



# Utilities & Offsites

**Enppi**





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# Enppi at a Glance



Enppi established in 1978 and headquartered in Cairo, Egypt, is an engineering and EPC Main Contractor providing fully integrated engineering, procurement, construction supervision and project management services for the petroleum, petrochemicals, energy, power and other industries in Egypt, MENA region & Latin America.

Enppi engineers are known for their invaluable expertise and knowhow, and their proficient work conduct is what makes the company's name a world renowned one. At Enppi, we are committed to retaining our engineering experts and talents by providing them with the work environment and support they require to thrive.

Enppi holds a long and pride-worthy track record of success stories in engineering projects that can be mapped across the globe. Our accumulated experience in engineering solutions is the cornerstone of our global reach, and the Enppi name is now internationally recognizable as a professional, efficient and trusted partner.



## Shareholders

96.61%

Egyptian General Petroleum  
Corporation  
(EGPC)

2.12%

Petroleum Projects &  
Technical Consultations  
Co. (Petrojet)

0.99%

Housing and Social Services  
Fund for the Petroleum  
Sector's Employees  
(HSSFE)

0.14%

Egyptian Natural Gas  
Holding Co.  
(EGAS)

0.07%

Egyptian Petrochemicals  
Holding Co.  
(ECHEM)

0.07%

Egyptian Natural Gas Co.  
(GASCO)

# Utilities & Offsites Profile

Since Enppi was established in 1978, Enppi had gained extensive experience in the design and commissioning of Utility and Offsite systems that are supporting process units.

Utility and Offsite facilities consists of utility facilities (air/nitrogen systems, water systems; fuel systems; power generation; steam generation,.. etc.), and offsite facilities (firewater system; flare system; interconnecting piping; loading/ unloading; tankage & storage; wastewater treatment, Zero liquid discharge (ZLD),... etc.)

Enppi is always committed to progress towards achieving the Sustainable Development Goals as part of Egypt's Sustainable Development Strategy (Egypt Vision 2030).

Our environmental engineers are looking for innovative ways to protect the earth's environment and climate by seeking best solutions for wastewater management, water and air pollution control, water recycling and waste safe disposal.

Our goal is to get our clients closer to a closed-loop water cycle where water is safely reused.

## Utility & Offsites experience / capabilities cover the following:

- Studies on existing utility systems (Existing systems adequacy studies, capacity verification, upgrading, etc.)
- Flare relief load & network analysis.
- Environmental engineering studies (Waste processing and disposal, dispersion analysis..., etc.)
- Pre- front-end engineering and design (Pre-FEED) studies.
- Front-end engineering and design (FEED) studies.
- Basic Engineering.
- Revamping.
- Engineering, procurement and construction (EPC) Projects.
- Turn-key Lumpsum Projects.
- Detailed Engineering.
- Rehabilitation.
- Expansions.

We have the overall responsibility for the Utility and Offsite facilities in any project.

This includes coordinating with different parties (other contractors, licensors. Owner, etc.) to ensure the integrity of the design of Utility and Offsite systems that meet the needs of the different process units taking into account all normal / upset operating modes, commissioning & start-up, shutdown and emergency requirements.

## Our experience is including but not limited to the following systems:

- Water delivery systems including fresh water/sea water intake, pumping facilities and pipelines.
- Water planning and treatment including raw water treatment, utility & potable water systems, sea water desalination and demineralization.
- Cooling water systems including cooling towers, tempered water systems, chilled water systems, etc.
- Steam generation, waste heat recovery, co-generation and steam/energy balance & optimization.
- Steam condensate recovery & treatment.
- Power generation including steam turbo-generators, gas turbine driven generators, diesel generators.
- Fuel treatment systems; fuel gas/natural gas systems, diesel, fuel oil..., etc.
- Air compressors, air treatment & drying, air separation units and nitrogen, Hydrogen & oxygen production.
- Liquid nitrogen storage and vaporization.
- Central chemical storage, loading/unloading and chemical injection skids.
- Wastewater treatment system and integration with other utility systems to incorporate the Zero liquid discharge (ZLD) requirement.
- Treated water evaporation bonds, sludge dewatering, drying and handling systems.
- Flare systems including elevated flares, ground flares, thermal oxidizers..., etc.
- Onsite and offsite storage tanks including fixed roof, floating roof tanks, cigar tanks, spheres, cryogenic storage, boil off gas recovery systems, gasoline blending and dying systems.



