



Air Products and Technip Hydrogen Alliance . . .

**. . . combined expertise for hydrogen supply
to the second power.**

Together, Air Products and Technip
bring a totally optimized hydrogen supply
that's there when you need it.

Hydrogen Supply

A matter of economics, flexibility and reliability

Air Products operates a growing network of on-site facilities and pipelines that supply hydrogen to various customers. Collectively, by 2010 these systems will have a capacity of over 1.75 billion SCFD (4,200 T/D; 1.9 million Nm³/h) of high-purity hydrogen at pressures ranging from 250 to 2,000 psig (18 to 138 barg).

Air Products operates major hydrogen pipeline systems in:

- Texas, USA
- Louisiana, USA
- Rotterdam, Netherlands
- Edmonton and Sarnia, Canada
- Mab Tha Put, Thailand
- Camaçari, Brazil



Hydrogen plant in Edmonton, Alberta is the most modern hydrogen plant design to date with a capacity in excess of 168 tpd (70 MMSCFD) of hydrogen with steam export.

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Air Products and Technip alliance hydrogen supply =
1,528,000,000 scfd and still counting!



Hydrogen plant near Cressier, Switzerland services Petroplus refinery, with a hydrogen capacity of 7.1 MMSCFD (17 T/D ; 7,850 Nm³/h) on butane feed.



*Excellent hydrogen supply reliability can be maintained from facilities such as Air Products' Port Arthur, Texas complex with **two SMR hydrogen plants** producing 105 and 110 MMSCFD of hydrogen respectively, totaling 516 T/D or 239,000 Nm³/h of hydrogen, each with integrated power generation.*



Hydrogen plant serves Motiva Enterprises LLC refinery in Convent, Louisiana, USA. The plant utilizes multiple refinery fuel gas streams as feed and fuel for the SMR and supplies hydrogen to multiple customers in the Air Products hydrogen network along the Mississippi River.



The Wilmington, California site started the Los Angeles Basin refinery pipeline network and includes utility supplies (steam, power) to the Valero refinery.



This plant in Tarragona, Spain incorporates a pre-reformer to process naphtha or refinery fuel gas for the Repsol refinery. In addition, Air Products recovers CO₂ for the merchant gases market in Spain.

About Air Products

With operations in over 40 countries and annual revenues of \$10 billion, Air Products is a leading supplier of industrial gases and related equipment and has built leading positions in key growth markets such as semiconductor materials, refinery hydrogen, home healthcare services, natural gas liquefaction, and advanced coatings and adhesives.

For over 60 years, Air Products has developed expertise in the safe and reliable supply of industrial gases to a diverse base of customers in the manufacturing, service and process industries.

The expertise is particularly evident in the supply of hydrogen to petroleum refineries and chemical facilities, where Air Products has established a world leadership position, through the operation of more than 50 steam reformers and off-gas plants. Hydrogen is directly delivered from these facilities or via pipeline networks reliably to over 80 customers worldwide.

Air Products is recognized for its innovative culture, operational excellence and commitment to safety and the environment. The company is ranked in the top 150 U.S. industrial companies.

About Technip

As a world class full-service integrated group, Technip ranks among the top five global players providing onshore and offshore engineering, technologies and construction services for oil and gas, refining and petrochemical industries. It has a workforce of 22,000 people globally and annual revenues of almost 7 billion euros (\$9.5 billion).

Technip is a global leader in the supply of hydrogen plant and SMR technology with an impressive share of over 230 units worldwide, ranging from 1 to 250 tons per day of hydrogen (or equivalent syngas) in a single train. Most of these plants are for refinery application, and feature state-of-the-art technology along with production cost optimization while respecting the highest focus on HSE and reliability.

Technip has extensive experience and expertise to manage all aspects of major projects from feasibility studies, conceptual designs to front-end engineering design packages, turnkey execution and commissioning.

With its headquarters in Paris, Technip's has its main operating and engineering centers spread around in all five continents. For the hydrogen-syngas product-line, the two main competence centers are in California, USA and Zoetermeer, the Netherlands.



