

Where energies make tomorrow ●

# Loading Systems

Offering advanced technology, expertise and innovation

**T.EN**

**TECHNIP  
ENERGIES**



# Loading Systems

Leading provider of fluid transfer system for the energy industry



**Technip Energies Loading Systems is a trusted solutions provider. As an offshore and LNG leader, we differentiate ourselves through quality products, innovation, unmatched engineering support structures and unrivaled aftersales services.**

Technip Energies Loading Systems serves clients across the petrochemicals, gas and new energies industries from offshore facilities to refineries and chemical users. Safety and quality drive everything we do and we strive to remain pioneers in the market with a strong focus on developing

new technology.

One of our main activities since the 1950s has been providing marine loading arms for onshore and offshore use with different applications on the energy market. Our superior loading arms engineering has helped to distinguish us in the LNG

market. We have been blazing trails in offshore and ship-to-ship transfers while providing a full-fledged FLNG offer. We have field-proven technologies to meet any energy transition challenge.

# Worldwide footprint

Global commitment, proven expertise and quality

## HEADQUARTERS AND EUROPE, AFRICA

Route des Clérimois-CS10705  
89107 Sens Cedex  
France  
+33 (0)3 86 95 87 00  
loadingsystems@technipenergies.com

## SOUTH KOREA

#611, Kolon Science Valley II,  
55, Digital-ro 34-gil, Guro-gu  
Seoul, 08378  
Republic of Korea  
+82 2 850 3017  
loadingsystems.sk@technipenergies.com

## AMERICAS

11720 Katy Freeway  
Houston, Texas 77079 USA  
+1 281 405 6365  
loadingsystems.americas@technipenergies.com

## CHINA

19/F, Block A, Xuhui Vanke Center, 55 Dingan Road  
Xuhui District, Shanghai  
China - 200030  
+862124221532  
loadingsystems.china@technipenergies.com

## INDIA

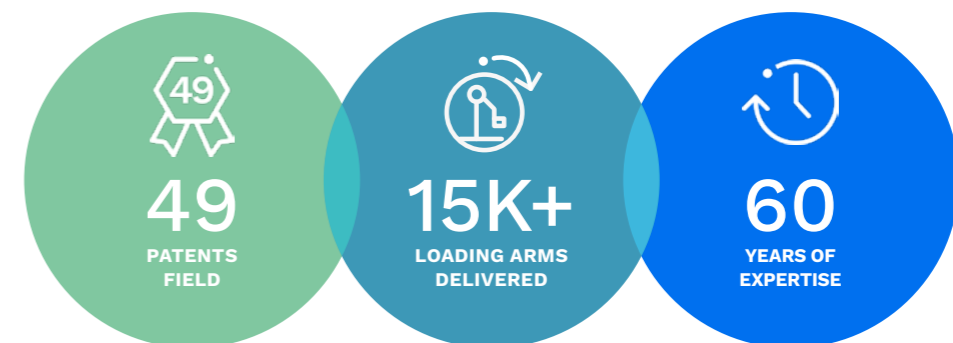
Technology Centre- 2, B- Wing , Fifth Floor  
L&T Business Park, Gate No.5  
Saki Vihar Road Powai Campus  
Mumbai  
Maharashtra, 400072  
+91 2267002530  
loadingsystems.india@technipenergies.com

## SOUTH EAST ASIA

T.EN Loading Systems SAS  
Menara Technip Energies  
38 Jalan Inai | Wilayah Persekutuan, Kuala  
Lumpur 55100 | Malaysia  
+603 2705 3000

## In a nutshell

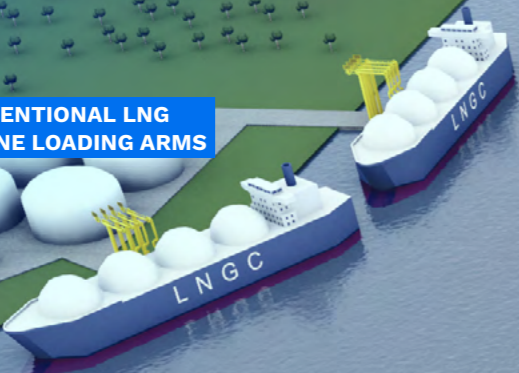
- Three certifications
  - ISO 9001: 2015 – Quality management systems
  - ISO 14001: 2015 – Environmental management
  - ISO 45001: 2018 – Occupational health and safety
- 24/48 responsive service
- 83,000 m<sup>2</sup> main plant in Sens, France
- Scope: Design and manufacture of loading systems for crude and refined products, chemicals, liquefied and cryogenic gases and other fluids
- 33 highly-skilled field engineers with global coverage dedicated to rapid intervention and onsite supervision
- Two partnered factories for loading arms assembly worldwide



