

Clean Power to Transport – Milano 21/06/2013

SOL Group presentation

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Project Manager

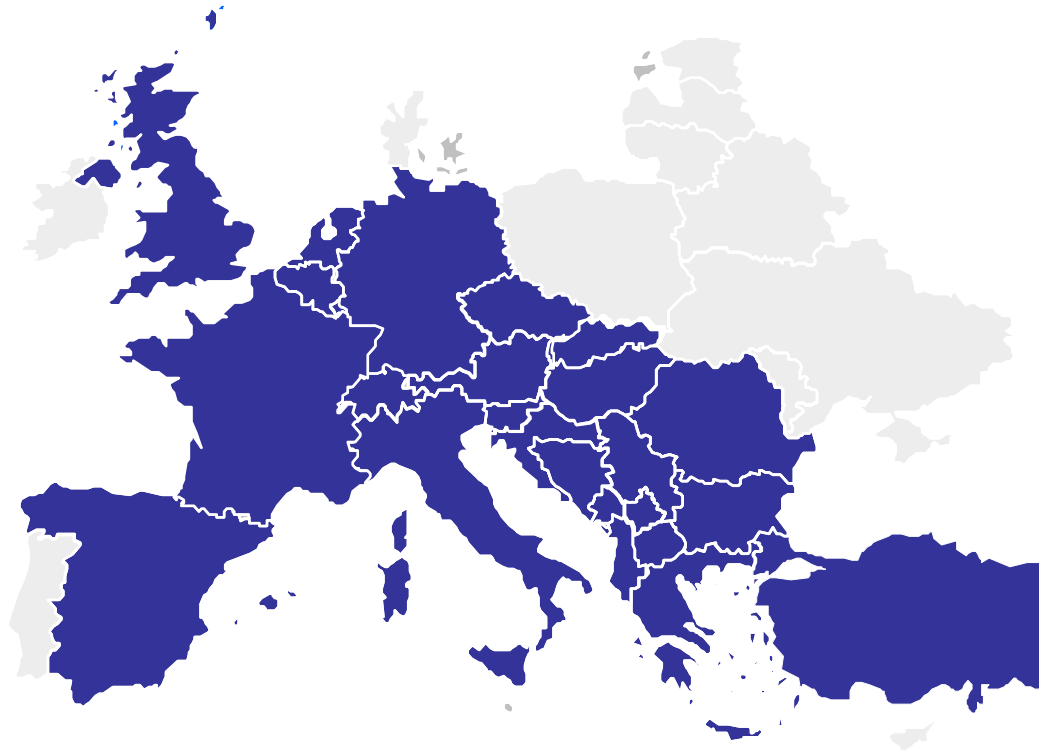
Hydrogen, Fuel Cells, On-site Units
Project Department



SOL Group at a glance

- Founded in **1927**, is an Italian based multinational company present in **23** countries with more of **2.500** people employed.
- **Two core**, separated but integrated and synergic business areas: **Technical Gas** sector (production, applied research and marketing of pure, medical and industrial gases) and **Home-Care** service sector (supply of medical products and medical assistance services as well as equipment for home care therapy).
- **Two recent** businesses: **Hydro Energy** and Biotechnology.
- Strong results and sound balance sheet:
 - Over **583** millions € of Total Group revenues in FY2012;
 - Over **46%** of international revenues in 2012 (vs 23,7% in 2000)
 - Listed on Milan Stock Exchange

SOL Group in the world



**23 countries in Europe
and outside Europe**



The Technical Gases Business



The Technical Gases Business

SOL Group operates in the technical gases business throughout the brand SOL

Production and distribution of Gases

A complete range of industrial gas (both atmospheric and non-atmospheric): medicinal, pure and special gases.

- ◆ Oxygen
- ◆ Nitrogen
- ◆ Argon
- ◆ Hydrogen
- ◆ Carbon dioxide
- ◆ Acetylene
- ◆ Nitrous oxide
- ◆ Gas mixtures
- ◆ Ultra high purity gases
- ◆ Medical gases
- ◆ Gaseous helium
- ◆ Liquid helium
- ◆ Refrigerating gases
- ◆ Electronics gases
- ◆ Ammonia
- ◆ Combustible gases

Supply of plants, equipments, services and consultancy

Research, design, and construction of:

- **Industrial gas production facilities,**
- **Plant and equipment for gas utilization**
- **Services and consultancy**

- ◆ Equipment for medical applications
- ◆ Equipment for cryogenic applications
- ◆ Deep freezing tunnels
- ◆ Oxygen burners
- ◆ Ozonisers
- ◆ Medical air plants
- ◆ On-site plants
- ◆ Welding machines and equipment

Hydrogen sector



Hydrogen main production plants



SOL owns and operates H₂ production facilities in Italy and Europe

Main technology: steam reforming

H₂ distribution:

- trailers**
- cylinders-bundles**
- pipelines**

Hydrogen on-site plants



SOL supply compact plants for hydrogen production on-site by customers facilities, suitable also for refueling stations.

Technology: steam reforming, partial oxidation and electrolysis

SOL H₂ automotive technologies



**SOL project: bi-fuel car
(H₂ and gasoline)**



**HBUS Project:
H₂ fuel cell bus**



**Mhybus Project:
HCNG bus for public
transportation**



**Dolomiti Energia Project:
HCNG vehicles for urban
waste materials management**



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SOL H₂ refueling technologies



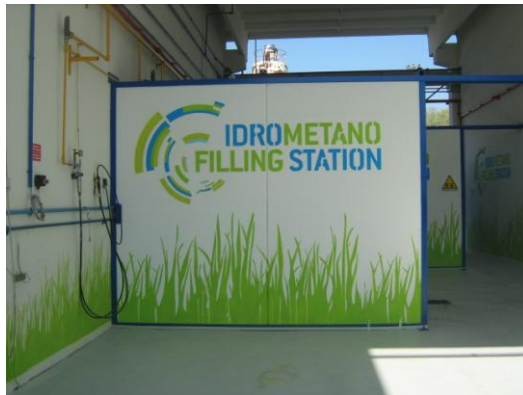
Bicocca project:
liquid & compressed H₂
refueling station



MRI Project:
H₂ compressed refueling station



HBUS Project:
H₂ compressed
refueling station



Mhybus Project:
HCNG refueling station



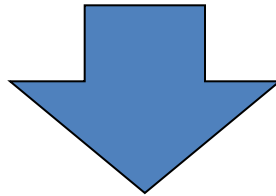
Dolomiti Energia Project:
HCNG refueling station

SOL main hydrogen R&D areas

- High energy density H2 storage systems, also in synergy with renewable energy
- High efficiency H2 production plants, also in synergy with renewable energy
- Stationary energy applications with FC
- Early markets application with FC

In conclusion

New technologies and innovative applications of H2 create smarter and more sustainable scenarios for mobility and energy sectors.



It needs a strong commitment from EU institutions to deploy new strategies for H2 diffusion as ordinary energy carrier.

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Thank you for your attention

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