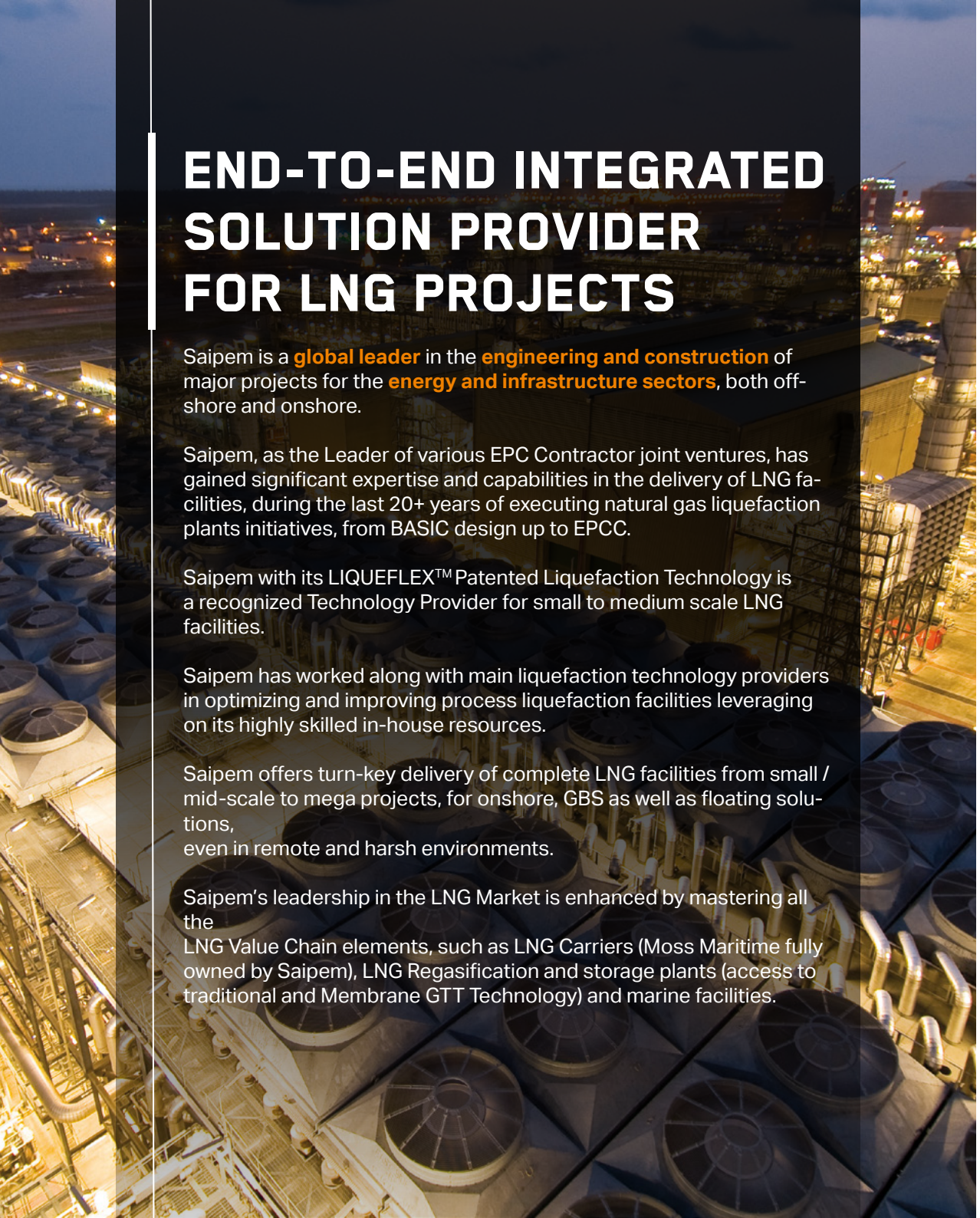

SAIPEM
DELIVERY SUSTAINABLE
LNG SOLUTIONS
SAIPEM



END-TO-END INTEGRATED SOLUTION PROVIDER FOR LNG PROJECTS

Saipem is a **global leader** in the **engineering and construction** of major projects for the **energy and infrastructure sectors**, both off-shore and onshore.

Saipem, as the Leader of various EPC Contractor joint ventures, has gained significant expertise and capabilities in the delivery of LNG facilities, during the last 20+ years of executing natural gas liquefaction plants initiatives, from BASIC design up to EPCC.