# Utilities

## Offsites

## Experience



## International projects

### Water Disposal System Refurbishment at Safaniyah 2019 - 2021

#### Client

Saudi Aramco

#### Contract Type

EPC LSTK- Main Contractor.

#### Scope of Services

Engineering, Procurement, Construction, Pre-commissioning, Commissioning & Start-up assistance.

#### Project Description

Resolve the water handling facilities performance issue related to gravity flow limitation in the Corrugated Plate Interceptor (CPI) and the Dissolved Gas Flotation (DGF) systems in Safaniyah onshore plant through Pressurizing the CPIs and DGFs using motive fuel gas. The overall water handling capacity of the plant is 810 MBCD, and the scope includes the installation of the following New Equipment:

- Formation Water Draw-off Pumps.
- Corrugated Plate Interceptors (CPIs)
- Recovered Oil Pumps.
- CPI Sand Sludge Tank.
- Recovered Oil Surge Drum.

### Steam Turbine Generator at Shedgum Gas Plant 2018 - 2022

#### Client

Saudi Aramco

#### Contract Type

EPC LSTK- Main Contractor.

#### Scope of Services

FEED Verification, Detailed Engineering, Procurement, Construction, and Pre-commissioning, in addition to preparation of As-built drawings as well as providing commissioning and start-up assistance activities.

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Saudi Aramco



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Saudi Aramco



#### Project Description

Improve the power and steam generation efficiency at Shedgum Gas Plant (SGP) by installing a Condensing / Induction Steam Turbine Generator utilizing excess HP and LP steam, and generate approximately 83 MW of electric power.

The project will also install an Air Compressor and Air Dryers Packages and includes some modifications on the existing Cooling Water System and Steam Condensate System to meet the additional utilities requirements for the STG package operation.

### Juaymah crude oil terminal project 2022-2024

#### Client

Saudi Aramco

#### Contract Type

EPC LSTK- Main Contractor.

#### Scope of Services

Engineering, Procurement, Construction, Pre-commissioning, Commissioning & Start-up assistance.

#### Project Description

The intent of this project includes condensate and Crude Oil handling and export facilities at the Juaymah Terminal Onshore (JTO).

The condensate will be supplied to the new storage tanks at JTO from Jafurah Gas Plant (JfGP) and other futur resources.

The new storage tanks shall be utilized also to store crude oil from the existing crude oil pipelines.

The storage service shall be switched upon operation requirements.

Enppi scope include six external floating roof dual service storage tanks (Crude oil and Condensates) with net volumetric capacity of 1 MMBBL , new booster pumps, new shipping pumps and the jump over line for connecting the existing facilities with the new Facilities loading system in addition to all required utilities includes (potable water, tank dewatering , closed drain, oily water lifting station, Nitrogen racks).

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Saudi Aramco



## Sulfate Removal Facility 2018 – 2021

### Client

Saudi Aramco

### Contract Type

EPC LSTK Main Contractor/GES+ (WP).

### Scope of Services

Engineering, Procurement, Construction, Pre-commissioning and Commissioning & Startup Assistance

### Project Description

Deliver 435 MBD (2882 m<sup>3</sup>/hr) of low sulfate water (<200 ppm) to injection headers in Ain Dar and Fazran fields for reservoir pressure maintenance to support the proposed production of 100 MBD and 75 MBD Arab Extra Light increments from 'Ain Dar and Fazran fields respectively.

Low sulfate water is produced from sea water.

