

*CO₂ Capture
and Liquefaction*



CO₂ solutions since 1987

The SIAD Group

SIAD is an international chemical group active for almost 100 years
in the businesses of **Industrial Gases, Engineering,**
Healthcare, LPG and Natural Gas;
in addition it offers energy solutions and environmental management services.



Values



Research,
Technology
and Innovation



Experience,
Tradition
and Strength



Geographical
and sector
diversification



Commitment to
Quality, Safety
and the Environment



Reliability,
Professionalism
and Expertise



Attention to
social and
cultural issues

Sections

Industrial Gases

SIAD - Production and distribution of industrial, specialty, food-grade and medical gases.

Present in 16 European countries with manufacturing and trading companies.

Tecnoservizi Ambientali - Services aimed at achieving environmental sustainability through the recovery and/or the disposal of hazardous and non-hazardous industrial waste.

Healthcare

Medigas Italia / Magaldi Life - Innovative services and products for home and hospital care.

Engineering

SIAD Macchine Impianti - Design, production and installation of cryogenic air separation units, cryogenic nitrogen generators, natural gas liquefaction systems, reciprocating compressors for process gas and air, plus instrument air packages.

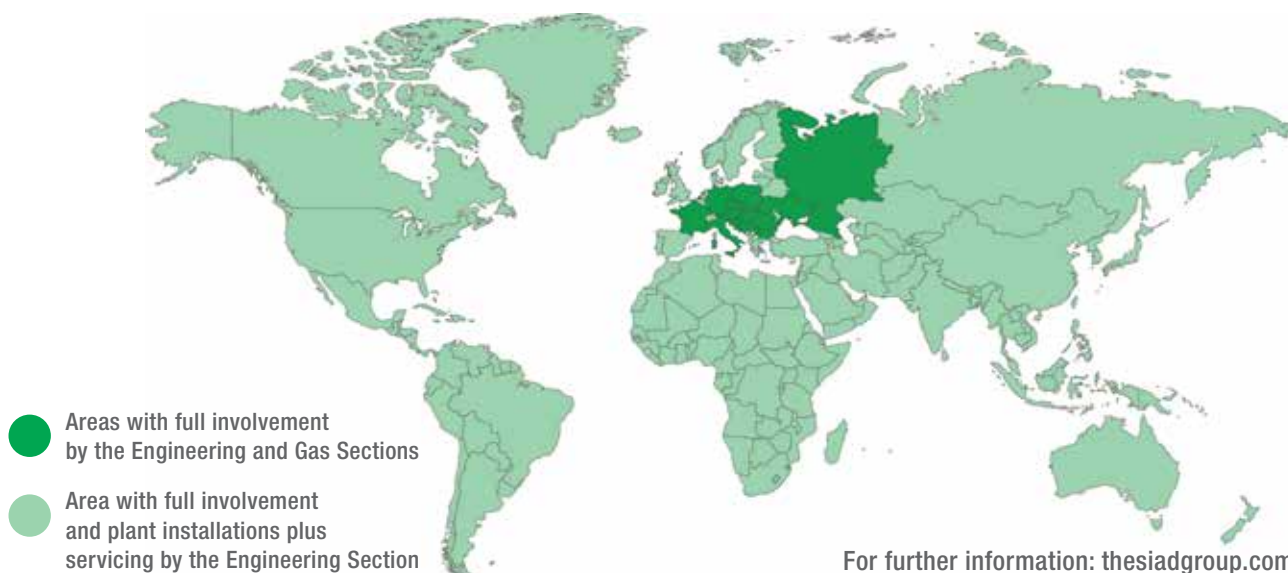
ESA - Systems, solutions and components for industrial combustion.

Tecno Project Industriale - Systems for the production, recovery, extraction, liquefaction and vaporization of carbon dioxide and biogas upgrading systems. Biogas upgrading plants to purify biogas produced by anaerobic digestion from organic waste, processing scrap and by-products, effluent from livestock farming, crop wastes and other biomass and plants for polishing and liquefaction of biomethane, bioLNG, bioCO₂ and gas analysis systems.

LPG and Natural Gas

Istrabenz plini Group - Production and sale of liquefied petroleum gas and methane gas for civil and industrial use.

Worldwide presence



For further information: thesiadgroup.com

Tecno Project Industriale Capabilities

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.