Saipem with its LIQUEFLEX™ Patented Liquefaction Technology is a recognized Technology Provider for small to medium scale LNG facilities.

Saipem has worked along with main liquefaction technology providers in optimizing and improving process liquefaction facilities leveraging on its highly skilled in-house resources.

Saipem offers turn-key delivery of complete LNG facilities from small / mid-scale to mega projects, for onshore, GBS as well as floating solutions,
even in remote and harsh environments.

Saipem's leadership in the LNG Market is enhanced by mastering all the
LNG Value Chain elements, such as LNG Carriers (Moss Maritime fully owned by Saipem), LNG Regasification and storage plants (access to traditional and Membrane GTT Technology) and marine facilities.

EXPERTS IN THE GAS VALUE CHAIN

LEADING THE ENERGY TRANSITION WITH NATURAL GAS

With over 60 years experience delivering large and medium sized natural gas projects in over 50 countries for the upstream, midstream and downstream sectors, Saipem has earned its place among the world's leading LNG EPC contractors.

GAS PRODUCTION AND TREATMENT

LIQUEFACTION PLANT

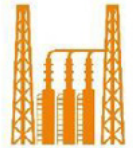
FLNG

LNG TRANSPORTATION

STORAGE & LOADING

REGASIFICATION

PIPELINE



GAS MONETIZATION

40B+ SCFD
GAS TREATED

85+ MTPA
LIQUEFACTION CAPACITY*

8M+ m^3
LNG STORAGE CAPACITY*

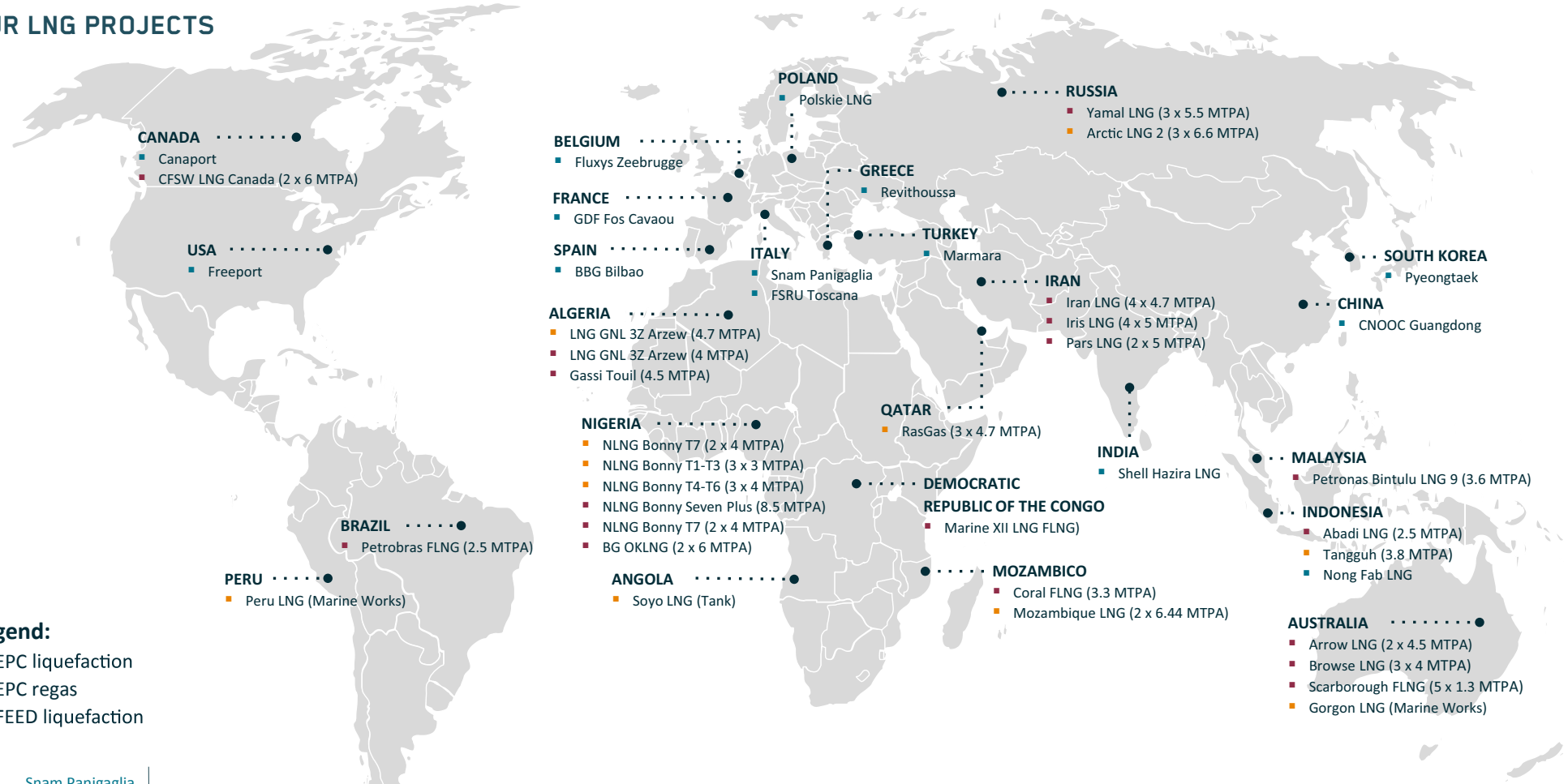
62 MTPA
GASIFICATION CAPACITY*

75K km
PIPELINES INSTALLED

50+
FERTILIZER PLANTS BUILT

* INSTALLED & UNDER CONSTRUCTION

OUR LNG PROJECTS



Legend:

- EPC liquefaction
- EPC regas
- FEED liquefaction

1971-2005
Snam Panigaglia
Pyeongtaek
Marmara
Revithoussa
BBG Bilbao
Shell Hazira LNG

2006-2007
RasGas LNG
Guangdong
NLNG 7 Plus
BG OKLNG
Pars LNG

2008
NLNG T1-T6
Soyo LNG
Freeport
Zeebrugge
Iran LNG
Iris LNG
Gassi Touil

2009-2011
GorgonL NG
Canaport
Peru LNG
Fos Cavaou
Petrobras FLNG

2012
YamalL NG
Browse LNG
Arrow LNG

2013-2014
FSRU Toscana
BintuluL NG 9
ScarboroughF LNG
Abadi FLNG

2015-2016
GNL 3Z Arzew
PolskieL NG
LNG Canada
GNL 3Z Arzew
Coral FLNG
Eni East Africa LNG

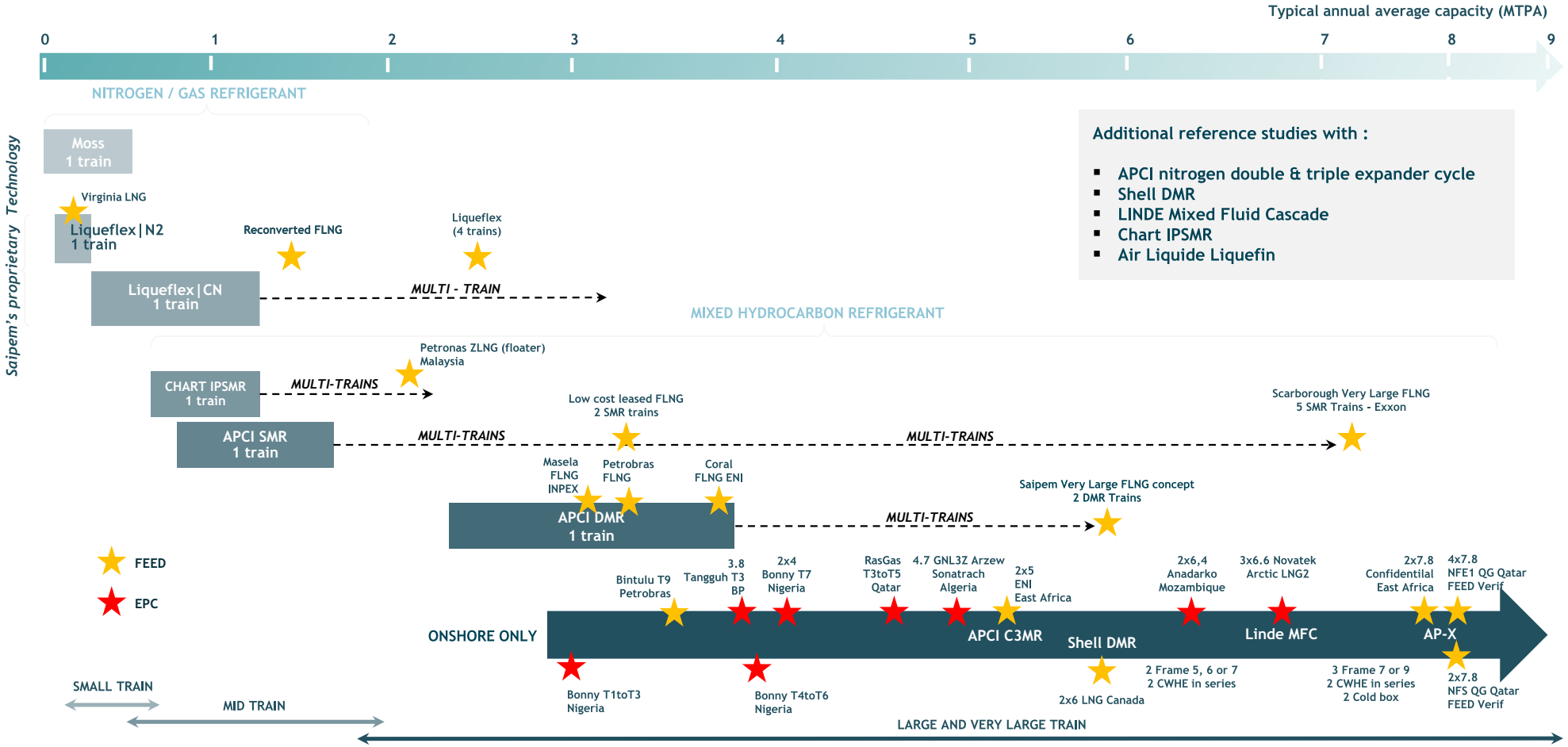
2019
NLNG T7
Confidential (East Africa LNG)

