

# Oil and Gas Terminals

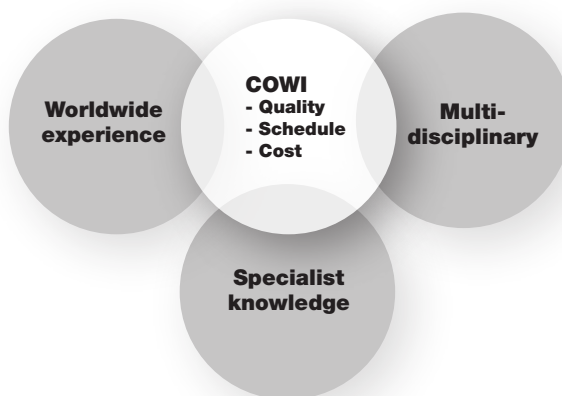


## COWI expertise

COWI is a highly versatile and multidisciplinary consultancy firm that has been setting its mark on society since 1930. From over 40 offices around the world we plan, design and execute projects in collaboration with our clients from both private and public sectors.

Above and beyond specific specialist tasks, COWI offers multidisciplinary consultancy in complex and diversified projects within the Oil and Gas Terminal industry that are to be executed as single and coherent assignments. Our staff of more than 3300 employees does this by taking part in every phase of a project of the earliest concept, through feasibility studies, planning and design, to operation, maintenance and training.

COWI's work experience in virtually every country in the world further compliments the multidisciplinary consultancy services and enables COWI to provide the most cost effective and comprehensive services world wide.