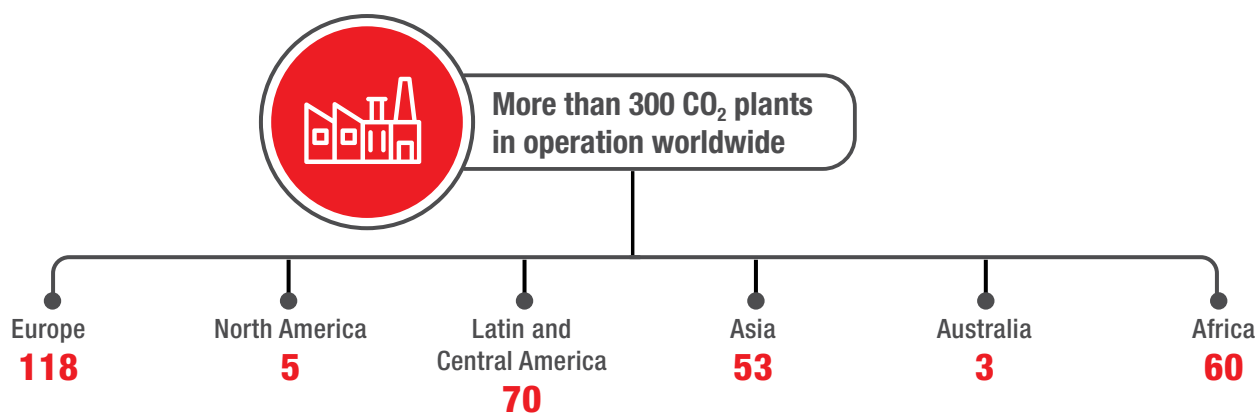
For more than 30 years, TPI has specialized in the engineering, procurement and construction of:

- **CO₂ capture plants**
- **CO₂ liquefaction plants.**
- **CO₂ production 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 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 400 mTPD
- ✓ Liquefaction capacities from 4 to 720 mTPD of purified CO₂
- ✓ Complete engineered-to-order and standard 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.



PENTATEC DIVISION

The Pentatec Division of Tecno Project Industriale supplies tools provides tools, carries out analyzes, monitoring and quality certification of gas streams. Pentatec analyser is designed to assure the highest accuracy and reliability with minimum cost to comply with the strictest CO₂ purity specifications. Pentatec system can be combined with multiple sampling system.

For further information:
pentatec_div_commercial@tecnoproject.com

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

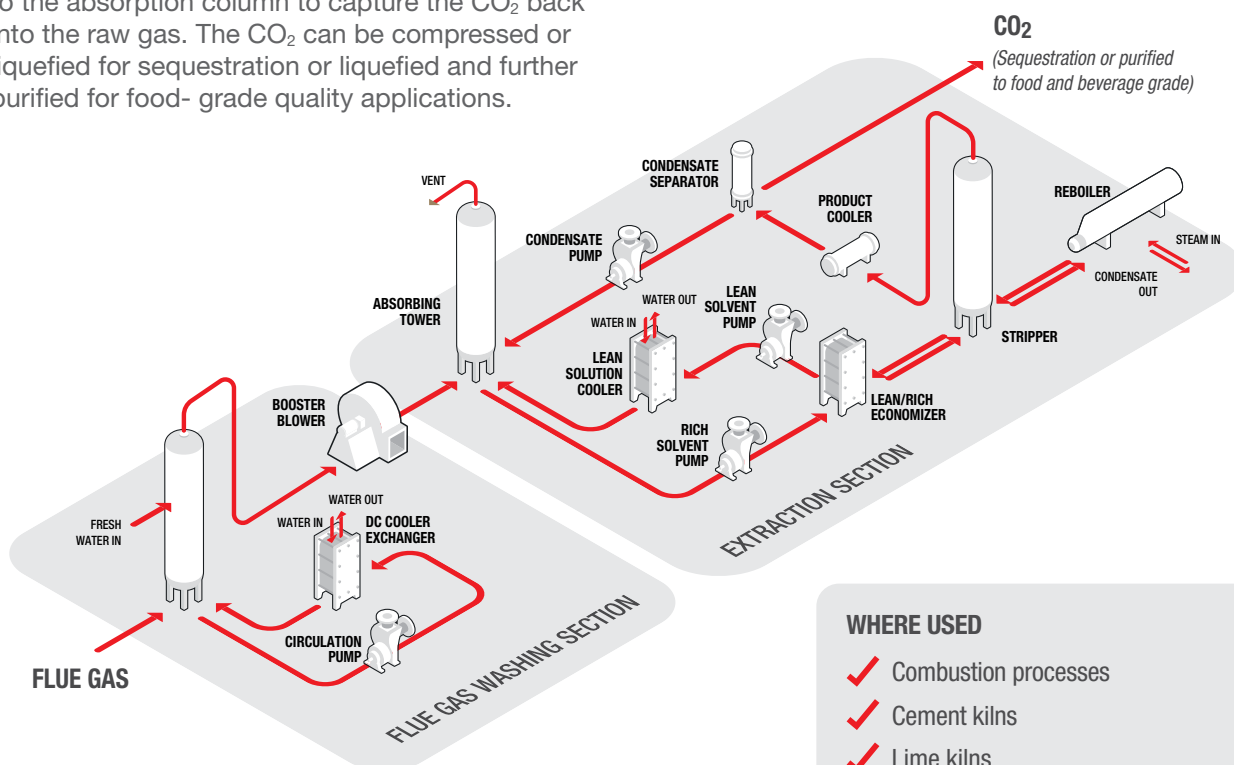
TPI supplies CO₂ capture plants from gas streams with CO₂ content less than 80% but higher than 5% using standard and advanced amine solution adsorption and stripping technologies. TPI also is evaluating new technologies from others along with developing its own to provide more-efficient, lower-cost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