2021-2022
Virginia LNG Ph. 2
ZLNG (FLNG)

Ongoingp rojects
Arctic LNG 2
NLNG T7 (Bonny)
Tangguh T3
Mozambique LNG
Nong Fab LNG
Marine XII LNG FLNG

SAIPEM EXPERIENCE WITH ALL SCALES OF LIQUEFACTION PLANTS

REFERENCES AND ACCESS TO A COMPLETE RANGE OF PROCESSES, INCLUDING IN-HOUSE SOLUTIONS ONSHORE, NEAR-SHORE (INCL. ON GBS), OFFSHORE & FLOATERS



MOZAMBIQUE LNG PROJECT

GREENFIELD LNG (EPC/LSTK)

- **Client:** Total Mozambique Area 1, Mozambique
- **Role:** Main contractor as JV leader
- **Location:** Cabo Delgado coast, Mozambique
- **Project status:** Suspended
- **SoW:** EPC of greenfield LNG export terminal including 2 trains with 6.44 MTPA capacity each (APCI C3-MR technology) and associated utilities

The scope of work includes 2 LNG trains with total 13 MTPA capacity, 2 LNG tanks (180,000 m3), LNG condensate export jetty, various offsites facilities, including marine offloading facilities, administration buildings and space provision for future LNG trains expansion.

The EPC turnkey project started with FEED performed by the JV.

The design of liquefaction and main process units was carried out by Saipem.

NLNG T7 PROJECT

BROWNFIELD LNG (EPC/LSTK)

- **Client:** NLNG, Nigeria
- **Role:** Main contractor as JV leader
- **Location:** Bonny Island, Nigeria
- **Project status:** Under construction (completion expected in 2025)
- **SoW:** EPCC, support to start-up and performance test of one complete LNG train and one additional liquefaction unit with a total capacity of 8 MTPA (APCI C3-MR technology), new export jetty and brownfield interconnections

The NLNG T7 project has the objective to expand the existing 21 MTPA facility with a new liquefaction facility for 8 MTPA additional LNG capacity.

At the beginning of 2000 Saipem delivered the first 6 trains. In 2020 it was awarded the EPC contract for the 7th train based on the FEED which had been developed by the JV during the 2018-2019 dual FEED competition.

The design of liquefaction and main process units was carried out by Saipem.

