Petronas
FLNG Satu

Engineering and delivering Malaysia's first FLNG
Key figures

- Production capacity: 1.2 Mtpa of LNG
- Nitrogen cycle liquefaction process
- Hull dimensions: 365 m x 60 m x 33 m
- Topsides: 21 modules and one flare
- 177,000 m³ of LNG storage
- 20,000 m³ of condensate storage
- Four marine offloading arms
- Condensate offloading system
- 100 MW generated on board
- External turret
- Living quarters for 158 personnel
- Classification: DNV/GL
A combined effort to engineer and deliver Malaysia’s first FLNG

Petronas FLNG Satu Milestones

Petronas
One of the largest LNG producers in the world, with broad expertise in plant operation and design.

TechnipFMC
A leader in natural gas liquefaction plants and floating facilities, providing extensive industrial engineering, procurement, and installation experience.

DSME
One of the largest shipbuilders in the world with experience in construction of large FPSO and numerous LNG carriers.

Client and Operator: Petronas
Contractors: TechnipFMC in a consortium with DSME
Location: Malaysia, Sarawak, Kanowit gas field, about 180 km offshore Bintulu
Design Life: 20 years
Water depth: 70m

- Q4 2010 - FEED
- Q2 2012 - Start of EPCIC
- Q3 2013 - First hull and topsides steel cutting
- Q1 2014 - Keel laying
- Q2 2014 - Hull launch
- Q3 2014 - First module lift
- Q1 2015 - Last module lift
- Q2 2015 - Commencement of commissioning activities
- March 4, 2016 - Naming ceremony
- Q4 2016 - First LNG drop ever produced offshore
A unique combination of technologies

“We have built a trustful and long-term relationship with Petronas over the years and are very proud today, with our partner DSME, to have met the challenges of this game-changing project.”

Thierry Pilenko, TechnipFMC, Executive Chairman

Liquefaction
Natural gas is liquefied using Air Products’ dual nitrogen cycle technology. The process enhances safety by avoiding hydrocarbon refrigerants.

LNG loading arms
Marine loading arms adapt to offshore conditions for smooth LNG offloading from the facility to an LNG carrier moored alongside.

Naval aspects
Extensive naval architecture studies, supported by wind tunnel and wave basin tests, ensure the robustness and performance of the FLNG under various sea states and operating conditions.

Cargo containment system
A two-row arrangement of eight membrane-type LNG storage tanks (GTT No.96 type) and two condensate storage tanks located below deck. The tanks can store up to 177,000 m³ of LNG and 20,000 m³ of condensate, with total storage capacity equivalent to about 79 Olympic swimming pools.
Petronas FLNG Satu milestones in pictures

Q3 2013 Hull steel cutting

Q1 2014 Keel laying

Q2 2014 Hull launch

Q3 2014 Lifting of the first module

Q1 2015 Lifting of the last module

March 4, 2016 Naming ceremony

Q4 2016 First LNG drop ever produced offshore
Safety in design: New challenges

Given the novelty of the FLNG concept, safety has been the focus of many technical studies. Numerous safety features built into the Petronas FLNG design address possible hazards and reduce risk to life and property.

Fire and cryogenic risk
Fire and cryogenic risk analyses developed during engineering ensure that risks are as low as reasonably practicable.

Exhaust dispersion and helideck availability
We performed CFD dispersion simulations to study the risk of helideck impairment by hot plumes and derive an estimation of availability. This study also confirmed the acceptability of pollutant concentration at air intakes for living quarters.

Explosion risk
During engineering, TechnipFMC performed numerous flammable gas dispersion and explosion simulations using computational fluid dynamics simulation. The results were used to derive explosion loads for the design of safety-critical elements.
Noise and vibration
Extensive noise and vibration analyses helped drive design measures to keep these levels within tolerance.

Key safety features

- Four fire and blast walls contain potential fire zones on main deck and topsides process and utilities modules
- Several primary escape routes run the length of the vessel
- Three emergency depressurization/blowdown zones
- Passive fire protection
- Cryogenic spill protection
- Fire water system
- The FLNG also includes several refuges

FLNG is a game-changer for the LNG industry

Floating liquefied natural gas combines several technologies to liquefy natural gas at sea. The subject of extensive study over the past decade, FLNG solutions have the potential to place gas liquefaction facilities directly over offshore gas fields, unlocking new energy resources offshore.

Offering a unique combination of know-how and technologies in subsea, offshore, and onshore, TechnipFMC is a leader in FLNG. The company secured three of the world’s first FLNG projects.

Petronas FLNG Satu plays a significant role in Petronas’ efforts to unlock gas reserves in Malaysia’s remote and stranded fields to help meet the growing demand for gas.
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