- ## WHERE USED

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

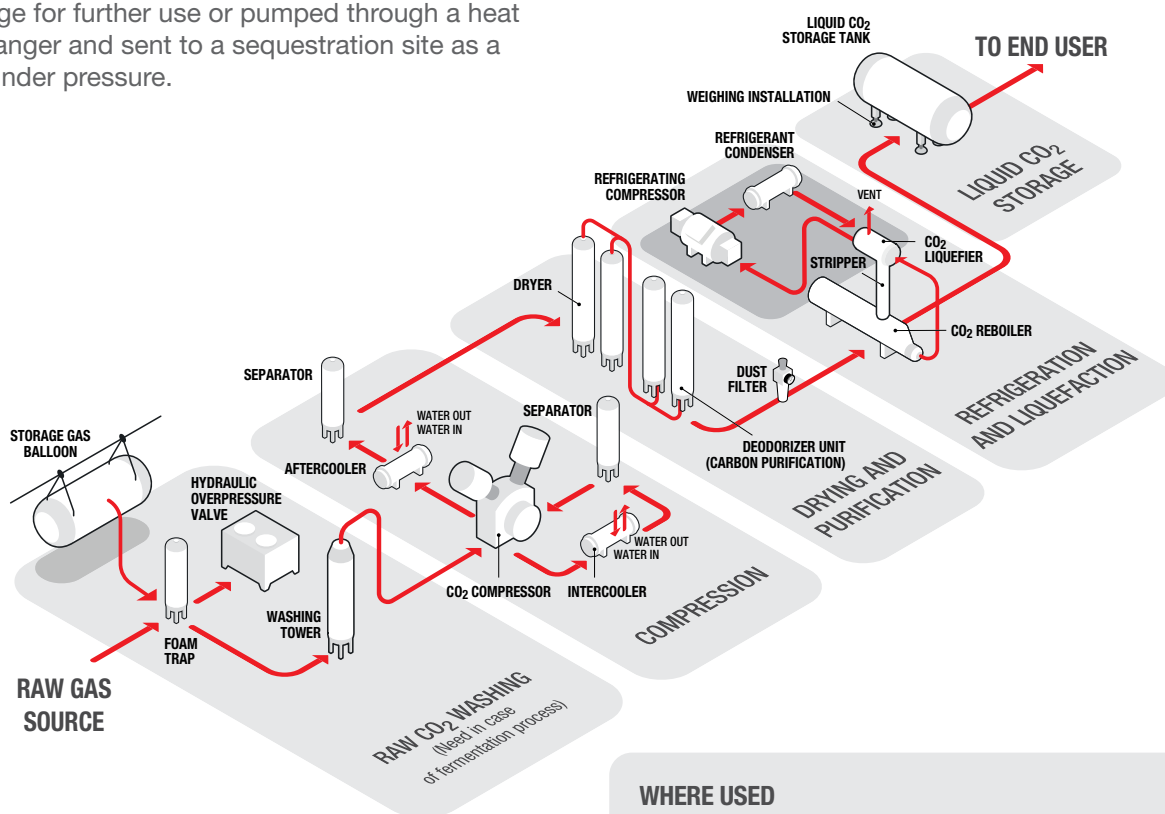
CO₂ Liquefaction Plants

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

For information:
info@tecnoproject.com

The SIAD Group

Engineering

Industrial Gases



LPG and Natural Gas

Industrial Gases

SIAD S.p.A.

Via San Bernardino, 92
IT-24126 BERGAMO
Tel. +39 035 328111
www.siad.com - siad@siad.eu
GPS: N 45 40.57 - E 9 39.44

AUSTRIA

SIAD Austria GmbH
Bergwerkstrasse 5
AT-5120 ST. PANTALEON
Tel. +43 (6277) 7447-0
www.siad.at - siad_austria@siad.eu
GPS: N 48 01.34 - E 12 51.36

BULGARIA

SIAD Bulgaria EOOD
4, Amsterdam str. P. O. Box 28
BG-1528 SOFIA
Tel. +359 (2) 9785636
www.siad.bg - siad@siad.bg
GPS: N 43 25.68 - E 23 24.43

CZECH REPUBLIC

SIAD Czech spol. s r.o.
Prague Office Park II - K Hájem 2606/2b
CZ-155 00 PRAHA 5
Tel. +420 235097520
www.siad.cz - siad@siad.cz
GPS: N 50 03.21 - E 14 19.32

FRANCE

SIAD France SAS
Parc d'activité de Signes, espace Arusha
Avenue de Berlin
FR-83870 SIGNES
Tel. +33 (0) 498181463
www.siad.com - siad_france@siad.eu
GPS: N 43 25.68 - E 5 80.05

GERMANY

SIAD Germany GmbH
Ziffling 1
DE-93497 Willmering bei CHAM
Tel. +49 (0)9971 858010
www.siad.com - siad_germany@siad.eu
