

CO₂ TC vs CO₂-HFC cascades in warm ambients

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By [Charlotte McLaughlin](#), Oct 12, 2017, 17:03 GMT+2 · 1 minute reading

Arneg's Chiara Tognoli explains that CO₂ systems with ejectors can be much more efficient than HFC-CO₂ cascade systems even in temperatures above 40°C.



Chiara Tognoli, customer technical support engineer at Arneg, during the innovation session at ATMO Europe.

Photo Credit: Anna Salhofer

Demonstrating that CO₂ transcritical (TC) refrigeration systems can be much more efficient than HFC-CO₂ cascade systems even in high ambient temperatures, Chiara Tognoli, customer technical support engineer at Arneg, provided an analysis of two systems installed in similar supermarkets at ATMOsphere Europe in Berlin, Germany in September.

The first system is a CO₂ transcritical one with an ejector (in a 10,000 m² supermarket) and the other is a CO₂/HFC cascade (in a 9,500 m² supermarket), both of which were installed in northern Italy.

The energy performance of the system was measured (with the Arneg supervision system: IRIS) during the period August 2016 to August 2017 with ambient conditions reaching 40°C during the summer months, according to Tognoli.

The CO₂ TC ejector system was found to save 9% over the twelve-month period with 60,300 kWh/year saved, which translates into a €10,800 annual saving for the end user compared to an HFC-CO₂ cascade system.

"This makes CO₂ competitive warmer climates," she declared during the innovation session at ATMO Europe.

Arneg also compared the environmental impact of the two installations (as depicted in the below table):

Plant	Direct emissions [ton CO ₂ eq]	Indirect emissions [ton CO ₂ eq]	Total emissions [ton CO ₂ eq]
CO ₂ Ejector	2	2020	2022
Subcritical	1416	2217	3633

The CO₂ ejector system has 44% less total [CO₂ eq.] emissions than the HFC cascade system, which is "equivalent to saving 7,100 trees," Tognoli said.



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