

ENERGY

INDUSTRY
INSIDER

Q2 2020 | Pulse
Small Scale LNG

FutureBridge

WHAT'S INSIDE!

How is small scale LNG making inroads to multiple countries?

What is the research direction in small scale LNG and which country leads the race?

01

Pulse themes:

- a. Penetration of small scale LNG networks in North America
- b. Penetration of small scale LNG networks in Africa and East Asia



02

Quarterly research review

- a. Patenting activity – small scale LNG
- b. Key elements in Ship-to-ship transfer



01

Emerging trends

Small scale LNG Networks penetrates North America

13 Apr 2020



Cryopeak building out small-scale LNG distribution hub in Northern Canada

The small-scale facility would be capable of producing 90,000 gallons of LNG daily from Fort Nelson, located in the northeast corner of British Columbia.

The plant's design also includes a new truck-loading system that optimizes loading of its fleet of LNG tankers.

It would be the closest LNG production facility to both Northern Canada and parts of Alaska.

28 Apr 2020



Dominion Energy strengthens in US small-scale LNG

Dominion Energy strengthens in US small-scale LNG by acquiring Pivotal LNG of Atlanta from the Southern Company which is active in the supply of LNG for the maritime market.

Pivotal LNG's operations consist mainly of the Trussville LNG plant in Alabama, and a 50% stake in the JAX LNG of Jacksonville. In future, the JAX LNG plans to expand its production capacity to 480,000 gallons/day to meet the growing demand for LNG and double its storage capacity to 15 million gallons.



Cryopeak's expansion will act as key for expanding energy supply in Northern Canada by making the cheaper fuel more accessible to remote communities and industries



DEVELOPMENTS Emerging Trends



- Small scale LNG projects are making market inroads in the North America by acquisition of players or adding access to distribution hubs
- Small LNG plants, usually with production capacities of less than 1 million mt/year, are springing up across the US and Canada to service niche markets, such as providing IMO-compliant bunker fuel to oceangoing vessels, meeting peak-shaving demand and serving a growing export market in the nearby Caribbean
- Such steps will ensure success in decarbonization efforts on both the fronts: maritime sector as well as land based transportation.

Small scale LNG Networks penetrates Africa and East Asia



22 Jun 2020



Renergen will market South Africa's first LNG via Total

Renergen is developing South Africa's first LNG plant with a capacity of 645 tonnes per day to cater the transport sector, expected to start commercial operations in the Q3 of 2021

Renergen, will market and distribute LNG in Total's services stations in South Africa with the customer base for the LNG predominantly being the logistics companies operating trucks along the main routes across the country

12 Jun 2020



EXR to develop Small scale LNG plant, its first gas offtake project

Elixir Energy Limited has partnered with MT Group to develop the country's first small scale LNG plant supplied from local coal bed methane

Both the companies will seek to develop a SSLNG plant to supply fuel to the South Gobi region's large coal trucking fleet that currently uses diesel, and shifting to LNG will help in reducing the pollution levels



DEVELOPMENTS

Emerging Trends



- Road transport accounts for a third of NOx emissions and is the dominant source in urban, heavily-trafficked areas. According to The European Environment Agency estimates that road transport contributes to excessive concentrations about 70% for nitrogen dioxide (NO2) and about 30% for particulate matter (PM).
- By switching to cleaner options like LNG will decrease this pollution levels drastically and setting up the infrastructure will further boost the greater wide scale adoption of cleaner fuels across other types vehicles as well (passenger vehicles)
- Developing regions like Africa and Asia currently lags such infrastructure, but in coming time these are the regions where most of the companies will try to focus their investments and monetize the market opportunity.

Elixir's Managing Director, Mr Neil Young, said: "Supplying gas to a SSLNG plant in the South Gobi region is a great initial offtake project for our company to investigate. There is a clear existing market in terms of the very large local coal trucking fleet which could operate on clean gas rather than diesel. We are very pleased to be working with a company of MT Group's caliber in pursuing this project."

Renergen and Total sign joint LNG marketing agreement – Capacity building in South Africa

RENERGEN
FUTURE ENERGY. TODAY



“It is a proud moment for Total South Africa as it is yet another first for our company. Total is committed to better energy and with this partnership we are taking another step towards providing affordable, reliable and clean energy in line with our Climate Ambition to achieving carbon neutrality by 2050 together with society. We look forward to working together with Renergen to continue making a difference in South Africa.”

Mariam Kane-Garcia, MD of Total South Africa.

Capacity building

- **The agreement:** Renergen has signed an agreement for the joint marketing and distribution of LNG through Total’s service stations in South Africa.
- **Current status:** Renergen is in the construction phase of South Africa’s first commercial LNG plant, and is anticipating a turn-on date of the plant around the third quarter 2021.
- **Benefit achieved:** The LNG displaces diesel usage, reducing operating costs and helping customers meet their sustainability targets due to the significantly lower greenhouse gas emissions from natural gas over diesel.
- **The off-takers:** The customer base for the LNG will predominantly be logistics companies operating trucks along the main routes across the country, with a significant portion of the initial production already allocated to customers.
- The first route targeted under the agreement will be the N3 between Johannesburg and Durban, followed by the corridors leading to the other major cities once Renergen’s Phase 2 project comes into production.
- With a capacity of 645 tonnes per day, the plant will target the transport sector.