# A wide range of products

## Making the link

CONVENTIONAL LNG  
MARINE LOADING ARMS



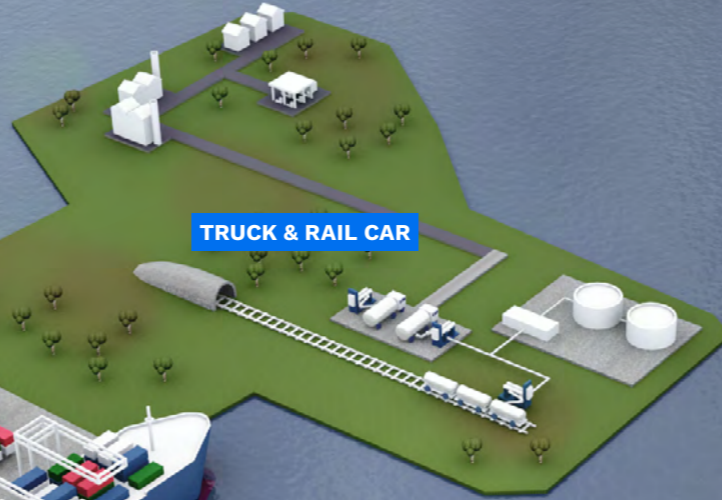
SMALL SCALE MARINE  
LOADING ARMS



SHORE-TO-SHIP  
TRANSFER SYSTEM  
FOR LNG BUNKERING



TRUCK & RAIL CAR



SHIP-TO-SHIP  
TRANSFER SYSTEM  
FOR LNG BUNKERING



OLAF  
or  
DCMA-S  
LNG MARINE LOADING ARMS



ARCOS  
or  
DCMA-S  
LNG MARINE LOADING ARMS



HPNG MARINE  
LOADING ARMS

CONVENTIONAL  
PETROCHEMICAL  
MARINE LOADING ARMS



DCMA-S OFFSHORE®



# Leading solutions for Onshore and Nearshore

Our advanced technology in transfer operations offers innovating designs, systems, packages and services to the energy industry.

## Onshore



### REFINING AND PETROCHEMICAL LOADING SOLUTIONS

- Configurable loading arm design adapted for the transfer of petroleum, LPG, refined products or chemicals (including sulfuric, nitric acids, chlorine, sulfur, bitumen, ammonia, etc).
- Applicable for liquid CO<sub>2</sub>
- Diameter from 6" to 24" and design pressure up to 50 bars (ANSI 300)
- Self-supported product line
- Integrated control system
- Reliable and field-proven pantograph system, swivel joints, Quick Connect / Disconnect Couplers (QC/DC), Emergency Release Systems (ERS)
- Multiple configuration options available such as piggy back line, heat tracing system, insulation, Constant Position and Management System (CPMS), EasyDrive, automatic connection, electrical drives, etc...

### LNG LOADING SOLUTIONS

- Leader in LNG transfer systems including swivel joints, ERS and QC/DC in-house components
- LNG loading arms designed for small- to large-scale LNG transfer (from 6" to 20")
- Unique offering of complete 20" full bore
- Exposed jetties solutions with our patented technology



### HIGH-PRESSURE NATURAL GAS (HPNG)



- Diameter: 12"
- In-house ERS and QCDC design
- Two design pressure classes: ANSI 600 and ANSI 900
- High-duty swivel joint design with three redundant sealing levels
- Tri-redundant dynamic sealing for swivel joints to reduce maintenance and optimize availability
- Simple, reliable and safe emergency shutdown (ESD) philosophy

### TRUCK AND RAILCAR LOADING MODULES

#### Loading arms

- Top/bottom loading and unloading arms
- Top-closed systems loading arms for pressurized service
- Loading systems for special applications (e.g. heated, corrosive and toxic products)
- Cryogenic loading arms

#### Skids

- Design and supply of integrated packages and turnkey installations including loading and unloading systems
- LNG products



## Nearshore

### ARCOS (ARTICULATED RIGID CATENARY OFFLOADING SYSTEM): MAKING THE SHIP-TO-SHIP LNG TRANSFER SAFE AND EFFICIENT

We offer unique combinations of rigid technologies and flexible behavior designed for Floating Storage Regasification Unit (FSRU) operators looking for a cost-effective solution for safe and efficient ship-to-ship LNG transfer operations.