GPS: N 49 23.78 - E 12 67.81

HUNGARY

SIAD Hungary Kft.
Zsigmondy u. 38.
HU-3527 MISKOLC
Tel. +36 (46) 501130 - Fax +36 (46) 501131
www.siad.hu - siad_hungary@siad.eu
GPS: N 48 07.25 - E 20 48.07

POLAND

SIAD Poland sp. z o.o.
ul. Kokotek 66
PL-41-700 RUDA ŚLĄSKA
Tel. +48 32 7711650
www.siad.pl - siad@siad.pl
GPS: N 50 18.25 - E 18 51.55

ROMANIA

SIAD Romania S.R.L.
Drumul Osiei, 75-79, Sector 6
RO-062395 BUCUREȘTI
Tel. +40 (21) 3103658 - Fax +40 (21) 3149806
www.siad.ro - siad@siad.ro
GPS: N 44 26.26 - E 25 59.10

RUSSIA

LLC SIAD Rus
Bolshaya Dmitrovka street 12/1 - build 1, 3 floor
RU-107031 MOSCOW
Tel. +7 (495) 7213026
www.siad.ru - siad@siad.ru
GPS: N 55 45.41 - E 37 36.53

SLOVAKIA

SIAD Slovakia spol. s r.o.
Galvaniho 161307/B
SK-821 04 BRATISLAVA
Tel. +421 (2) 44460347
www.siad.sk - siad@siad.sk
GPS: N 48 9.53 - E 17 10.34

UKRAINE

LLC SIAD Ukraine
Konstantinovskaya street, 2A
UA-04071 KIEV
Tel. +7 495 9871217

LLC Remtekhgaz

Kolomoyshevskaya street, 28
UA-50106 KRIVÓY ROG
Tel. +38 093 3978017
www.rtg.com.ua

Arroweld Italia S.p.A.

Via Monte Pasubio, 137
IT-36010 ZANÈ - VI
Tel. +39 0445 804444
www.arroweld.com - arroweld@arroweld.com
GPS: N 45 43.18 - E 11 26.21

Bieffe Saldatura S.r.l.