N3 highway connecting Johannesburg and Durban

02

Quarterly research review

China's activity in patenting -

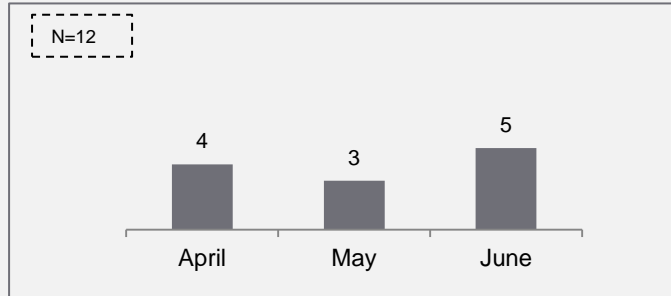
- Maximum number of patents filed by Chinese players are focusing on handling and heat exchanger related mechanisms for small scale LNG
- Most of the patents are filed by corporates which includes engineering companies
- Universities like Xi'an Jiaotong, China Jiliang and Jiangsu University Of Science & Technology focus on liquefaction, handling and storage & transportation of small scale LNG

Key areas of research -

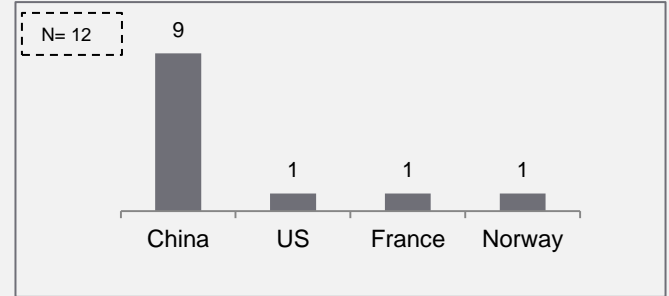
- **Liquefaction:** The focus is on the processes or apparatus for liquefying or solidifying gases or gaseous mixtures characterized by the kind of cold generation within the liquefaction unit for compensating heat leaks and liquid production using an "external" refrigerant stream in a closed vapor compression cycle
- **Heat exchange:** The focus is on providing a self-circulation type LNG pipeline precooling system, which selects NG and LNG as working media, gasifies a certain amount of LNG by utilizing the sensible heat of NG. It saves external expensive coolants like nitrogen and helium.

Patenting Activity – small scale LNG (Q2, 2020)

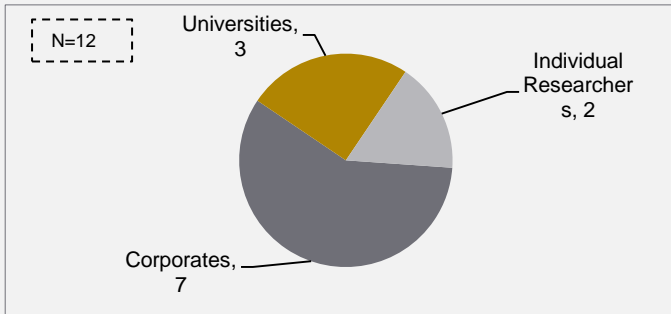
Patent publication



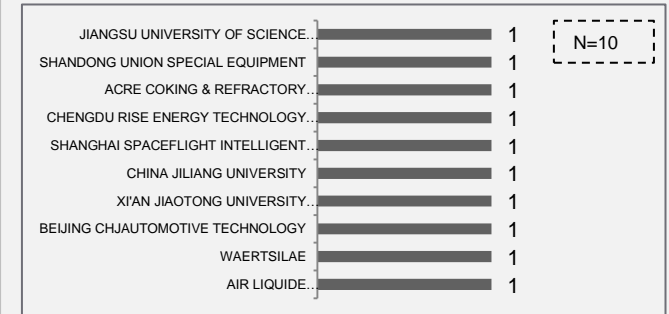
Distribution of patents w.r.t. country of origin



Distribution of patents: Corporate, Individuals & Academics



Top patent holders



Source: Orbit

Ship-to-Ship Transfer

Ship to ship transfer enables safe and efficient LNG transfer and is capable of handling any unexpected events by closing the transfer and avoiding the spills

Key elements in Ship-to-ship transfer

- **The Emergency Release System (ERS)** is a vital component of any LNG Transfer system. This has been designed to react to any unexpected events. It controls the system towards minimizing spills and shutdown the transfer system.
- LNG Emergency Release Systems helps in providing a safe and efficient LNG transfer method during normal transfer operations. Whenever an event takes place, the system activates and controls a safe system shutdown. The ERS consists of several components that include the Emergency Release Coupling (ERC).
- **The Flip-Flap Valve system** delivers 100% shut-off of the LNG upstream and downstream during the transfer system. The key advantages offered by this system are based on its ability and simplicity in terms of delivering successful operation under a broad spectrum of transfer circumstances beyond what other closure systems can offer. The Flip-Flap Valve system in addition offers low pressure drop feature that help in maintaining efficiency as well better LNG transfer times.
- **ERC Collar release:** The collar release mechanism has been designed to shut down, detach and make the flow of LNG safe in case an emergency occurs. The ERC provides 2 clear benefits for LNG safety transfer applications. The first advantage is the fact that it doesn't depend on hose line axial tensile load or any other transfer system parts like loading systems or flange joints. The second is in terms of control as it is hydraulically controlled directly from the HPU, providing several control solutions and options under all manner of emergency situations.

System applications



Key players in the value chain



Source: (FutureBridge analysis)

North America

55 Madison Ave, Suite 400
Morristown, NJ 07960
USA
T: +1 212 835 1590

Europe

328-334 Graadt van Roggenweg
4th Floor, Utrecht, 3531 AH
Netherlands
T: +31 30 298 2108

United Kingdom

5 Chancery Lane
London EC4A 1BL
United Kingdom
T: +44 207 406 7548

Asia Pacific

Millennium Business Park
Sector 3, Building # 4, Mahape
Navi Mumbai 400 710
India
T: +91 22 6772 5700