Sea water (580 MBD) containing high concentrations of sulfate ions is received from QSTP through 700 meter - 36 inch intake pipeline for treatment, the main part of the Sulfate Removal Facilities is the Nano-Filtration (NF) package. The primary objective of the NF system is to reduce the sulfate content of sea water from 4400 ppm to less than 200 ppm, reject water (145 MBD) is returned to QUAD1 thru 700 meter - 16 inch pipeline.

## UPGRADE DESALINATION WATER TREATMENT at Safaniyah PLANT 2018 – 2021

### Client

Saudi Aramco

### Contract Type

EPC LSTK Main Contractor

### Scope of Services

FEED Verification, Detailed Engineering, Procurement, construction and Pre-commissioning and start-up assistance activities Tanajib -Safaniyah pipeline to be Bi-directional.

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### Project Description

Meet high demand of desalinated water in Safaniyah plant of 1,610 GPM by installing a new Reverse Osmosis plant (RO) including three Packages units, to replace the existing plant to minimize SONPD's dependence on Tanajib Reverse Osmosis plant. the project includes upgrading of the existing.

Replace 3 existing drum screens at the sea water intake with 3 new drum screens, providing tie-ins from the new RO plant intake line to existing Sea Water users for operational flexibility, installing a new R.O Plant, Vacuum de-aerator package and associated storage tanks.

The drum screens scope includes only the replacement of the existing ones with new drums with identical capacities (30000 GPM each)

The purpose of the project is to provide an R.O. plant which will produce 1500 GPM of desalinated water (500 ppm TDS specification) which shall be further utilized to produce wash water, flushing / dilution water and potable water.

Sea water feed TDS: 53000 max.

## Yanbu South Terminal, Rehabilitation of Onshore Facilities Project – Oily Water Treatment Package 2016 – 2020

### Client

Saudi Aramco

### Contract Type

EPC LSTK Main Contractor

### Scope of Services

Detailed Engineering, Material Supply, Construction, Pre-commissioning and Commissioning & Startup.

### Project Description

Yanbu South Terminal (YST) consisting of ten crude oil storage tanks, the dewatering oily water from the existing crude tank transfer to the Oily water with specification up to 5% peaks oil content to treatment package to reach effluent specification 8 ppm.

The treated water transferred by pumping station with 80 m<sup>3</sup>/hr to evaporation pond through 13 Km length 8" pipeline.

Oily water treatment package design capacity is 80m<sup>3</sup>/hr includes Exiting Slop oil tanks, Equalization tank, CPI and wall nut shell filters as well as sludge dewatering centrifugal system.

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## South Area Safety Facilities 2018 - 2022



### Client

Al Khafji Joint Operations (KJO)

### Contract Type

EPC LSTK- Main Contractor

### Scope of Services

Engineering, procurement, fabrication, transportation and customs clearance, construction, pre-commissioning, mechanical completion, start-up / commissioning, performance testing / acceptance.

### Project Description

#### Package 1: Replacement of Old Fire Fighting Systems at South Area (RFFSSA)

Complete Replacement of the old Fire Fighting Systems at South Area Facilities (Onshore production facilities) of Khafji with a New Systems to achieve and satisfy the Fire Fighting requirements of its current and future operations

#### Package 2: South Area Fire Station (SAFS)

New Fire Station building with relevant support facilities, new safety management system and Upgrade of existing Seven (7) Control Rooms to interface with the new safety management system at the new South Area Fire Station.

#### Package 3: Upgrade of HVAC and Installation of Safety System for Sour Gas Dispersion (UHS)

Upgrade the HVAC Systems, safety alarming & gas detection systems.

## Yasref Warehouse Facilities Construction Phase 1 2015 - 2017



### Client

Yanbu Aramco Sinopec Refining (YASREF)

### Contract Type

EPC LSTK

### Scope of Services

Engineering, Procurement, Construction and Overall Management.