- Self-supported
- Fully rigid transfer system composed of three articulated piping assemblies made of 16" stainless steel pipes
- Field-proven cryogenic swivel joints equipped with full bore ERS
- Enhanced flow performance and at least 30% faster on operations compared to flexible solutions
- Minimized lifting and bolting
- SIL 2 ESD capabilities



# Customized solutions for offshore transfer systems

Offering a combination of expertise and experience in LNG offshore transfer systems, we deliver a full range of solutions for Floating Liquefied Natural Gas (FLNG) and FSRU applications operating offshore in side-by-side or tandem configurations.

Designed and tested to the highest standards of safety and reliability, we use proven technology supported by more than 60 years of excellence in LNG operations. We provide essential expertise from the early project stage to define and integrate the offloading function in the most cost-effective manner

## Side-by-side loading arms

For dynamic environmental conditions with Hs up to 2.5m, side-by-side offloading configuration requires specifically developed loading arms to transfer the LNG from the FLNG to the LNG carrier.

Our **targeting system** is required to enable a safe, repetitive and reliable connection and disconnection of the loading arms. Based on a fiber rope and stretched at a constant tension, it guides the loading arm during its approach towards the LNGC



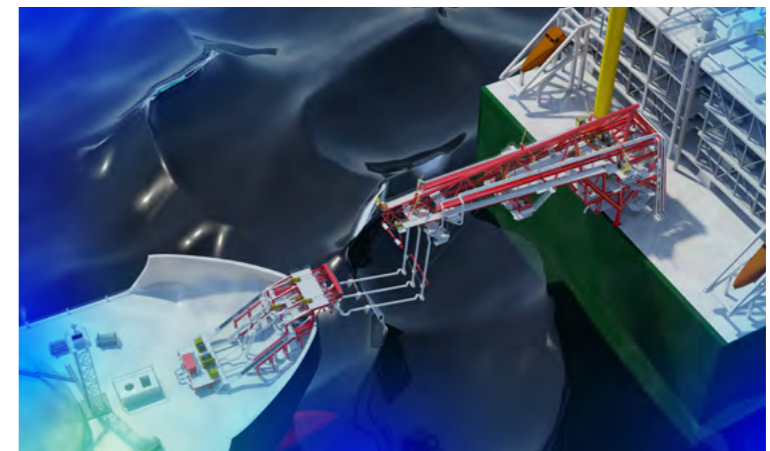
**DCMA-S** Double Counterweight Marine Arm Structure

**OLAF** Offshore Loading Arm Footless



## ATOL (Articulated Tandem Offshore Loader)

- Full rigid transfer system allowing LNG transfer up to Hs of 5.5m
- High-flow performance up to 16,000 m<sup>3</sup>/h of LNG flow rate thanks to 20" full bore product lines
- Same key components design philosophy (swivel joint, ERS, QC/DC) and loading arms operating philosophy used for offshore side-by-side loading arms



## PLS (Parallel Loading System)

- PLS combines the advantages of side-by-side and tandem by accepting standard LNGC fleets while allowing LNG transfers up to Hs of 4m.
- A bridge simulated LNG carrier position prevents collision risks even in degraded mode.



# Hot spot Breakthrough innovation

## EasyDrive system

The EasyDrive system allows an intuitive MLA linear control resulting in simpler and safer maneuvering, connection and disconnection operations.

- Intuitive rectilinear control of the presentation flange motions
- Variable speed (real-time proportional control)
- Smooth displacement with virtually no oscillation of the presentation flange
- Reduces connection time and enables in more dynamic conditions
- Minimizes risk of manifold flange, packing damage and operator training requirements