ARCTIC LNG2 PROJECT

COMPLETE LNG PLANT ON GBS (EPC/LSTK)

- **Client:** LLC ARCTIC LNG-2 (JSP Novatek 60%, Ekropromstroy LLC 30%, Total E&P Salmanov 10%), Russia
- **Role:** Main contractor as JV leader in the GBS, Main contractor in Top Sides
- **Location:** Murmansk yard (Barents sea), Russia then towing to Gydan
- **Project status:** Under construction (suspended)
- **SoW:** EPC, pre-commissioning and assistance to commissioning of 3 trains with 6.6 MTPA capacity each (Linde MFC technology) and associated utilities

This is the **world's first large scale LNG on GBS.**

The units are supplied in 42 topside process modules (450,000 tonnes approx overall weight) and installed on 3 concrete Gravity Based Structures (GBS) accommodating LNG trains and other liquid storages.

Each GBS has the following features: 300 m x 152 m x 30 m (incl. cantilevers); 2 x 114,500 m³ membrane LNG tanks; 1 x 75,000 m³ condensate tank and water ballast tanks. The GBS platforms will be shipped 2,000 km to the Gydan Peninsula.

TANGGUH EXPANSION PROJECT

BROWNFIELD LNG IN REMOTE AREA (EPC/LSTK)

- **Client:** BP Berau, Indonesia
- **Role:** Main contractor as JV leader
- **Location:** Tangguh field, Indonesia
- **Project status:** Completed in 2023
- **SoW:** EPC of brownfield liquefaction facility (3rd LNG train) with 3.8 MTPA capacity (APCI C3-MR technology) and associated utilities

Onshore receiving facility, LNG and condensate loading berth, boil-off gas recovery, utilities, flares, and associated infrastructure facility are included in the scope of work.

FEED and detailed design were performed by the JV integrated team in Jakarta.

Saipem developed an innovative ad-hoc execution strategy to effectively manage the **extremely challenging project logistics** due to the lack of the most basic infrastructure.

GNL 3Z ARZEW PROJECT

GREENFIELD LNG (EPC/LSTK)

- **Client:** Sonatrach, Algeria
- **Role:** Main contractor
- **Location:** Arzew, Algeria
- **Project status:** Completed in 2015
- **SoW:** EPC, including FEED, of complete onshore greenfield LNG export terminal made up of 1 train of 4.7 MTPA (APCI C3-Split MR technology), 2 LNG tanks 160,000 m3 each, all necessary utilities, infrastructures and marine works (jetty, breakwater and offshore flare)

Saipem executed this large gas liquefaction plant as the **prime contractor**, asserting its reputation as an integrated player, capable of managing large and complex turnkey projects in the high-tech market of the LNG sector.

RASGAS II (T3-T4-T5) PROJECT

BROWNFIELD LNG IN REMOTE AREA (EPC/LSTK)

- **Client:** Rasgas, Qatar
- **Role:** Main contractor
- **Location:** Ras Laffan, Qatar
- **Project status:** Completed in 2006 (delivered in 3 phases)
- **SoW:** EPC, including FEED, of 3 liquefaction trains to expand the existing facilities (Trains 1,2), with 4.7 MTPA each (APCI C3-MR technology), water cooled, 2 LNG tanks (140,000 m3 each) as well as all necessary utilities

This project was ranked **among the largest trains** operating in the world, helping to launch Qatar into a new era as a leading LNG exporter.

NONG FAB LNG PROJECT

LNG RECEIVING TERMINAL (EPC)

- **Client:** PTT LNG, Thailand
- **Role**: Main contractor as JV leader
- **Location**: Baan Nong Fab, Thailand
- **Project status:** Completed in 2023
- **SoW:** EPCC of LNG regasification terminal with 7.5 MTPA regasification capacity, 2 LNG tanks (250,000 m3 each), the berth and associated utilities

The Nong Fab Terminal will receive LNG from carriers and store in **very large cryogenic** tanks, warm the liquid to retransform it into a gaseous state and feed the existing external network.

The EPC work also includes an important administration area and buildings to support the future operations.

POLSKIE LNG PROJECT

LNG RECEIVING TERMINAL (EPC)

- **Client:** Polskie LNG, Poland
- **Role:** Main contractor as JV leader
- **Location:** Świnoujście, Poland
- **Project status:** Completed in 2016
- **SoW:** EPCC of an LNG regasification terminal, with 4.1 MTPA of regasification capacity, 2 full containment LNG storage tanks (160,000 m3 each), the berth and associated utilities

Polskie LNG terminal was the **first regasification plant** ever built in Poland.