### Project Description

The warehouse facility is designed to construct 8000 m2 storage area in two different buildings for YASREF material storage purpose. The overall facility plot size is 20,000 m2. The facility consists of the following buildings and its required utilities:

- Warehouse-I (3250 m2)
- Warehouse-II (4595 m2)
- Security Guard House and Security Fencing
- Access Roads to warehouse
- Main and Emergency Gates
- Utilities (Power, Potable Water System, Fire Water System, Sewage and Septic Tank)
- Open Yards.

## Local projects

### Upgrading Existing Industrial Waste Water Treatment System 2018 - 2020

#### Client

Nasr Petroleum Company- (NPC).

#### Contract Type

Lumpsum price for Professional Services and cost plus for material supply.

#### Scope of Services

Engineering & Procurement Services.

#### Project Description

Upgrade the industrial waste water treatment system in order to have the treated water complying with the Egyptian Environmental Laws and regulations for discharge to Gulf of Suez.

The new added treatment units are Phenol Oxidation Unit (capacity of 70 M3/hr) and Biological Treatment Unit (capacity of 700 M3/hr).

### Utilities and Offsites for ASORC Naphtha Complex “OSBL” 2017 - 2021

#### Client

Assiut Oil Refining Company (ASORC).

#### Contract Type

EPC Main Contractor

Lumpsum: Detailed Engineering and E&I Works

Cost Plus: Procurement and Civil & Mechanical Construction (C&M Works).

#### Scope of Services

Basic & detailed engineering, procurement, construction, pre-commissioning, commissioning and start up assistance.



#### Project Description

Establish utilities and offsite facilities required for the new Naphtha Complex. The Utilities and Off-sites project include:

- Raw water Treatment System
- Cooling water System
- Instrument and utility air system
- Cryogenic Nitrogen Generation Package and Liquid Nitrogen Storage & Vaporization System
- Water Demineralization Package
- Steam Generation Package
- Steam Condensate Recovery and Treatment Package
- Fuel Gas Treatment System
- Liquid Fuel Systems (Diesel & fuel oil)
- Offsites Storage Tanks (Isomerase, Reformate, S.R and Hydrotreated naphtha)
- Gasoline Blending System
- Flare System
- Oily Water Treatment
- Chemical injection systems.



# Meleiha Power Generation Upgrade 2017 - 2019

## Client

Agiba Petroleum Company

## Contract Type

Lumpsum for Engineering, cost plus for Procurement services

## Scope of Services

Detailed Engineering and Procurement services

## Project Description

Upgrade the existing power generation plant at Meleiha field by adding 2 new gas turbine generators.

the plant fuel gas compression capabilities couldn't meet the total fuel gas demand required to operate the upgraded power generation system, so a new reciprocating gas compressor is needed to supply the excess fuel gas required. The project scope includes:

- Connecting the two new gas turbo-generators (Centaur 50) with the existing system
- Installing one new reciprocating gas booster compressor package.
- Installing New Electrical Power Module
- Install new MCC for turbo-generator auxiliary loads.
- Adding two incomer cubicles for the existing 11 KV switchgear.
- Installing new step down power transformers.

# Ethylene's Utilities & Offsites Project For New Ethylene & Derivatives Complex in Alexandria

## Client

The Egyptian Ethylene and Derivatives Company (ETHYDCO)

## Contract Type

EPC Main Contractor, Lump-Sum for Professional Services, Disbursable for Procurement & Construction.

## Scope of Services

Basic & Detailed Engineering, Procurement Services, Construction Supervision, Pre-Commissioning and Commissioning Supervision & Overall Management



## Project Description

The Egyptian Ethylene and Derivatives Company (ETHYDCO) executed a Utility Plant to provide the New Ethylene and Derivatives Complex with its requirements of different utilities. The complex and its utility plant are located in Alexandria, Egypt.

## The Complex comprises the following plants:

- Ethylene Plant 460,000 T/Y
- Polyethylene Plant 400,000 T/Y
- Butadiene Plant 20,000 T/Y
- Polybutadiene plant 36,000 T/Y

## ETHYDCO's Utilities and Offsite's plant includes the following:

- Water treatment train (consisting the following units)
  - Micro Filtration
  - Water Desalination
  - Water Demineralization
  - Water Evaporation & Crystallization
- Sludge Treatment The Train is fed with 1100 m3/hr consists of filtered water in addition to recycled waste water.

