

*CO₂ Capture
and Liquefaction*



CO₂ solutions since 1987

Tecno Project Industriale

Tecno Project Industriale (TPI) is a wholly owned subsidiary of SIAD Macchine Impianti S.p.A., the engineering subsidiary of SIAD Group, a large industrial gases enterprise headquartered in Bergamo, Italy.

For more than 30 years, TPI has specialized in the engineering, procurement and construction of:

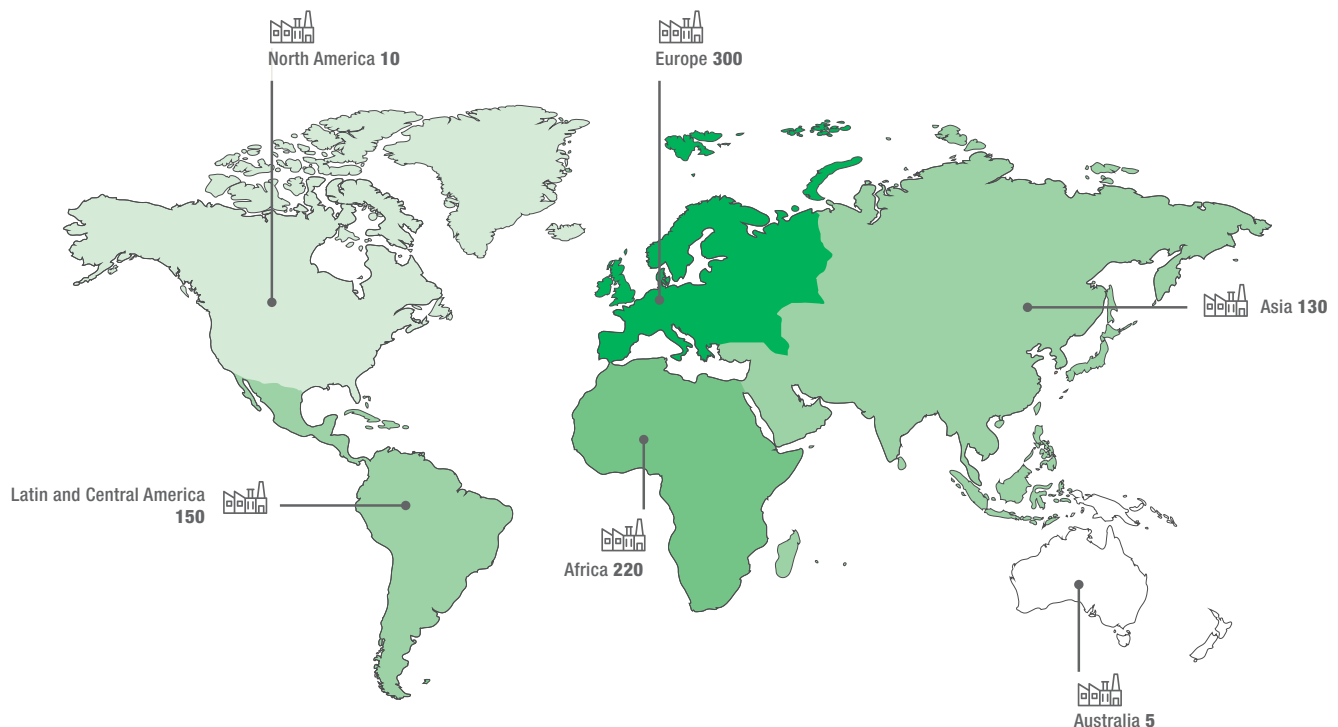
- CO₂ capture plants
- CO₂ liquefaction plants.

TPI's CO₂ advanced technology, plant designs and service support provides customers with the most cost-effective solutions in purifying and liquifying CO₂. TPI recently expanded its product portfolio to include biogas upgrading and Biomethane liquefaction technology and plants to offer customers a full range of support.