The plant was successfully completed in an environmentally-protected area which aims to preserve wildlife and ensure access to the nature reserve and tourist area.

FSRU TOSCANA PROJECT

EPC

- **Client:** OLT (Offshore LNG Toscana SpA), Italy
- **Role:** EPC LSTK Contractor
- **Location:** Offshore Livorno, Italy
- **Project status:** Completed in 2013
- **SoW:** From feasibility to EPCIC of an FSRU with 4 MTPA LNG regasification capacity and a 135,000 m3 storage tank

This is the world's **first FSRU** moored in open sea by means of a **turret** and able to transfer side-by-side the LNG in open sea with a maximum wave height of 2.5 m at a rate of 12,000 m3/h.

It is based on the reconversion of a **Moss Maritime** (Saipem company in Norway) type LNG carrier.

ZNLG

FLNG FEED

- **Client:** Petronas
- **Role:** JV leader
- **Location:** Sabah, Malaysia
- **Project status:** Completed in 2022
- **SoW:** FEED for FLNG (2 liquefaction unit x 1.1 MTPA) using IPSMR by CHART Technology, hull membrane tanks 200,000 m^3

Saipem developed detailed design of the floating liquefaction facilities to be located in a nearshore evironment using state-of-the-art aeroderivative gas turbines for the liquefaction cycle compressors.

CORAL FLNG

FLNG FEED

- **Client:** Eni
- **Role:** JV leader
- **Location:** Mozambique offshore
- **Project status:** Completed in 2016
- **SoW:** FFED for FLNG, 3.4 MTPA liquefaction facility using APCI DMR tecnology

Saipem developed detailed design of the FLNG in an open-sea environment to help Client developing huge offshore gas reserves.

ABADI FLNG PROJECT

FLNG FEED

- **Client:** Inpex Masela, Indonesia
- **Role:** JV leader
- **Location:** Abadi gas field, Indonesia
- **Project status:** Completed in 2014
- **SoW:** FEED for FLNG (2.5 MTPA of total liquefaction capacity based on APCI DMR technology), non-disconnectable turret, mooring and relevant anchors, LNG storage capacity of 250,000 m3, hull dimensions (410 m x 70 m x 36 m - bp L x B x D)

With a nameplate capacity of 2.5 MTPA, the FEED for the Abadi FLNG facility in the eastern Indonesia Masela Block was one of the **world's most complex** engineering studies.

Based on a new build hull development, the concept was jointly studied with a first-class shipyard.

OUR LICENSE TO OPERATE

Whilst Saipem has historically delivered industry leading safety performance, we believe that reaching Zero Fatalities and Zero Accidents is not only desirable, but absolutely achievable. For this reason, in 2014, Saipem launched We Want Zero, which sets the purpose and vision that leads Saipem's efforts and commitment to move our safety performance from good to outstanding.

CULTURE OF HEALTH AND SAFETY

We Want Zero complements and extends the activities of our **Leadership in Health and Safety** (LiHS) Foundation, a non-profit organization created by Saipem in 2010. This foundation develops and actively promotes – internally and externally - HSE Excellence, developing research, training programs and information campaigns in the field of health and safety by focusing on four key points: Culture, Behavior, Leadership and Change. The implementation of the **IOGP Life Saving Rules** in our operations and procedures has been another key enabler for Saipem's safety performance.

SAIPEM ROLE IN NET ZERO PATH

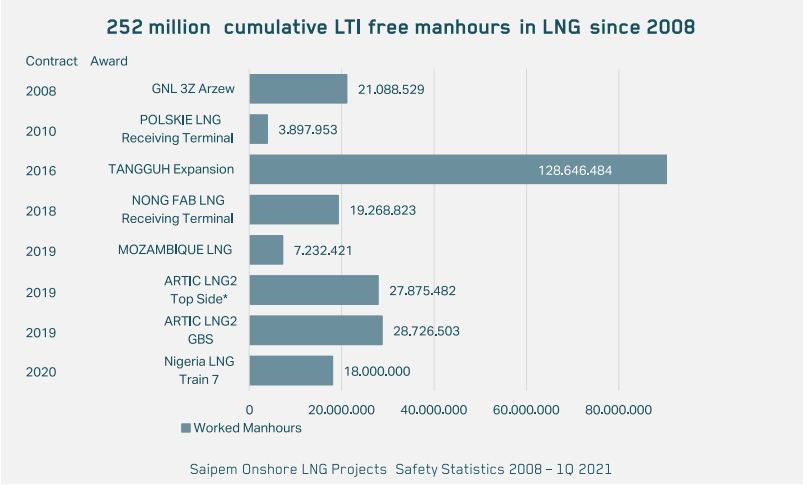
The Company's purpose is **Engineering for a Sustainable Future** and as such, Saipem is committed to supporting its clients on the energy transition pathway, towards **Net Zero**.
Along with them, Saipem has also undertaken its own voyage, embracing tech innovation and digitalization, as well as adopting processes geared towards **environmental sustainability**.

