

BOIL-OFF GAS MANAGEMENT LNG TERMINAL TECHNOLOGIES



Air Liquide Group

The world leader in gases, technologies and services for Industry and Health

Air Liquide is present in 80 countries with approximately 65,000 employees and serves more than 3 million customers and patients. Oxygen, nitrogen and hydrogen are essential small molecules for life, matter and energy. They embody Air Liquide's scientific territory and have been at the core of the company's activities since its creation in 1902.

Air Liquide's ambition is to lead its industry, deliver long term performance and contribute to sustainability.

Our full suite of technologies

- Liquefied Natural Gas
- Cryogenics
- Hydrogen
- Syngas
- Petrochemicals
- Natural Gas Treatment
- Sulfur
- Standard Plants
- Oleochemicals

Air Liquide Engineering & Construction

A technology partner of choice

Air Liquide Engineering & Construction builds the Group's production units (mainly air gas separation and hydrogen production units) and provides external customers with efficient, sustainable, customized technology and process solutions.

Our core expertise in industrial gas, energy conversion and gas purification, enables customers to optimize natural resources.

We cover the entire project life-cycle: license engineering services / proprietary equipment, high-end engineering & design capabilities, project management & execution services. In addition we also offer efficient customer services through our worldwide set-up.

As a technology partner, customers benefit from our research and development to achieve energy transition goals.

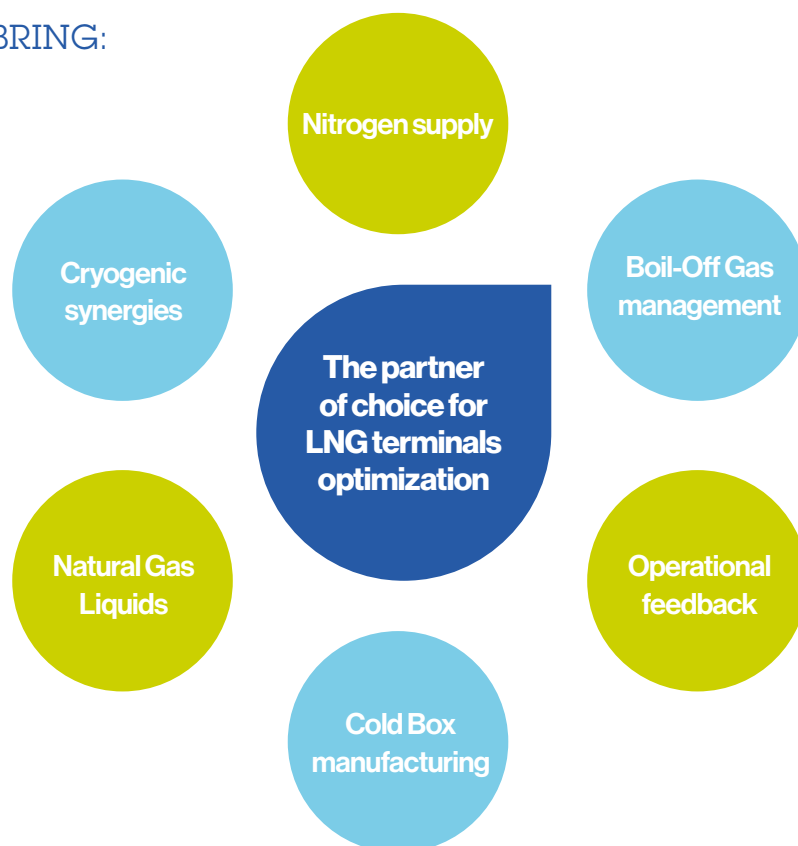


Leader in Cryogenics and LNG Pioneer

For more than 110 years, experience in cryogenic technologies have been the foundation of Air Liquide's business. Air Liquide pioneered the optimisation of the LNG terminal with the world's first integrated Air Separation Unit reference in Fos-sur-Mer (France) and has been designing and supplying core cryogenic equipment for LNG terminals for over 40 years. This expertise enables us to offer cutting-edge solutions for optimal BOG management in LNG terminals.

Air Liquide Engineering & Construction offers a comprehensive range of LNG terminal technologies underpinned by the Air Liquide Group's expertise in cryogenic separation and LNG technology. We also design and manufacture proprietary equipment for processing and managing boil-off gas that reduces the capital and operating costs of LNG import and export terminals.

VALUE WE BRING:



Nitrogen supply:

Cryogenic nitrogen generators or bulk nitrogen supply for both import and export terminals.

Boil-Off Gas management:

Modular solutions based on proprietary cryogenic technologies that enhance terminal flexibility.

Extraction of Natural Gas Liquids:

Proprietary Cryogenic unit to extract ethane and liquefied petroleum gas from natural gas.

Cryogenic synergies:

Customized Air Separation Units using cold production to cut costs.

Operational feedback:

Continuous feedback from our operations validates our engineering design.

Cold Box manufacturing:

Strong know-how in Cold box design and cryogenics. Manufacturing centers in United Arab Emirates and China.

Boil-Off Gas management technologies

Air Liquide Engineering & Construction proprietary technologies have a broad spectrum of application that range from optimizing the flexibility of small-scale infrastructure to revamping large terminals.

We combine breakthrough technologies and allow easy siting and permitting to maximise customer satisfaction while optimizing performance.