FEATURES & BENEFITS

- ✓ Purify/liquefy CO₂ from both capture and recovery streams
- ✓ Produce food-grade quality CO₂
- ✓ Captured CO₂ capacities from 4 to 300 mTPD
- ✓ Liquefaction capacities from 4 to 720 mTPD of purified CO₂
- ✓ Complete tailor-made design or customized and standardized plant designs according to client's needs
- ✓ Modularized design to minimize site installation and total installed cost
- ✓ Fully automated and continuously monitored operation
- ✓ High efficiency for low operating cost
- ✓ Designed for high reliability with minimal maintenance cost.

TPI CO₂ installation worldwide



CO₂ Treatment From Any Source

CO₂ Sources

TPI technologies purify most CO₂-containing streams coming from various sources.

- ✓ **Natural**
Deep wells, natural gas
- ✓ **Chemical process waste streams**
Ammonia synthesis, ethylene oxide, bioethanol, steam reforming
- ✓ **Combustion processes**
Natural Gas, oil, coal, biomass, solid waste
- ✓ **Biological processes**
Fermentation (bioethanol production), biogas off-gas, biogas digester (dairy farms), deep wells.

TPI plants are designed to produce **high-purity CO₂ (99,998%)** from any source while meeting the most stringent quality requirements of the **industrial gases industry** and **food and beverage industry** in compliance with USDA, US FDA, Health Canada, COFEPRIS, CGA, EIGA, ISBT and/or other guidelines, standards and regulations around the world.



OUR CCUS SOLUTIONS AND APPLICATIONS

Carbon Capture, Utilization and Storage (CCUS) is the process of removing carbon dioxide from fossil fuel-based power generation and numerous industrial processes and then either using it to produce a product or safely sequestering it in deep geological formations so it does not return to the atmosphere. If not utilized or sequestered on-site, the captured CO₂ can be liquefied and transported to another location to be used in a product or sequestered.



Industrial application of CCUS

TPI technologies can help bridge the gap until innovative, next-generation low, zero or negative carbon technologies are developed and commercialized.

During this energy transition, TPI can assist in the decarbonization of existing processes enabling the CO₂ to be reused or sequestered.

- ✓ **Power plants and industrial processes.**
Large quantities of CO₂ are released during combustion or chemical processing.
TPI plants capture and recover the CO₂ generated, preventing it from being released into the atmosphere.
- ✓ **Fuel and basic chemicals industrial sectors.**
New technologies produce synthetic gas from various carbon sources such as recovered CO₂.
When combined with chemical processes, this synthetic gas can be used to produce synthetic fuels and basic chemicals that can contribute to decarbonization in these sectors.