Saipem's commitment to climate change prevention is reflected in its governance, principles, and policies. The Board of Directors has become increasingly proactive on climate issues, and these were integrated into the Company business strategy. Climate related targets have been included in Company's Variable Incentives since 2018.
Recognising the actual global energy transformation, Saipem plans to gradually reduce its footprint, throughout its value chain, with a comprehensive strategy made up of **2 key pillars**:

1. Reducing the footprint of Saipem own assets and operations
2. Supporting Clients reducing their own footprint

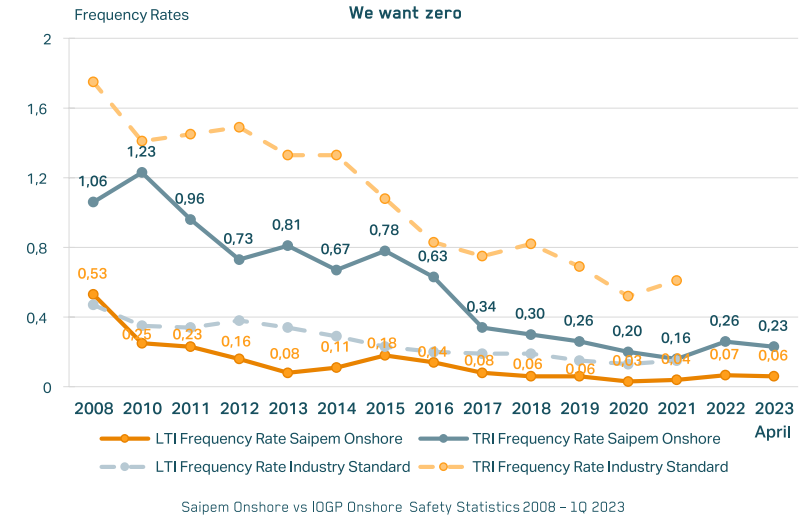
[1]: calculated vs 2018 baseline

INDUSTRY LEADING SAFETY RECORD



Other Onshore Projects: 749+ million LTI free manhours since 2008

1000+ million cumulative LTI free manhours since 2008



NEXT GENERATION GREEN LNG

SAIPEM PORTFOLIO OFFERINGS AND EXPERTISE

ENERGY EFFICIENCY

PROVEN EFFICIENT ENERGY GENERATION TO REDUCE EMISSIONS

- Combined Cycle Power Gen
- E-drive solutions
- High efficiency mechanical drives Waste Heat Recovery
- Designed and built combined systems for normal operation and transients
- Collaboration with OEM

PROCESS OPTIMIZATION

IMPLEMENTING TODAY'S BEST AVAILABLE TECHNOLOGY AND RETURN ON EXPERIENCE FROM EXECUTED PROJECTS TO CUT OVERALL ENERGY DEMAND

- Higher efficiency schemes for NG treatment and liquefaction and End Flash
- Optimized utilities consumption
- Reduced flaring

CARBON CAPTURE

CO^2 CAPTURE TO SUPPORT NET-ZERO LNG

- Carbon capture & re-use with EPC expertise for ammonia, urea, methanol and GTL
- Carbon capture & storage with proprietary CC solutions and EPC experience

HYBRIDIZATION

INTEGRATING PROVEN AND EMERGING NEW ENERGY TECHNOLOGIES TO ELIMINATE KEY EMISSION SOURCES

- Renewable energy integration with plant power grid
- Energy storage and peak shaving
- H2 production for blending with fuel gas

INNOVATIVE GBS LNG APPLICATIONS

Gravity Based Structures (GBS) are a **competitive, robust and highly flexible nearshore alternative solution** to conventional onshore or floating LNG terminals, especially where **environmental** impact is a concern. Steel or concrete GBS can combine multiple functions: breakwater, scalable storage, host platform for liquefaction, regasification or LNG-to-power plant and transfer dock. GBS are suitable for the following applications:

- mid / large scale liquefaction plants
- small / mid-scale regasification plants
- LNG-to-power (GBS power plants)
- storage for bunkering vessels powered with LNG as fuel.