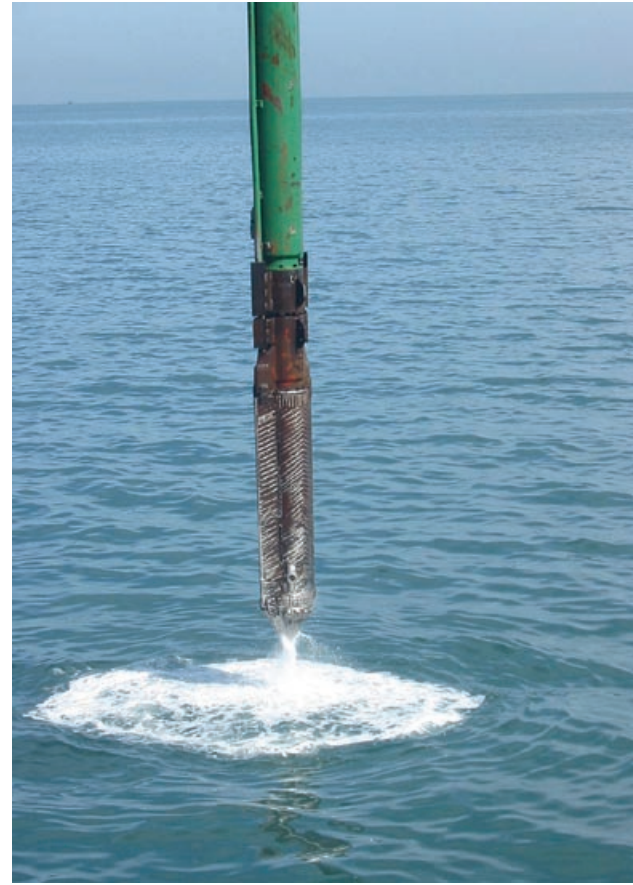


## Concept screening and pre-planning services

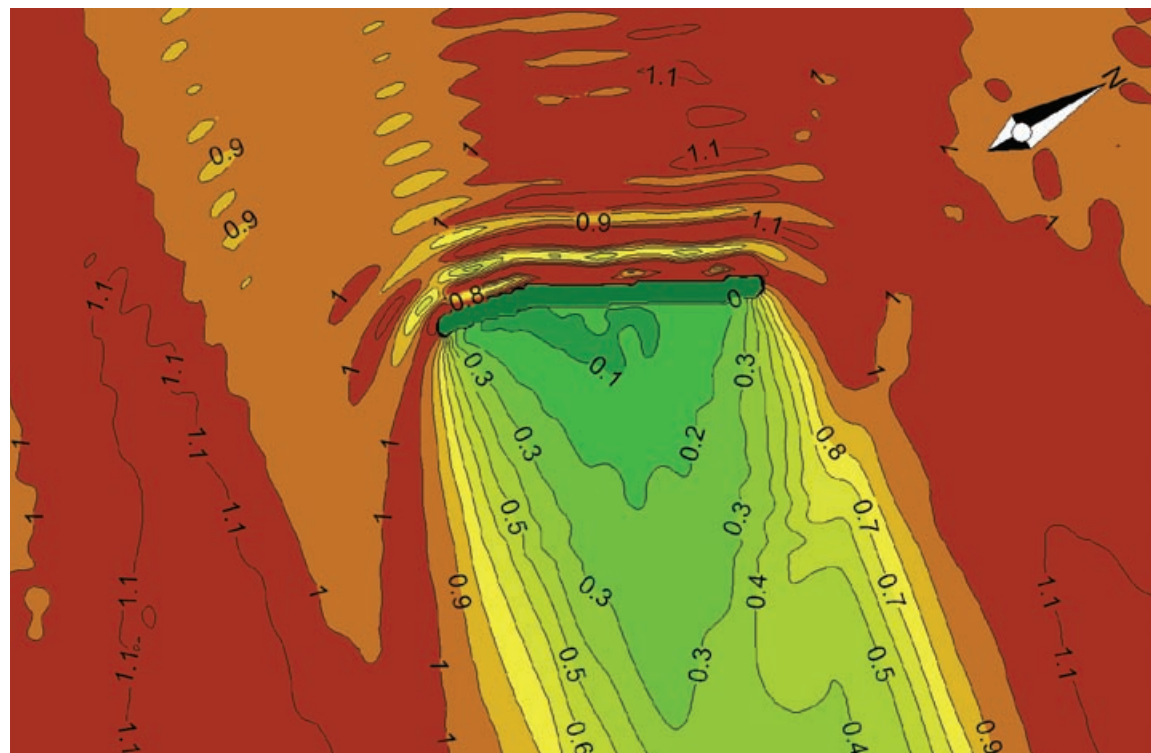
COWI has extensive experience in conducting feasibility studies of potential import and export marine terminal sites. This phase typically involves environmental investigation and impact assessment, met-ocean data collection required to conduct hydrographic and meteorological studies as well as preliminary geotechnical investigations.

COWI typically also conducts alternatives analysis of the various concepts and develops a ranking based on a large number of factors including costs, risks, maintenance and environmental impact.

COWI's strong multidisciplinary consultancy capabilities enable COWI to effectively identify the optimal layout of the facility, number of storage tanks, interface with existing utilities, roads, number and type of buildings required as well as accurate budget estimates.



*Geotechnical Investigations at potential marine jetty site.*



*Wave predictions behind breakwater to assess breakwater location, size and feasibility of planned berthing facility.*

## Front end engineering design services

COWI offers complete integrated services to conduct Front End Engineering Design (FEED) as well as preparation of specifications, drawings and tender requirement documents for EPC bid packages.

For the marine works, COWI typically conducts the following services:

Facilities layout study including review of metocean, geotechnical and geophysical data, hydrodynamic modelling, dynamic mooring analyses including vessel downtime assessment, vessel manoeuvring, berth availability assessment and risk assessment.

Facilities design including berth and loading facilities, breakwater,

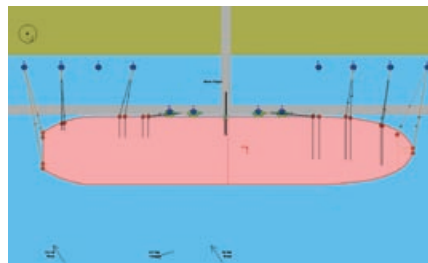
access trestle including pipe racks, tug berth, construction dock, intake and outfall structures, electrical and mechanical installations including security features and emergency shutdown, etc.

Operations design including approach and departure philosophy, operations and maintenances outline, operational requirements with local authorities, and manning requirements.

EPC documentation preparation including cost estimates and schedule, drawings, specifications and other documentation required to tender the project.



*FEED and preparation of tender documents for Oil/LPG Jetty Terminal.*



*Dynamic Mooring Analysis of LNG Tanker in order to verify optimal layout of berthing facility.*



*Detailed Design of LNG Berths, Port of Ras Laffan, Qatar.*

## **Detailed design**

COWI has extensive experience performing final design of oil and gas terminals. COWI has performed detailed design directly for the owner, as part of an EPC consortium or as a consultant for contractors.

COWI's detailed design services includes:

- All marine engineering including import and export berthing facilities
- All infrastructure elements including buildings, roads, bridges, drainage, electricity, sewage.
- All oil and gas process elements including piping, tanks, substations, pump stations, piperacks, P&ID's etc.

COWI's extensive experience working with marine contractors enables COWI to design cost effective, durable and constructible marine facilities with minimal risk of delays and claims.



*Detailed Design of ELNG Terminal, Egypt.*

## Operation and maintenance including upgrades and expansion



*Quick release hook.*



*Rodeo Terminal upgrade  
California, USA.*

For an existing terminal or facility, COWI provides a variety of services ranging from the support of a single specialist to solve an operational problem to the complete expansion or upgrade of the terminal.

Durability of especially marine structures highly depends on the material properties. COWI has specialists within all fields of material technology and state-of-the-art technology is utilized for analyzing concrete and steel deterioration mechanisms. On this basis, our staff is able to solve the often complex correlation between material conditions, environmental issues and financial aspects.