The treatment system applies ZLD (Zero Liquid Discharge) concept to maximize reuse of recycled water and minimize the use of fresh water.

- Cooling water system with a capacity of 32,500 m3/hr
- Potable / Utility water systems
- Emergency Diesel Generator.
- Sanitary sewage collection and treatment system
- Drain systems for rain water and chemicals
- Firefighting water system and fire & gas detection and alarm system.
- Instrument / Utility / Breathing air systems (compressed air capacity is 13,500 Nm3/hr)





**Permanent Power Plant (PPP).  
2014 - 2019**



**Client**  
The Egyptian Ethylene and Derivatives Company (ETHYDCO)

**Contract Type**  
Lump-Sum for Professional Services and Reimbursable for Commissioning Assistance

**Scope of Services**  
Basic & Detailed Engineering, procurement, Field Engineering support and commissioning assistance

**Project Description**  
Installation of a new permanent power plant (PPP) for it's complex in Ameriya with a capacity of 70 MW, generated through a simple gas turbine cycle, designed as per manufacturer standard and convertible to a combined cycle scheme.

**Phase I:**  
Covering the installation of 70 MW power plant based on simple cycle gas turbines and convertible to combined Cycle Gas Turbines, together with associated ancillaries / utilities

**Phase II:**  
Covering the installation of a new 220 / 66 KV transformer substation and its connection with the national 220 KV grid.

**Ethylene and Polyethylene Plants Utilities and Offsite Complex Project  
1997 - 2000**



**Client**  
Sidi Kerir Petrochemicals Company (SIDPEC)

**Contract Type**  
EPC LSTK.

**Scope of Services**  
Engineering, Procurement, Construction, Commissioning & Start-Up, Overall Project Management.

**Project Description**  
The utilities and offsite plant provides SIDPEC's two new plants (Ethylene and Polyethylene) with fire fighting & cooling water, compressed air and de-mineralized water. Moreover, the complex provides process water treatment.

# Storage Tank Experience



## International projects

### Yanbu Export Refinery Project - Methyl Tertiary Butyl Ether System (MTBE) Storage Tanks 2015 / 2016

#### Client

Yanbu Aramco Sinopec Refining (YASREF)

#### Contract Type

EPC LSTK.

#### Scope of Services

EPC Main Contractor for Basic & Detailed Engineering, Construction and Pre-Commissioning.

#### Project Description

Build two typical of dome roof tanks with internal floating which its diameter (68 mt), capacity 365,000 barrels designed according to API 650 for the storage of MTBE "Methyl Tertiary Butyl Ether" product complete with all the relevant utilities and tie-in with existing facilities.



### Yanbu Export Refinery Project Tank Farm Package – SP1 2010 - 2014

#### Client

Yanbu Aramco Sinopec Refining (YASREF).

#### Contract Type

EPC LSTK.

#### Scope of Services

Engineering, Material Supply, Construction (Subcontracted to Several Saudi and Egyptian Companies), Commissioning & Start-Up and Overall Project Management.

#### Project Description

Installation of a new refinery with capacity of 400,000 barrel / day.

The tank farm package of Yanbu export refinery with capacity of 400,000 barrel / day includes:



- 14 of External Floating Roof storage tanks with different diameters (27 to 120mt), sizing up to 1.2 million barrels designed according to API 650 - 11th edition.
- 20 of Dome Roof storage tanks with different diameters (12.5 to 106.5 mt), sizing up to 800,000 barrels designed according to API 650 - 11th edition. 11 Out of 20 tanks are equipped with internal floating roof.
- 4 of spheroidal storage tanks with different diameters (31 to 33.9 mt), sizing up to 60,000 barrels designed according to API 620 - 11th edition.
- 10 spherical tanks with 20 mt diameter, size 25,000 barrels designed according to ASME VIII Div. 2.

