Innovation in the upstream process

Enhancement of the gas engineering business

The extraction of shale gas has driven the growing capacity of the natural gas supply mainly from Australia and the United States. This has resulted in downward pressure on the natural gas price, heightened expectations for the worldwide expansion of the liquefied gas market, and raised hopes for innovation in the gas transportation business.
Anticipating the development of liquefied gas business, MES has acquired ownership of TGE Marine AG (TGE), a gas carrier engineering company, and has started to build up its gas engineering business.

01

Diversification of the different types of gas

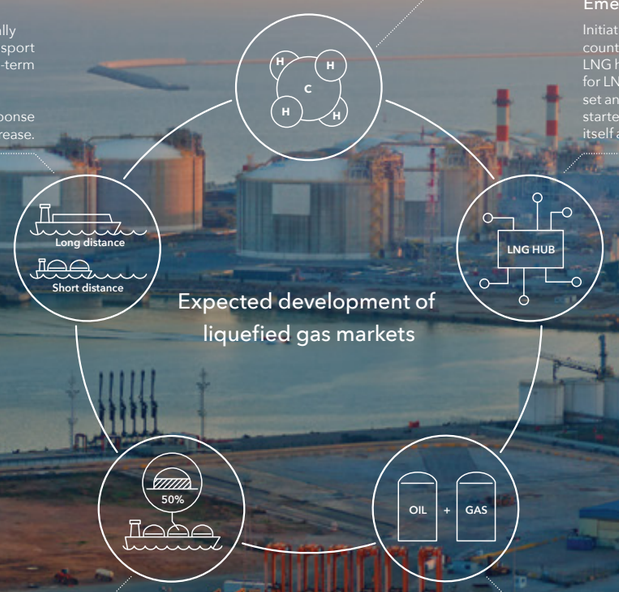
Markets for different types of liquefied gas, such as ethane and ethylene gas (LEG), which are byproducts of shale gas development, liquefied petroleum gas (LPG), and liquefied natural gas (LNG), are expected to expand in the future.

Increase of short-distance transport

In the past, liquefied gas was generally supplied with the long-distance transport of large quantities of gas under long-term contracts. Hereafter, small-scale, short-distance transport under spot contracts or flexible contracts in response to flexible demand is expected to increase.

Emergence of LNG hubs

Initiatives are now underway in Asian countries, such as Singapore, to develop LNG hubs. These hubs serve as centers for LNG trade, and are where prices are set and disseminated. Japan has also started initiatives aimed at establishing itself as an LNG hub.



Expected development of liquefied gas markets

Necessity of partial loads

Amidst the shift from bulk shipment to small-scale transport, the need for partial loading, in which a tank full of cargo is discharged little by little at multiple ports, is expected to grow in the future.

Increase of demand for dual fuel propulsion engines

Dual fuel propulsion engines, which use LNG and heavy oil, ethane and heavy oil, or methanol and heavy oil, for example, are expected to become the main type of engines in use.

Topics

In October 2015, MES acquired ownership of TGE Marine AG (TGE), a German gas carrier engineering company.

What is TGE Marine AG (TGE)?

TGE is a gas carrier engineering company headquartered in Bonn, Germany. The company undertakes the EPCS business, including the engineering and construction of type-C pressurized gas tanks and gas handling systems, and the supervision of construction for small and midsize gas carriers. TGE already commands a global market share of more than 50% for both small LNG carriers and small ethylene carriers, and approximately 30% for LPG carriers. Its marketing activities target clients that include both influential gas carrier owners in Europe and shipyards in China and South Korea.

Development of small and midsize gas carriers

Action 01 Focusing efforts on the development of small and midsize gas carriers

In the building of gas carriers, MES used to focus on large carriers and did not work on small and midsize ones. However, the demand for small and midsize carriers is expected to increase in the gas markets of India, China, and Southeast Asia following the development of routes for short-distance transport that enable the efficient supply of gas in the region. By collaborating with TGE, which excels in the engineering of small and midsize gas carriers, MES will focus on the development of small-sized ships known as Type C, and small and midsize gas carriers referred to as “MOSS Type.”

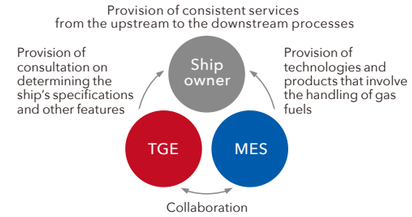
Type-C LNG carrier

neo83GC (MOSS type)

Engagement in EPCS business

Action 02 Entering the upstream process of gas carrier construction

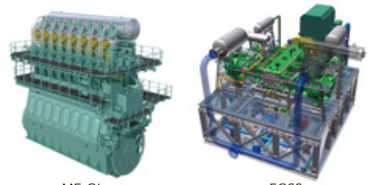
EPCS business is a business method in which Engineering, Procurement, and Construction Supervision are undertaken as a job lot, and the gas system of a gas carrier is managed as a whole. In the global market of gas career construction, TGE has been involved in projects starting from the phase for determining the specifications of ships. We will enter the upstream process in gas carrier construction by learning the ins and outs of the projects from TGE, which has worked on a large number of EPCS business projects.



Expanding sales channels of gas engineering equipment

Action 03 Expanding sales channels of ME-GI and FGSS

MES has been making progress on the development and sales of the electronically-controlled gas injection diesel engine (ME-GI), which allows for the use of LNG as well as heavy oil, and the high-pressure compressors for fuel gas supply systems (FGSS). Moving forward, we will work to expand the sales channels of these technologies and products, which involve the handling of gas fuels, in the global market for systems in which TGE has shares.



ME-GI

FGSS