing the need for intermediate refrigerant solutions.

In sum, when it comes to low GWP, CO_2 is simply one of the best and most practical refrigerant alternatives for container refrigeration applications today.

CO_2 (R-744) REFRIGERANT FUNDAMENTALS

- Power consumption comparable to Carrier's best-selling unit
- Excellent efficiency, especially for part-load perishable cargo
- ASHRAE 34 and ISO 817 safety classification A1, nonflammable and nontoxic
- U.S. EPA-approved for transport applications and unaffected by phasedowns, F-gas Regulations and Kigali Amendment to the Montreal Protocol
- No refrigerant tax
- No intermediate refrigerant step needed
- Familiar controls and maintenance
- Global support from Carrier

European Union's F-gas Regulation Timeline for the Phasedown of Fluorinated Gases, including HFC Refrigerants



Source: EU Commission

Sustainability that Goes Beyond

The NaturaLINE unit's sustainability does not stop with its refrigerant. Further bolstering its environmental profile is its outstanding energy efficiency, which can reduce shipboard demand for electricity, conserving fuel and reducing emissions related to power generation, thus helping to reduce carbon footprint.

The zero-GWP polyurethane foam blowing agent technology used in the NaturaLINE unit offers high insulation properties without contributing to GWP. And, when the NaturaLINE unit reaches the end of its useful service life, it is nearly entirely recyclable. The 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.

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.

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