Air Products and Technip Global Hydrogen Alliance

For more than 15 years, Air Products and Technip have participated in a cooperation agreement to supply hydrogen to the global refining industry on an “over-the-fence” or on-site basis. The alliance combines the strengths of Air Products’ extensive experience and technical capabilities, resulting in efficient operation and leading-edge reliability of hydrogen plants, and Technip’s leading steam-methane reforming (SMR) technology and their broad plant design and execution expertise.

As industry leaders, Air Products and Technip bring the benefits of more than 1,200 cumulative years of hydrogen operating experience and completion of 230 hydrogen plants, respectively. Customers have benefited from efficient and highly reliable plant performance, superior plant technology and faster plant commissioning schedules.

The alliance constantly aims for excellence through continuous improvement and best practice application, supported by extensive operational feedback from Air Products’ global network of over 50 plants. Together we can provide our customers a hydrogen facility optimized around the unit cost of production and tailored solutions to the customer’s needs, while achieving world-class health, safety, environmental (HSE) compliance and reliability.

The Air Products and Technip alliance has successfully executed 29 projects since 1992 to date, resulting in more than 1.5 billion scfd (3,600 T/D or 1.7 million Nm³/hr) of capacity serving customers worldwide. Air Products typically owns, operates and maintains the facilities under a long-term contract with the customer, typically for a term of 15 to 20 years.

Why BUY hydrogen rather than MAKE it?

- Both Air Products and Technip are fully committed to hydrogen—their global core business.
- Air Products provides the initial capital outlay for the hydrogen plant, thereby allowing the customer to focus on their core business.
- Large multi-plant, multi-customer pipeline systems can provide unparalleled supply reliability and improved economics.
- The unit cost of hydrogen production can be lower because of savings achieved through site-specific integration and/or value-added solutions as well as extensive experience in optimum operation and maintenance of such plants.
- Risks of project execution, plant efficiency and onstream performance lie largely with the “over-the-fence” supplier and not with the end user.
- Leading-edge plant reliability and compliance to highest HSE standards.



Hydrogen production facility in Westlake, Louisiana supplies high-purity hydrogen for converting heavy crude oils into cleaner-burning gasoline and low-sulfur diesel.

This brochure gives a very brief overview of the many capabilities and benefits that the Air Products and Technip global hydrogen alliance offers to the energy and petroleum refining industries. Please contact us at any of the listed locations for more information.

The Americas

Air Products and Chemicals, Inc.
7201 Hamilton Boulevard
Allentown, PA 18195-1501
T: 800-654-4567 (toll free)
F: 800-272-4449 (toll free)
or
T: 610-706-4730
F: 610-706-6890
E-mail: info@airproducts.com

Europe

Air Products PLC
Hersham Place
Molesey Road
Walton-on-Thames
Surrey KT12 4RZ
England
T: 44 1270 614114
F: 44 1932 258502

Asia

Air Products Asia, Inc.
9 Temasek Boulevard
#28-01 Suntec Tower 2
Singapore 038989
T: 65 332-1610
F: 65 332-1600

Air Products Asia, Inc.
East Wing, Floor 1, Building #88
Lane 887 Zu Chongzhi Road
Zhangjiang Hi-Tech Park
Shanghai 201203, PRC
T: 86-21-38962000
F: 86-21-50805555

The Americas

Technip USA, Inc.
555, W Arrow Hwy
Claremont, CA 91711
USA
T: +1 909 447 3600
F: +1 909 447 3700
E-mail: sratan@technip.com

Europe

Technip Benelux B.V
Boerhaavelaan, 31
2713 HA, Zoetermeer
The Netherlands
T: +31 79 3293 600
F: +31 79 3293 700
E-mail: tpbenelux@technip.com

Asia

Technip-KT India
A-4, Sector 1, Institutional area
Noida 201301, U.P
India
T : +91-120-4301-000
F: +91-120-4301-010

Technip Headquarters

Tour Technip
6-8 Allée de l'Arche
92973 Paris La Défense Cedex
France
T : +33 (0)1 47 78 21 21
F: +33 (0)1 47 78 33 40
www.technip.com

www.H2Alliance.com