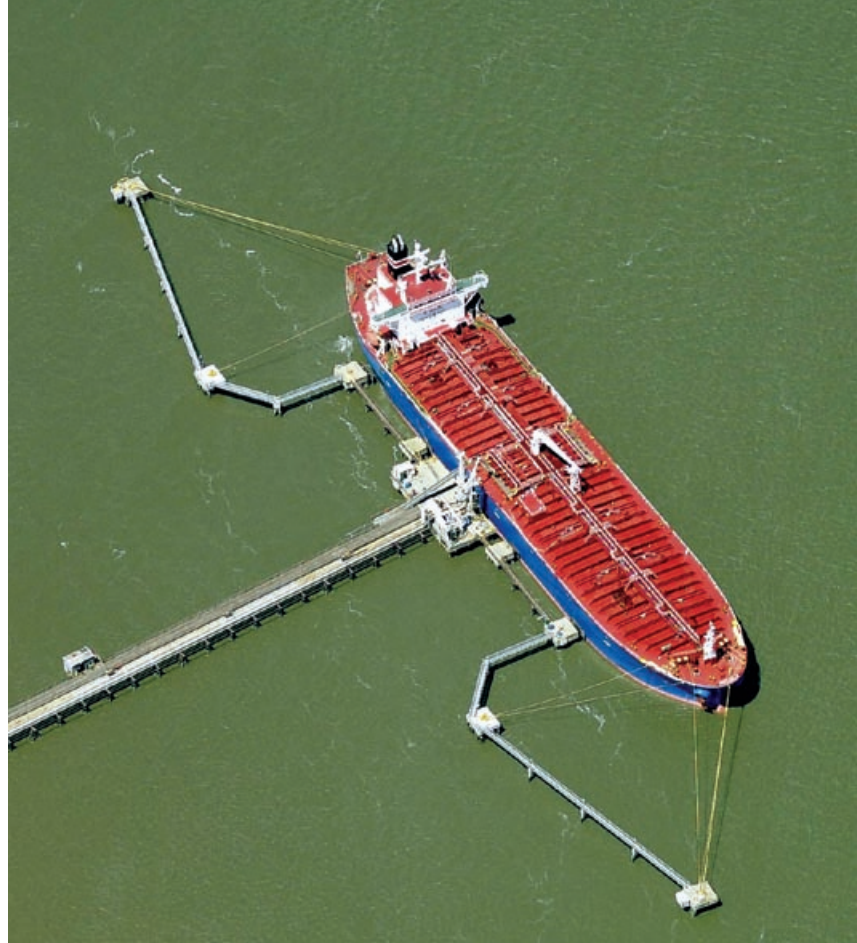
COWI has extensive experience in condition and lifetime assessments covering all kinds of materials and structure types. COWI also covers structural assessments from simple survey methods to fully three-dimensional probabilistic analyses. The assessments may be combined with loading tests and other related test programs. Re-evaluation, in many cases, justifies the continued use of the terminal and thus ensures the owner a significant increase in return of investment.

## Selected project references

COWI has been involved in all phases of oil and gas terminal development and design. As such, COWI has provided various levels of input to the development and design of new terminals or the expansion of existing terminals. This includes feasibility studies, front end engineering design, tender designs as well as detailed design and construction support.

COWI has recently been involved with the following oil and gas terminal projects:

- Egyptian LNG Project, Egypt
- Liquid Product Berths 1A/1B, 3A/3B, Qatar
- Rabigh Development Project, Sulphur and Liquid Product Berths, Saudi Arabia
- LNG Berths 3, 4 and 5, Qatar
- Costa Azul LNG Project, Mexico (Casting Basin)
- Shoaiba Tanker Terminal, Saudi Arabia
- EG LNG Project, Equatorial Guinea (Bridge Design)
- Rodeo Terminal Upgrade, California, USA
- Yemen LNG Project at Bal Haf, Yemen (Tender Design)
- Brass LNG Project, Nigeria (Tender Design)



DS/EN ISO 9001  
certificate.

*Quality is a key issue on any COWI project. We operate a Quality Management System, which is certified according to the requirements of ISO 9001. This assures our clients timely and professional management of any COWI project.*





- Permanent offices
- Project offices
- Centres for Oil & Gas Terminal Engineering
- Selected marine/terminal projects



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COWI is a leading northern European consulting group. We provide state-of-the-art services within the fields of engineering, environmental science and economics with due consideration for the environment and society. COWI is a leader within its fields because COWI's 3300 employees are leaders within theirs.

## **COWI**

COWI Group  
Main Office:

COWI A/S  
Parallelsvej 2  
DK-2800 Kongens Lyngby  
Denmark  
Tel.: +45 45 97 22 11  
Fax: +45 45 97 22 12  
E-mail: cowi@cowi.com  
Internet: www.cowi.com