Large to Mega-scale LNG plant capabilities for capacity >2 MTPA

Benefit from economies of scale and proven technology

Air Products' natural gas liquefaction processes and main cryogenic heat exchangers are the world's standard for baseload LNG.

Liquefaction capabilities and support:

We provide a complete range of products and services for the successful design, construction, start-up, and operation of your LNG facility:

- Feasibility studies
- Project development studies
- Detailed liquefaction process designs
- Coil wound heat exchanger design and fabrication
- Installation and start-up advisory services
- Technical support services during plant operations
- Debottlenecking studies

Benefits to our customers:

Economical Production

- Readily available refrigerants
- Large train sizes for economies of scale
- High efficiency/low feed gas consumption

High Reliability

- Fewer process components
- Proven performance, demonstrated by plant onstream records
- Robust CWHE (Coil Wound Heat Exchanger) design and construction

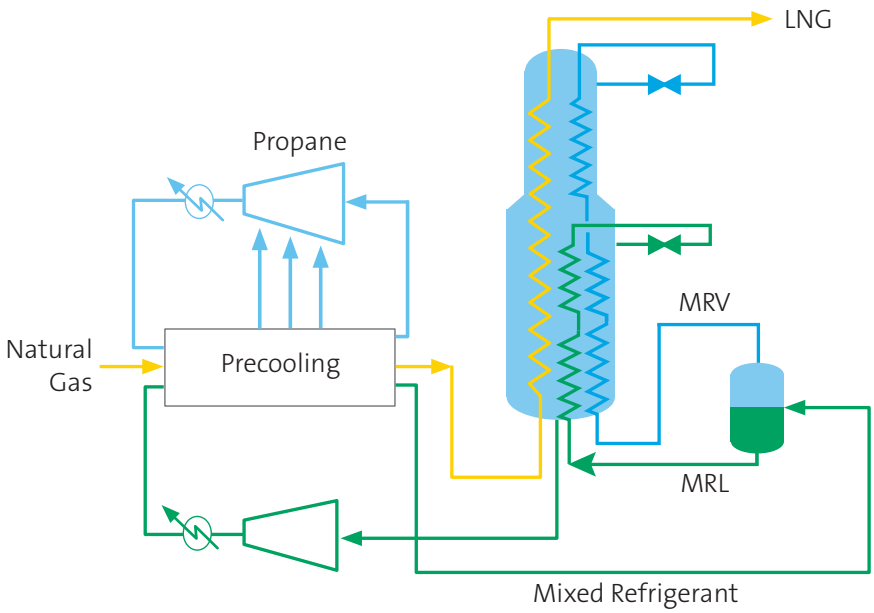
Improved Operation

- Ease of start-up to minimize the time to achieve full capacity
- Flexibility to operate at high efficiency over a wide range of feed gas compositions and conditions
- Efficient and stable turndown even at very low feed rates

The result is improved profitability due to faster project completion, higher availability of the process, and maximum efficiency.

The bundle winding process for each coil wound heat exchanger manufactured by Air Products.

The most prevalent liquefaction technology used today is Air Products' AP-C3MR™ LNG Process



MCR® LNG Processes:

Maximum production with high efficiency and low CAPEX/MTPA

More LNG is produced using Air Products' mixed component refrigerant and liquefaction processes than any other processes in the world. They have proven to be the highly reliable, flexible, and easy to operate. Air Products invented propane precooled mixed refrigerant process (AP-C3MR™), which has become the industry standard. To meet specific liquefaction requirements, we also offer several variations, including dual mixed-refrigerant (AP-DMR™) processes and the AP-X® LNG Process utilized by the industry's largest LNG trains in Qatar.

MCR® Cryogenic Heat Exchangers (MCHEs):

Flexible and Robust

The typical exchanger may be as large as 5 meters (16.5 feet) in diameter and 55 meters (180 feet) high and weigh 450 metric tonnes (500 tons). The large size of the individual heat exchanger tube bundles facilitates the design of large process trains. In addition to providing economies of scale, this leads to simple piping and control systems and, consequently, to reductions in installation, operation, and maintenance costs. Heat exchangers we supplied more than 45 years ago are still operating, many at production rates well in excess of their original design capacity.

Integrated Manufacturing

Air Products is the world's leading supplier of large coil wound heat exchangers (CWHEs). Each CWHE is manufactured by skilled craftspeople at our state-of-the-art facilities in the United States, convenient to U.S. ports for shipping to site. We fabricate the units with internal piping and components, and complete with transition joints or flanged connections so that no aluminum welding is required once the unit reaches the LNG plant site.