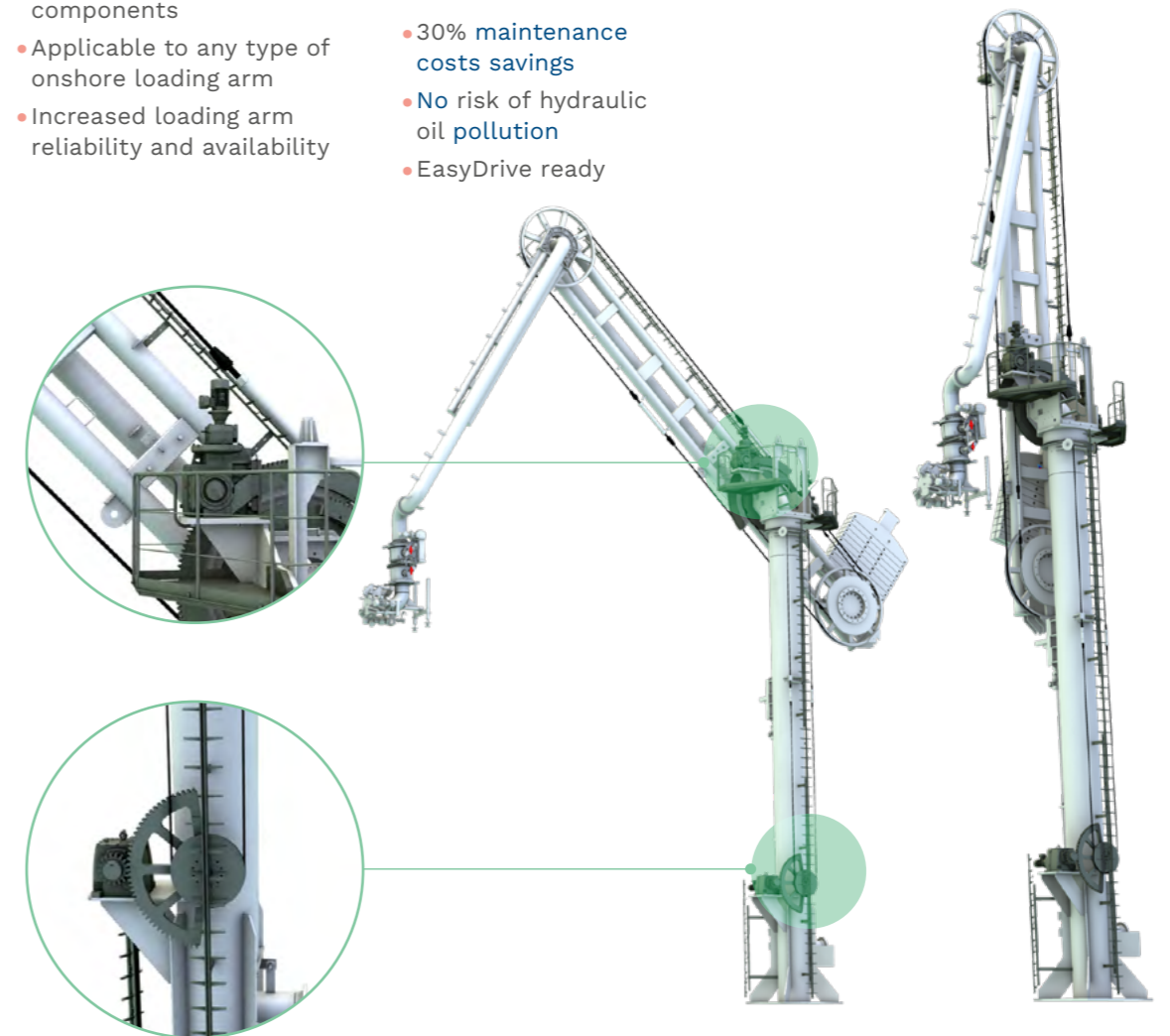


## e-MLA (Electric Marine Loading Arm)

### Green, simple and OPEX effective

e-MLA provides a highly reliable and available system that delivers market expectations by offering a green, oil leak-free transfer system.

- Proven technology and off-the-shelf electrical components
- Applicable to any type of onshore loading arm
- Increased loading arm reliability and availability
- Predictive maintenance and health monitoring
- 30% maintenance costs savings
- No risk of hydraulic oil pollution
- EasyDrive ready



# First-class services

## Recognized project management

We provide tailored loading and offloading solutions, working as a partner to keep clients' projects and operations on schedule and on budget with state-of-the-art services.

## Commitment to quality

Our dedicated teams work in close collaboration with our clients' project teams to ensure the highest levels of anticipation, testing and quality control. We thoroughly review all project specifications to determine the right path forward.