CASE STUDY: ARCTIC LNG 2 EPC PROJECT

JV leader of 3 Concrete GBS each supporting 6.6 MTPA LNG train.

Main Challenges

- Light weight aggregate
- Huge slip forming
- Winterization
- Schedule (ice-free navigation)

GBS Size

- Footprint = 330 m x 152 m
- Mass: 480,000 tonnes
- Concrete = 170,000 m³
- Rebar = 60,000 tonnes

GBS Top Slab

20,000 tonnes of structures (marine pipe racks, utility racks etc) and piping, E&I buildings, pumps and other equipment.

MODULARIZATION

DEEP EXPERIENCE

Saipem has more than 20 years experience designing and delivering over 1 million tonnes of **fully modularized onshore plants and FPSO** projects supporting our clients from concept studies through to FEED, EPC and operation.

Our experience covers new build and conversion projects, providing engineering, fabrication, module movement and hook-up.

We have the in-house capabilities and competencies to execute complex modularized projects for the entire EPC lifecycle. A dedicated **Modularization Group** is focused on the implementation of modularization methodologies and best practices.

SAIPEM FABRICATION YARDS

The 8 Saipem yards focus on prefabrication, assembling and erection operations of large and complex manufacts with the highest level of competence.
Fabrication yards are located in key geographical areas cooperating with local players thus contributing to the development of local economies.

Building on our direct experience and best practices operating our wholly owned fabrication yards, Saipem has the know-how to efficiently operate third-party fabrication yards.

LNG TECHNOLOGIES

COLLABORATION WITH LICENSORS AND MAIN SUPPLIERS

Saipem has the skills to evaluate licensor performance claims (e.g. APCI, Linde, Shell, Chart, ConocoPhillips, Air Liquide, Black & Veatch, Moss Maritime - Saipem Group) and the capability and experience to select and integrate the right machinery configuration and heat exchanger for the process scheme, and the capability to determine the best combination of operating parameters to minimize the parasitic refrigerant compressor power.

LIQUEFLEX™

- Proprietary technology for mid-small scale (0.2 to 1.2 MTPA) liquefaction units based on PFHE and expanders, scalable with multi-train arrangement
- Based on gas refrigerant intrinsically safe, good operability; enhanced efficiency compared to standard nitrogen expander process
- Applicable to a wide range of gas composition with simplified design for lean gas; developed for compact design and low CAPEX
- Based on proven equipment and concepts.
- Verified with advanced dynamic simulation
- Suitable for onshore & offshore applications
- Modularized and pre-engineered: quicker delivery and installation
- Reduced supply time for main equipment
- Suitable for installation on existing LNG carrier

DEDICATED CAPABILITIES

IN-HOUSE ENGINEERING SERVICES

Saipem has full in-house engineering and construction capabilities covering the entire LNG value chain.
Safety, construction, maintenance and operation provide the fundamental principles against which we develop our LNG layout solutions.

- Dedicated **LNG Technology Project Department** and senior specialists in the engineering organization
- Dedicated **Technology Innovation Department** specialised also in LNG innovation, process efficiency and GHG mitigation methods
- Wide pool of skilled and talented **permanent** multidiscipline engineering resources, able to support multiple parallel EPC LNG projects
- Key specialists for project execution with **field operation** experience
- Deep knowledge of applicable international standards and codes
- Ability to leverage on Saipem's climate protection expertise to reduce project carbon footprint
- Industry leading 3D model development and reviews using customized tools and applications
- Our team can offer **Modular Plant solutions** and application of **Advanced Work Packaging (AWP)** methodologies

UNIVERSITY PARTNERSHIP

Saipem's commitment to sustainable energy extends beyond the industrial arena. Building on our successful collaboration delivering the "New Technology Frontiers in Gas Production, Transportation and Processing" course, Saipem is proud to be the main lecturer for the **"Sustainable process design for natural gas and energy carriers"** course, a mandatory component of the **Politecnico di Milano**'s Masters in Chemical Engineering, starting from academic year 2022-2023.

07,2023

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LET'S KEEP IN TOUCH