Air Products' experience: leadership in mid-scale and large to mega-scale LNG plant projects

Country	Location/Project	Initial Start-Up	Trains	LNG Capacity per Train (MTPA)	LNG Process
Abu Dhabi (UAE)	Das Island	1977 1994	2 1	1.7 2.6	AP-C3MR™ AP-C3MR
Algeria	Arzew Skikda	1977 1981 2014 2013	6 6 1 1	1.3 1.4 4.7 4.5	AP-C3MR AP-C3MR AP-C3MR AP-C3MR
Australia	NWS Gorgon Prelude (FLNG) Ichthys	1989–1992 2016 2019 2018	3 3 1 2	2.5 5.2 3.6 4.45	AP-C3MR AP-C3MR DMR AP-C3MR
Brunei	Lumut	1972–1974	5	1.3	AP-C3MR
Canada	Squamish	2023	1	2.1	AP-C3MR
China	Ningxia Hanas Shaanxi Yangling Xian Gaoling LNG	2012 2015 2025	2 1 1	0.4 0.5 0.8	AP-SMR™ AP-SMR AP-SMR
Egypt	SEGAS	2004	1	5	AP-C3MR
Indonesia	Bontang Arun Tangguh Donggi	1977–1997 1999 1978–1986 2009, 2021 2015	7 1 6 3 1	2.8 3 2 3.8 2.1	AP-C3MR AP-C3MR AP-C3MR AP-C3MR AP-C3MR
Libya	Marsa el Brega	1970	4	0.8	AP-SMR
Malaysia	Satu Dua Tiga Petronas 9 PFLNG Satu PFLNG Dua	1982 1995 2003 2016 2016 2021	3 3 2 1 1 1	2.8 3.2 3.8 3.6 1.2 1.5	AP-C3MR AP-C3MR AP-C3MR AP-C3MR AP-N™ AP-N
Mexico	Energia Costa Azul	2023	1	3.25	AP-DMR™
Mozambique	Coral South (FLNG) Mozambique LNG	2022 2024	1 2	3.4 6.4	AP-DMR AP-C3MR
Nigeria	Bonny Island	1999–2002 2005–2007 2023+	3 3 2	3.2 4.1 8	AP-C3MR AP-C3MR AP-C3MR
Oman	Oman LNG	2000 2006	2 1	3.3 3.7	AP-C3MR AP-C3MR
Papua New Guinea	PNG LNG	2014	2	4	AP-C3MR
Peru	Peru LNG	2010	1	4.5	AP-C3MR
Qatar	QGN & QGS QGS QGN & QGS NFE & NFS	1996–1999 2003–2007 2009–2011 2025–2028	5 3 6 6	3.3 4.7 7.8 8	AP-C3MR AP-C3MR AP-X® AP-X
Russia	Yamal	2017	3	5.5	AP-C3MR
United States	Cove Point Freeport Cameron Golden Pass Port Arthur Rio Grande	2018 2019 2019 2025 2026 2027	1 3 3 3 2 3	5.25 5 4.4 5.2 6.5 5.9	AP-C3MR AP-C3MR AP-C3MR AP-C3MR AP-C3MR AP-C3MR
Yemen	Bal-Haf	2009	2	3.4	AP-C3MR
Total Trains			128		

Air Products experience: Industry leader

We helped pioneer the LNG industry, supplying our first LNG process and equipment over 50 years ago. Today, we are on the leading edge of LNG technology and provide quality, reliability, performance, and the best return on capital.

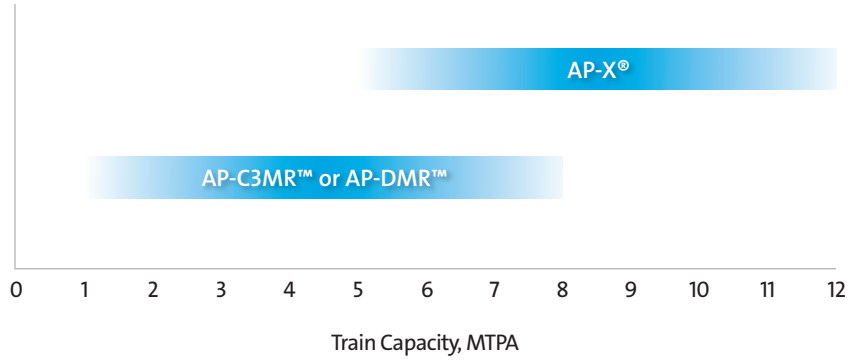
About Air Products

Air Products is a world-leading Industrial Gases company celebrating 80 years of operation. The company's core Industrial Gases business provides atmospheric and process gases and related equipment to manufacturing markets, including refining and petrochemical, metals, electronics, and food and beverage. Air Products is also the world's leading supplier of liquefied natural gas process technology and equipment.

For more information, please contact us at:

Corporate Headquarters
Air Products and Chemicals, Inc.
1940 Air Products Blvd.
Allentown, PA 18106-5500
T 610-481-4861
info@airproducts.com

Large to mega-scale LNG plant liquefaction process capacities



For the AP-X® LNG Process, in addition to liquefaction process design and CWHEs (Coil Wound Heat Exchangers), Air Products designs and manufactures cryogenic nitrogen companders (compressor turbo-expander machinery), and nitrogen economizer heat exchanger cold boxes.

A large Air Products' custom designed coil wound heat exchanger.

AIR PRODUCTS

airproducts.com/LNG

 230-17-004-GLB-Jun24