### Expansion of Hout Crude Onshore Production Facility 2006 - 2009

#### Client

Al-Khafji Joint Operations (KJO).

#### Contract Type

EPC LSTK Consortium with Petrojet (Enppi Consortium Leader).

#### Scope of Services

Engineering, Procurement, Construction Supervision, Project Management, Commissioning, Start-Up Assistance & Consortium Leader.

#### Project Description

Expand storage capacity at Hout onshore production facility by installation of additional 4 storage tanks (500 to 80,000 m3 capacity floating and fixed roof), in addition to booster pumps, instrumentation, piping, fire fighting and a new electrical substation:

- 1 of External Floating Roof storage tanks with diameters (77 mt), sizing of 81,000 m3 designed according to API 650.
- 1 of Dome Roof storage tanks with diameters (43.5 mt), sizing of 28,000 m3 designed according to API 620.
- 2 of fixed conical Roof storage tanks with diameters (8.5 mt), sizing of 596 m3 designed according to API 650.



## Local projects

### New Crude Oil Tank Farms 2019 - 2022

#### Client

EGPC

#### Contract Type

EPC LSTK - Consortium (Enppi – Petrojet).

#### Scope of Services

Detailed Engineering, Procurement & Construction Management

#### Project Description

Install Seven new 'Crude Oil Storage Tank Farm Modules' with total storage capacity of 32 million Barrels of crude oil (MMbbl) in different locations of Egypt. Each module contains different number of tanks Each module

contains different number of tanks in order to fulfill.

Egyptian General Petroleum Corporation (EGPC) plans to cover the Egyptian refineries imported crude needs in case of any upset.

Each tank farm module is supplied with its corresponding utility systems and infrastructure and mainly comprise of; crude oil storage tanks, crude oil transfer pumps, piping/manifolds, and associated utilities. Establish typical size crude tanks with total capacity of 32 million BBL by installation of new 29 tanks (each tank is External Floating Roof storage tanks with diameter (110 mt), sizing 1.1 million BBL capacity designed according to API 650).



### New Crude oil storage tank at EL-HAMRA terminal

#### Client

WEPCO

#### Contract Type

EPC Lump sum cost plus

#### Scope of Services

Basic & Detailed Engineering, Procurement, Supervision Construction, Assistance of Commissioning & Start-U.p

#### Project Description

Designing, procurement and Installing of two new storage Tanks External Floating Roof storage tanks with diameter (90 mt), 104,000 m3 capacity, designed according to API 650 at El-HAMRA Terminal with storage.



### TANKS IMPROVEMENT PROJECT

#### Client

Balayim petroleum company -PETROBE.

#### Contract Type

Lumpsum.

#### Scope of Services

Engineering and Procurement services.

#### Project Description

Install three new storage tanks as follows:

- One new oil storage tank 90,000 M3, External floating roof type with diameters (90 mt), designed according to API 650 installed at Feiran terminal.
- One new oil storage tank 7,400 M3, fixed conical Roof storage tanks with diameters (27.5 mt), designed according to API 650 installed at Petreco plant.
- One new Brackish water Tank (TK 20) 6, 000 M3, fixed conical Roof storage tanks with diameters (24 mt), designed according to API 650 installed at Petreco plant.





## Ain Sukhna Product Hub (ASPH) for Tank Farm and Topside Facilities Works (LOT II) 2017 - 2019

### Client

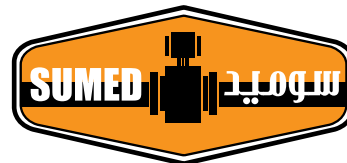
Arab Petroleum Pipelines Company (SUMED).

### Contract Type

EPC LSTK - Consortium with Petrojet (Enppi is the consortium leader).

### Scope of Services

Detailed Engineering design, procurement, construction, pre commissioning, commissioning and start up assistance.



