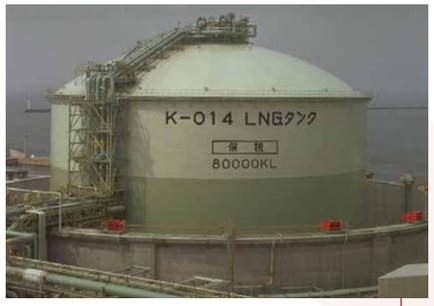
Epoch Maker

Cryogenic Storage Tanks for the Energy of Tomorrow

Liquefied natural gas (LNG) accounts for a quarter of the energy supplied in Japan. Kawasaki leads the world with LNG storage technologies that pave the way toward the hydrogen society of the future.



Osaka Gas's double metal wall type LNG tank in Himeji (completed in 1986)

1980s

Beginning of LNG usage

Kawasaki provided a proprietary in-ground tank featuring a stainless steel membrane structure in 1982, and an aboveground tank that applied nickel steel plate bending and welding technologies in 1983.

Tokyo Gas's LNG membrane tank in Ohgishima (completed in 1998)

LH_2 tanks at JAXA Tanegashima Space Center

Osaka Gas's PC outer wall LNG tank in Senboku (completed in 1996)

1990s

Growth in LNG tank size

Increasing demand for LNG called for the development of larger LNG tanks. In 1996, Kawasaki completed its first large PC outer wall full containment LNG tank, developing the technological foundation for designing and building large tanks. It also established the technology for supplying liquefied hydrogen to the Tanegashima Space Center to be used as propulsion fuel for launch vehicles.

Natural gas produces no sulfur oxides, and its nitrogen oxide emissions are about 40% of those of coal, making it an eco-friendly energy source. Armed with technologies for storing natural gas liquefied at a cryogenic temperature of −162°C, Kawasaki was among the first to start researching and developing aboveground LNG tanks. It completed its first in-ground LNG tank in 1982, followed by its first aboveground LNG tank the next year. Kawasaki subsequently developed various types of LNG tanks employing different techniques, including double metal wall type tanks, in-pit tanks, in-ground and underground membrane tanks, and prestressed concrete (PC) outer wall type tank.

A major turning point in its LNG tank business arrived in 2010, when Kawasaki completed an LNG storage and re-gasification terminal for Sakaide LNG Co., Inc. The Sakaide LNG terminal was constructed on a full turnkey basis; Kawasaki was responsible for everything from engineering to the provision of an LNG tank, LNG loading/unloading and re-gasification facility, and mechanical and electrical equipment. With this project, Kawasaki acquired the capacity to provide a comprehensive solution for LNG storage. Following the successful completion of this project, it received successive orders for numerous LNG tanks.

Now in 2016, Kawasaki's LNG tank business will mark a new watershed. One of the world's largest aboveground LNG tanks (for Tokyo Gas; capacity: 230,000 kl) and the largest in-ground LNG tank to be developed by Kawasaki (for Toho Gas; capacity: 220,000 kl) will be completed and go into service. The LNG tanks ordered in 2012 for an LNG loading terminal in Australia, Kawasaki's first overseas LNG terminal project, will also be completed in the near future.

These achievements all lead to the coming hydrogen era. As part of its hydrogen supply chain pilot project, Kawasaki is scheduled to construct a liquefied hydrogen loading/unloading and storage terminal by 2020. Hydrogen must be cooled to −253°C in order to be liquefied. With its ample experience in supplying liquefied hydrogen to the Tanegashima Space Center and developing LNG storage tanks, Kawasaki is fully equipped to make this possible, and to support the energy needs of tomorrow.

2000s & 2010s

Providing comprehensive solutions

In the 2000s, Kawasaki was awarded a full turnkey project for supplying the entire facilities of an LNG terminal. By successfully completing this project on schedule, Kawasaki made a leap forward to become a comprehensive LNG solutions provider. In 2016, a number of new cryogenic LNG storage tanks will go into service, including a PC outer wall LNG tank that is one of the largest in the world of its kind.

Sakaide LNG's LNG terminal (completed in 2010)

2020 and beyond

Contributing to a hydrogen society

In preparation for the coming hydrogen society, Kawasaki is building on the technologies it has cultivated through supplying liquefied hydrogen at Tanegashima and developing LNG products, with the aim of establishing a supply chain encompassing production, liquefaction, storage, transportation, reception, onshore storage, and delivery of hydrogen.

Architectural rendering of a liquefied hydrogen loading and storage terminal (NEDO project)