CO₂ Capture Plants

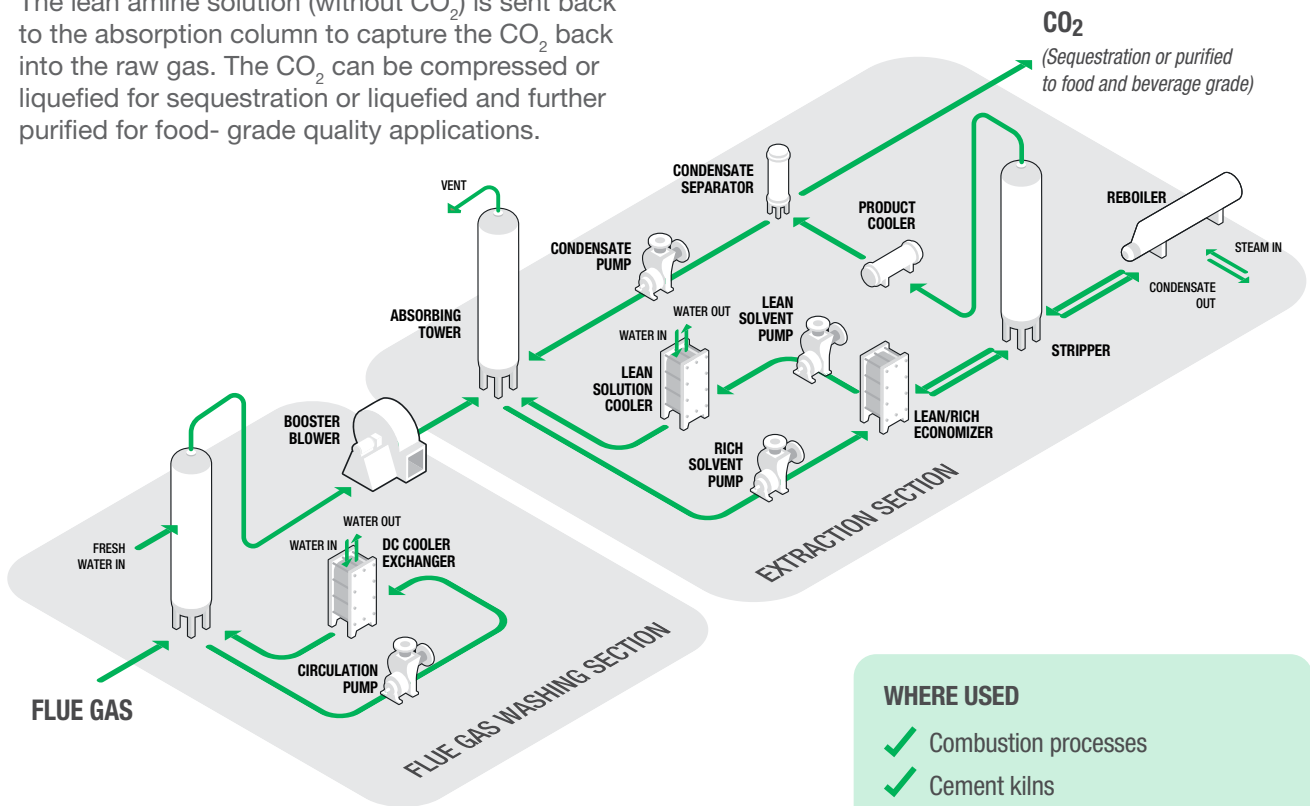
TPI supplies CO₂ capture plants from gas streams with CO₂ content less than 80% but higher than 5% using standard and advanced amine solution adsorption and stripping technologies. TPI also is evaluating new technologies from others along with developing its own to provide more-efficient, lower-cost solutions.

The amine capture process

The raw gas or flue gas enters the absorption column where it comes into contact with the amine solution. The amine solution only absorbs CO₂ during this step while the unabsorbed gas is vented to the atmosphere or reused.

The rich amine solution (with CO₂) is sent to the stripping column where, through the heat provided in the reboiler, the CO₂ is separated from the solution. The CO₂ leaving the top of the stripping column reaches a purity of 99%.

The lean amine solution (without CO₂) is sent back to the absorption column to capture the CO₂ back into the raw gas. The CO₂ can be compressed or liquefied for sequestration or liquefied and further purified for food-grade quality applications.



For information:
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WHERE USED

- ✓ Combustion processes
- ✓ Cement kilns
- ✓ Lime kilns
- ✓ Petrochemical/chemical
- ✓ Fossil fuel power plants
- ✓ Waste and biogas processes

