

From threat to valuable resource: challenges and prospects for the future of CO₂ in industry

Dr. Antonina Clemente
Nippon Gases Industrial S.r.l.

Carbon dioxide is an extremely important gas not only for its industrial uses but also for environmental balance.

It can be produced (recovered) from different sources and this changes its impact and quality. CO₂ is a completely natural gas present in the earth's atmosphere in percentages around 0.04%.

It is emitted in any hydrocarbon combustion process, but the main sources of "CO₂ recovery" for industrial applications are:

CHEMICAL SYNTHESIS (by-product of chemical reactions)

BIOGENIC (anaerobic fermentation)

NATURAL /GEOTHERMAL (carbon dioxide emissions from underground).

A key factor to consider is product quality, which determines compliance with different regulations (for example E290 food additive certification, ISBT standard compliance, FSSC 22000 certification) and affects the application of the product in the most critical areas.

The CO₂ market is constantly evolving due to its application in various sectors: from food for cooling dough, cryogenic freezing and packaging in a modified atmosphere, to beverages for carbonating beverages, to the pharmaceutical sector for the supercritical extraction of active ingredients, to refrigerated transport as dry ice, to wastewater treatment for pH correction, and many other applications.

The requirement to reduce CO₂ emissions in order to meet the carbon footprint reduction targets set at European and global level is therefore a significant challenge for both CO₂-producers and consumers.

Some technologies for CO₂ recovery and purification are already available on an industrial scale. The challenge is to find new sustainable solutions for CO₂ recovery and reuse as a raw material.