Via Canubia, 9/1
IT-12100 MADONNA DELL'OLMO - CN
Tel. +39 0171 414711
www.bieffesaldatura.com - info@bieffesaldatura.com
GPS: N 44 25.30 - E 7 33.36

Tecnoservizi Ambientali S.r.l.

Via San Bernardino, 92
IT-24126 BERGAMO
Tel. +39 035 328111
www.tecnoserviziambientali.eu - info@tasrl.com
GPS: N 45 40.57 - E 9 39.44

Roboteco S.p.A.

Via Carlinga, 43
IT-24035 CURNÒ - BG
Tel. +39 035 5780303
www.roboteco-italargon.it - info@roboteco-italargon.it
GPS: N 45 40.35 - E 9 36.25

Engineering

SIAD Macchine Impianti S.p.A.

Via Canovine, 2/4
IT-24126 BERGAMO
Tel. +39 035 327611
www.siadmi.com - siadmi@siad.eu
GPS: N 45 40.53 - E 9 39.44

SIAD Americas LLC

Engineered Equipment
2001 Timberloch Place
Suite 185
The Woodlands, TX 77380
Tel. +1 346 380 1268
www.siad-americas.com - info@siad-americas.com
GPS: N 30 15 7.4 - W 95.46 76.188

SIAD Engineering (Hangzhou) Co., Ltd.

17/F, Yizhan Business Bld., No.1 Wenyi West Rd., Xihu District
Hangzhou, 310012, Zhejiang Province, CHINA
Tel. +86 0571 85880480
www.siadmi.cn/hz - siad_cn@siad.eu
GPS: N 30 29 32.47 - E 120 12 43.68

SIAD Engineering Trading (Shanghai) Co., Ltd.

Rm.412, No. 5 building, No. 999 Ningqiao Rd.
Shanghai Pudong, 201206, CHINA
Tel. +86 021 50550066
www.siadmi.cn/sh - siad_cn@siad.eu
GPS: N 31 15.19 - E 121 37.4

SIAD Macchine Impianti Middle East F.Z.C.

Warehouse H1-03, Gate 1
P.O. Box 1248
Ajman Free Zone - UAE
Tel. +971 (0) 6 7427339
www.siadmi.com - siadmi_me@siad.eu
GPS: N 25 24.47 - E 55 27.12

Russian Branch of SIAD Macchine Impianti S.p.A.

Bolshaya Dmitrovka street 12/1 - build 1, 3 floor
RU-107031 MOSCOW
Tel. +7 (495) 7213026
www.siadmi.ru - siad@siad.ru
GPS: N 55 45.41 - E 37 36.53

Representative Office of SIAD Macchine Impianti S.p.A. in the Republic of Uzbekistan

Amir Temur Ave. 88A, Simurg Business Center
UZ-100084 TASHKENT
Tel. +998 712050212
www.thesiadgroup.com - siadmi_uz@siad.eu
GPS: N 41 20.02 - E 69 17.06

SIAD Macchine Impianti S.p.A. Sucursal de España

P.I. El Cascajal, Calle Urogallios 1-3
ES-26320 Pinto - MADRID
Tel. +34 673 789513
www.siadmi.com - siadmi_es@siad.eu
GPS: N 40 25.02 - E 3 71.31

SIAD Macchine Impianti S.p.A. Niederlassung Deutschland

Am Flughafen, 12
DE-60549 Frankfurt - GERMANY
Tel. +49 69 509589488
www.siadmi.com - siadmi_germany@siad.eu
GPS: N 50 05.26 - E 8.56.86

ESA S.p.A.

Via Enrico Fermi, 40
IT-24035 CURNÒ - BG
Tel. +39 035 6227411
www.esapyronics.com - esa@esacombustion.it
GPS: N 45 41.11 - E 9 37.19

Belgian Branch of ESA S.p.A.

Zoning Industriel, 4ème rue
BE-6040 JUMET
Tel. +32 71 256970
www.esapyronics.com - marketing@pyronics.be
GPS: N 50 27.9 - E 4 27.14

German Branch of ESA S.p.A.