Boil-Off Gas Recondenser package

Typical BOG capacity from 1 to 20 tons per hour

- Fully modular skid for easy installation on-site
- Skid can be integrated with rotating equipment (pumps), BOG pre-cooler and power supply (if required)
- Onshore & offshore applications



Subcooling Turbo-Brayton unit

Standardized unit capacity from 0.2 to 1.5 tons per hour

- Proprietary design based on reverse-Brayton technology
- Machinery has proven to be maintenance-free for over 5 years
- Large turndown range, fast startup & shutdown
- Off-the-shelf unit to minimize cost and delivery time
- Onshore and offshore applications (LNG carriers)



Reliquefaction unit

Taylor-Made unit capacity from 2 to 30 tons per hour

- Proprietary design based on nitrogen refrigerant technology
- Nitrogen refrigeration cycle simplifies siting and permitting
- Reliable machinery requires little maintenance
- On shore applications



LIN to LNG box

The perfect solution for Boil-Off Gas peak shaving

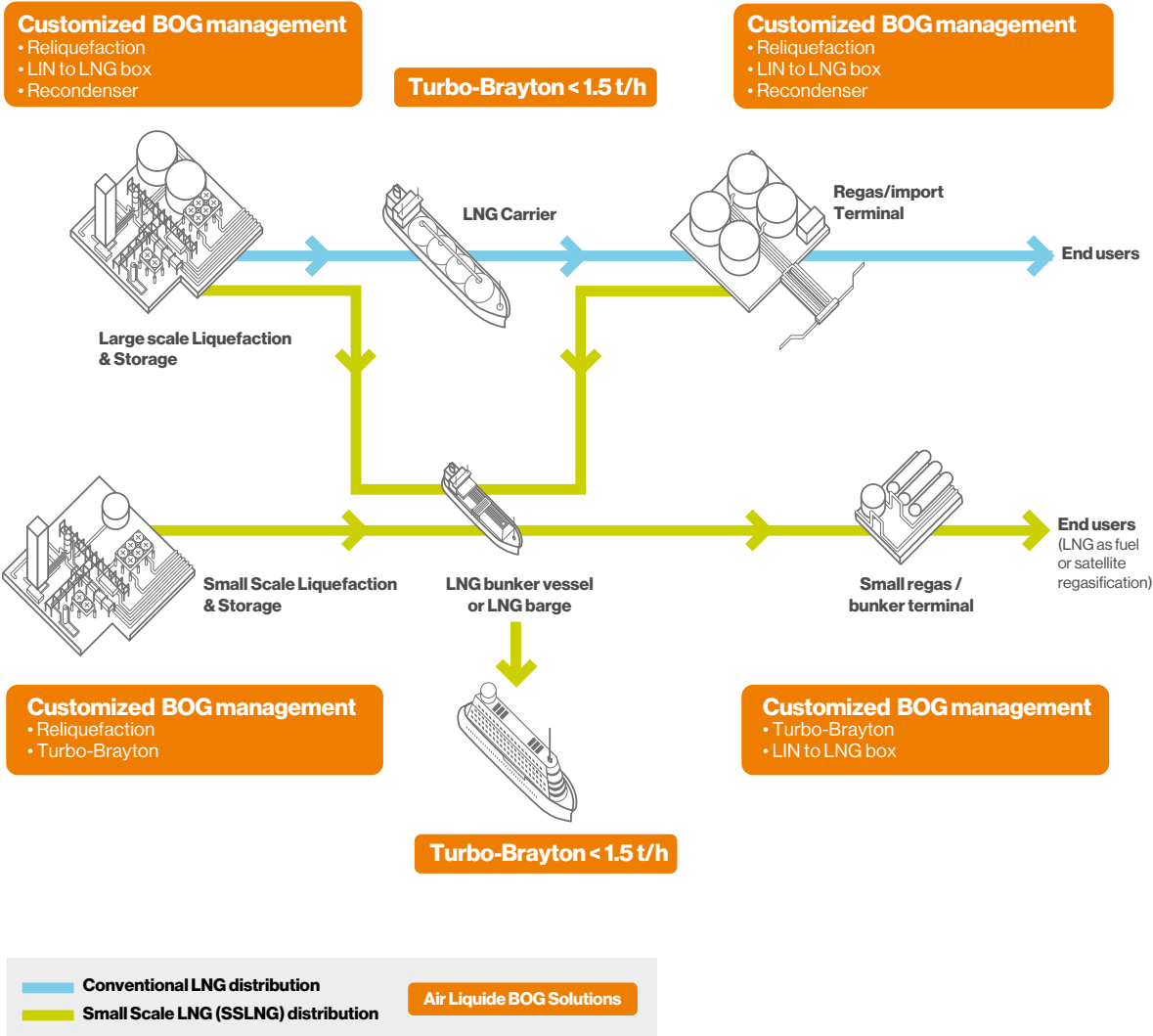
- Cold box is designed to handle peak of boil-off gas using liquid nitrogen (LIN) supply (when unloading LNG carriers)
- Large turndown range: 10% to 100%
- Proven heat exchanger technology is resilient to thermal shocks and fluctuating load

Boil-Off Gas management solutions

We can be your BOG management partner for:

- Conceptual design and site integration pre-feasibility studies
- Basic Engineering and Front-End Engineering Design (FEED)
- Proprietary equipment (Turbo-Brayton, reliquefaction unit...)
- Modularized equipment and procurement solutions

We also offers a complete range of products and services that covers the full span of LNG terminal operations. This includes spare parts, site services, production support, engineering services and long-term services agreements.





● Engineering Centers and front-end offices ● Manufacturing centers



Contact us

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