CO₂ Liquefaction Plants

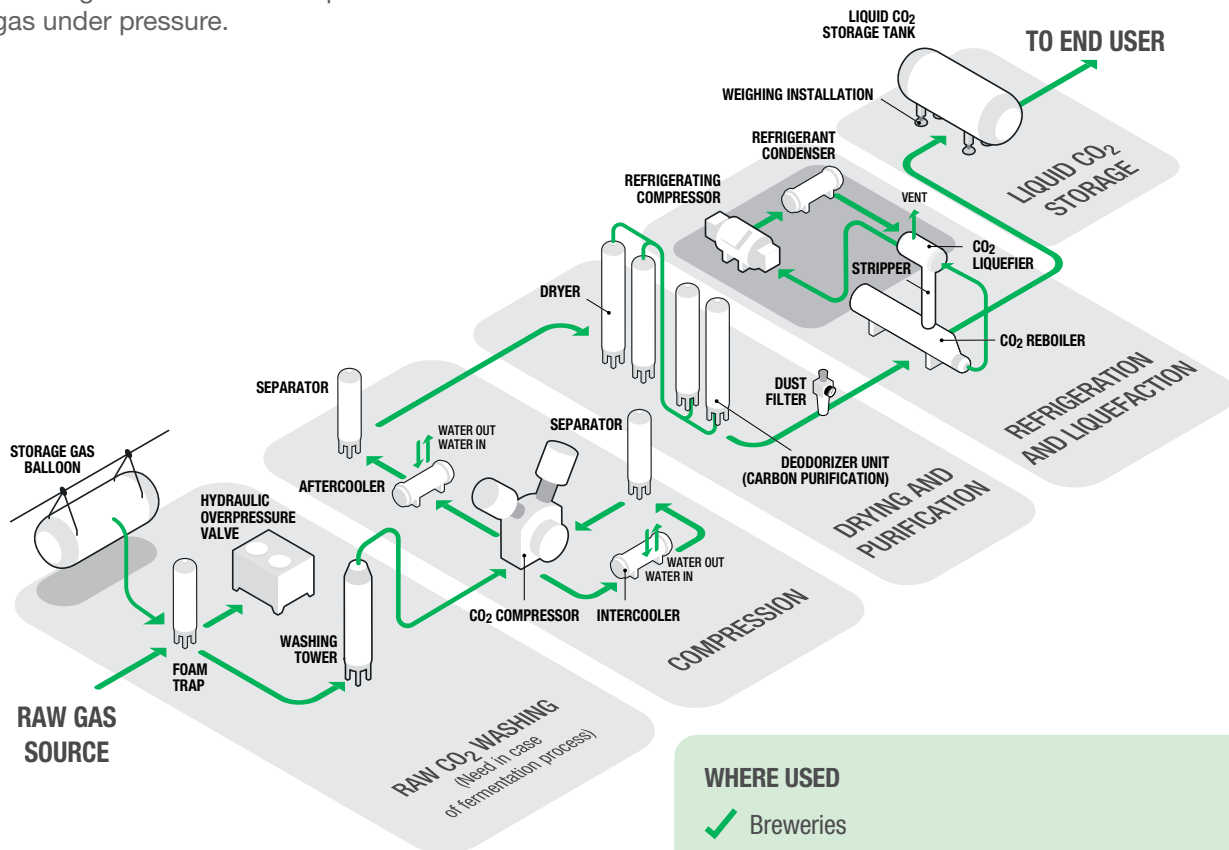
TPI CO₂ compression and liquefaction plants are installed when the CO₂ content in the raw gas is higher than 80%.

The CO₂ raw gas flows to the CO₂ compression package consisting of a CO₂ piston or screw compressor. The compressed gas is then sent to the drying and purification system to remove the moisture and the impurities inside the gas.

After this high-pressure treatment unit, a closed-circuit refrigeration system is used to cool the CO₂ gas to its liquefaction temperature.

The liquid CO₂ created in the condenser is gravity-fed to the stripper and reboiler, where the non-condensable impurities are reduced to final product **high-quality CO₂** including to food- and beverage-grade specifications.

The liquid CO₂ product is then transferred to liquid storage for further use or pumped through a heat exchanger and sent to a sequestration site as a gas under pressure.

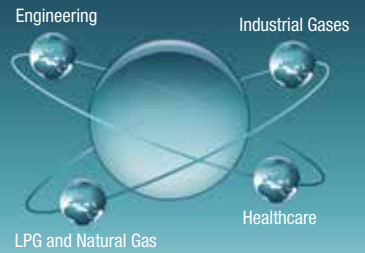


WHERE USED

- ✓ Breweries
- ✓ Distilleries and bioethanol
- ✓ Dry ice production companies
- ✓ Biogas upgrading off-gas (from digesters, landfills)
- ✓ Fossil fuel power plants
- ✓ Carbon capture system

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