Ziffling, 1
DE-93497 Willmering bei CHAM - GERMANY
www.esapyronics.com - esadeutschland@esacombustion.com
GPS: N 49 23.78 - E 12 67.81

Representative Office of ESA in People's Republic of China

c/o SIAD Engineering Co., Ltd
17/F, Yizhan Business Bld., No.1 Wenyi West Rd., Xihu District
Hangzhou, 310012, Zhejiang Province, CHINA
www.esapyronics.com - esachina@esacombustion.com
GPS: N 30 29 32.47 - E 120 12 43.68

ESA Manufacturing Pvt. Ltd.

Plot No. J-17, MIDC, Bhosari
IN-411 026 PUNE
Tel. +91 9822601452
www.esapyronics.com - esaindia@esapyronics.com
GPS: N 18 63.14 - E 73 83.32

Tecno Project Industriale S.r.l.

Via Enrico Fermi, 40
IT-24035 CURNÒ - BG
Tel. +39 035 4551811
www.tecnoproject.com - info@tecnoproject.com
GPS: N 45 41.11 - E 9 37.19

Tecno Project Industrial Ltda

Rua Pais de Gales, 161
Dist. Ind. Bandeirantes
SALTO - SP - CEP 13.326-195 BRAZIL
Tel. +55 11 40215654
www.tecnoproject.com.br - tpi@tecnoproject.com.br
GPS: S 23 11.32 - W 47 19.08

Healthcare

MEDIGAS ITALIA S.r.l.

Via Edison, 6
IT-20057 ASSAGO - MI
Tel. +39 02 4888111
www.medigas.it - info@medigas.it
GPS: N 45 24.17 - E 45 24.17

MAGALDI LIFE S.r.l.

Via Case Rosse, 19/a
IT-84131 SALERNO
Tel. +39 089 383004
www.magaldilife.it - info@magaldilife.it
GPS: N 40 38.42 - E 14 51.52

LPG, Natural Gas and Biomethane

SLOVENIA

ISTRABENZ PLINI d.o.o.
Bertoki, Semrin 8A
SI-6000 KOPER
Tel. +386 5 6634600 - Fax +386 5 6634699
www.istrabenzplini.si - info@istrabenzplini.si
GPS: N 45 33.10 - E 13 45.53

PLINARNA MARIBOR d.o.o.

Plinariška ulica 9
SI-2000 MARIBOR
Tel. +386 2 2284300 - Fax +386 2 2522272
www.plinarna-maribor.si - info@plinarna-maribor.si
GPS: N 46 55.92 - E 15 65.71

GTG Plin d.o.o.

Bukovžlak 65b
SI-3000 CELJE
Tel. +386 (0)3 42 60 760
www.gtg-plin.com - prodaja@gtg-plin.com
GPS: N 46 24.15 - E 15 30.42

BOSNIA AND HERZEGOVINA

ISTRABENZ PLINI d.o.o.
Potkraj bb
BIH-71370 BREZA
Tel. +387 32 789300 - Fax +387 32 789302
www.istrabenzplini.ba - istrabenzplini@istrabenzplini.si
GPS: N 44 00.17 - E 18 15.1

CROATIA

ISTRABENZ PLINI d.o.o.
Prstaniste Podbok 3
HR-51222 BAKAR
Tel. +385 51 455300 - Fax +385 51 761175
www.istrabenzplini.hr - istrabenzplini@istrabenzplini.hr
GPS: N 45 17.37 - E 14 33.54

SERBIA

ISTRABENZ PLINI d.o.o.
Cara dušana 20
RS-22310 SIMANOVCI
Tel. +381 22 322477
office_beograd@istrabenzplini.si
GPS: N 44 48.59 - E 20 27.47

DIME Società Agricola S.r.l.

Via San Bernardino, 92
IT-24126 BERGAMO
Tel. +39 035 328111
GPS: N 45 40.57 - E 9 39.44



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Tecno Project Industriale S.r.l.
Società a responsabilità limitata a Socio Unico
IT-24035 Curno (BG), Italy - Via Enrico Fermi, 40
Share Capital € 1.000.000 i.v.
P. IVA, C. F., Reg. Impr. Bg 01070500168
R.E.A. Bergamo 237676 - Export: BG012873

Telephone +39 035 4551 811 - 845 - 813

tecnoproject.com - info@tecnoproject.com

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