### FIT-FOR-PURPOSE MAINTENANCE CONTRACTS TO MEET EVERY CLIENT'S NEEDS

Our worldwide services network consists of top professionals based in various locations worldwide, ensuring a close, personal approach to each client and their needs.

We offer skilled advice and assistance throughout the life of the equipment from installation and commissioning to upgrades and major overhauls of loading arms.

#### Our core services include:

- Highly trained field service technicians for installation and maintenance
- Preventive Maintenance Inspections (PMI)
- Modular or tailor-made training programs
- Large range of supplies for new and long-lived systems spare parts (40 y+)
- Full revamping and upgrading of loading arm and associated equipment
- Digital services solutions:
  - OspreyEyes: Remotely Piloted Aircraft (RPA) for PMI
  - EagleEyes: Innovative and alternative solution for remote inspection with RPA
  - TigerEyes: Expert remote assistance anytime and anywhere
  - SquirrelEyes: Online training with interactive section possibly including virtual reality tools

# Some of our references

## Sinopec Tianjin LNG (Phase 1 & 2) CHINA

**Award:** 2015 & 2020    **Startup:** 2018 & 2021  
Nine marine loading arms delivered in two phases for one of the biggest LNG terminal in China.

## STAR Refinery 4 TURKEY

**Client:** STAR RAFINERI A.S.  
**Award:** 2014    **Startup:** 2016  
Thirty-four marine loading arms delivered and associated field services for the \$5.6 billion Star Refinery project (SOCAR Turkey Aegan Refinery), one of the biggest project in the Middle East and North Africa.

## Petronas FLNG (Satu & Dua) MALAYSIA

**Award:** 2013 / 2014    **Startup:** 2017 / 2021  
LNG Offshore loading arms for Satu (first worldwide operational FLNG facility) and Dua FLNGs.

## Al Zour LNG Import Terminal KUWAIT

**Client ENGINEERING:** Hyundai Engineering Company  
**END Client:** Kuwait Integrated Petrochemical Industries Company (KIPIC)  
**Award:** Jan 2017    **Startup:** 2021  
Delivery of two sets of four 20" full bore LNG loading arms for the LNG import terminal in Al-Zour.

## Shell Prelude AUSTRALIA

**Client:** Shell  
**Award:** 2012    **Startup:** 2019  
The world's largest offshore floating facility, including seven 16" marine loading arms (four LNG and three LPG loading arms).

## Basra Oil Export Terminal IRAQ

**Client:** Gulf Commercial Group for Basra Oil Company (BOC)  
**Award:** 2017    **Startup:** 2019  
24" marine loading arms delivered and the associated field services as part of the refurbishment of the crude oil export jetties of the Basra Oil Export Terminal in Iraq.

## Golar Hilli CAMEROON

**Client:** Golar LNG  
**Award:** 2015    **Startup:** 2017  
Delivery of LNG offloading solution to the world's first converted floating liquefaction vessel (FLNGV), including four 16" LNG marine loading arms.

## Porto de Açu BRAZIL

**Client:** Acciona Industrial  
**Award:** 2019    **Startup:** 2020  
Two 12" High Pressure Natural Gas Marine Loading Arms for the 3GW LNG to power project of Gas Natural Açu (GNA).

## Acronyms glossary

**ALLS:** Amplitude LNG Loading System  
**ARCOS:** Articulated Rigid Catenary Offloading System  
**ATOL:** Articulated Tandem Offshore Loader  
**CPMS:** Constant Position and Management System  
**DCMA-S:** Double Counterweight Marine Arm Structure  
**e-MLA:** Electric Marine Loading Arms  
**ERS:** Emergency Release System  
**ESD:** Emergency Shut Down  
**FLNG:** Floating Liquefied Natural Gas

**FSRU:** Floating Storage Regasification Unit  
**LNGC:** LNG Carrier  
**MLA:** Marine Loading Arms  
**OLAF:** Offshore Loading Arm Footless  
**PLS:** Parallel Loading System  
**PMI:** Preventive Maintenance Inspection  
**QC/DC:** Quick Connect / Disconnect Couplers  
**RPA:** Remote Piloted Aircraft  
**T&RC:** Truck and Railcar







## Loading Systems

### Head Office and Main Plant

Loading Systems S.A.S.  
Route des Clérimois - CS10705  
89107 Sens Cedex  
France  
+33 (0)3 86 95 87 00  
loadingsystems@ten.com

[www.ten.com](http://www.ten.com)