### Project Description

Establish and operate a fully equipped strategic hub for the trading of petroleum products and to increase the operation efficiency of Sumed Petroleum Zone in Ain Sukhna by adding the top side facilities of the first berth for petroleum products trading and the second Berth, storage warehouses PIT-1 with a storage capacity of 130,000 m<sup>3</sup>, storage warehouse PIT-2 with a storage capacity of 165,000 m<sup>3</sup>, facilities required for fuel oil storage and upper facilities for the marine operation on the marine terminal including pipe racks, pipes, loading arms and utilities.

- 9 of Dome Roof storage tanks with different diameters (10 to 55 mt), sizing up to 66,000 m<sup>3</sup> designed according to API 650 - 12th edition.
- 5 of Conical Roof storage tanks with different diameters (5.1 to 11 mt), sizing up to 1380 m<sup>3</sup> designed according to API 650 - 12th edition
- One external floating roof tank with diameter (32 mt), capacity of 13,670 m<sup>3</sup> designed according to API 650 - 12th edition.

# Expansion of Sumed Storage Capacity (6 Tanks) 2011 - 2013



## Client

SUMED

## Contract Type

EPC LSTK

## Scope of Services

Detailed Engineering, Procurement, Construction, Commissioning & Start-Up.



## Project Description

Increase the storage capacity at Ain Sukhna Terminal, SUMED decided to build six new external floating roof tanks, each of approximately 1.1-million-barrel crude oil (175,000 m3) of networking capacity, 110 m diameter designed according to API 650. The new tanks are located adjacent to the existing tank farm and connected to it.

# NGL Project at Port Said 2001 - 2004

## Client

United Gas Derivatives Company (UGDC) (BP / Eni / GASCO).

## Contract Type

Lumpsum for professional services and material supply disbursable.

## Scope of Services

EPCM: Basic Engineering Review, Detailed Engineering and Procurement, Construction, Commissioning & Start-Up Assistance and Overall Project Management.

## Project Description

Installation of processing facilities for 1100 MMSCFD feed of natural gases produced from El- Gamil & HA'PY fields. to produce propane, LPG, and condensates (dehydration package: 1100 MMSCFD molecular sieve one train).

The project also contains:

- 3 spherical tanks with 3131 m3 capacity and pf diameter 18mt designed according to ASME VIII Div.2.
- 2 propane bullets (cigar tanks) with different capacities up to 504 m3designed according diameter 4 mt and length till 39 mt designed according to ASME VIII Div.1.



# Damietta Export Facilities 2001 - 2004



## Client

United Gas Derivatives Company (UGDC) (Bp / Eni / Gasco).

## Contract Type

EPC Turnkey – consortium (Enppi / Tractebel) – Lump-Sum for Professional Services, Cost Plus Fees for Material Supply and Construction Work.

## Scope of Services

FEED & Detailed Engineering, Procurement, Construction, Commissioning & Start-Up Assistance.

## Project Description

Installation of Marine export facilities – cryogenic tank capacity (30,000 m3) for propane storage produced from Port Said NGL process facilities.



# Areas of Expertise

As an Engineering and EPC Main Contractor, Enppi areas of expertise lies in the value chain of its role as an Engineering, Procurement, Project Management & Construction Supervision Contractor.

## Engineering Process Technology

Enppi has considerable experience in the design of oil & gas, onshore/offshore, gas processing, oil refining, and petrochemicals facilities covering:

- Process optimization and selection
- Studies (techno-economic and technical)
- Flow assurance engineering (steady state & dynamic)
- Debottlenecking and revamps
- License evaluation and selection
- Review of basic engineering for others
- Oil & Gas separation
- FEED, conceptual, basic & detailed engineering
- HAZOP, HAZID, QRA, SIL and other safety studies
- Performance analysis and guarantees
- Operating manuals development
- Commissioning and start-up procedures
- Field assistance for construction and start-up



## Mechanical Engineering

Enppi has qualified specialists in all aspects of mechanical engineering. The following services are offered to support FEED and detailed design activities or independently as specialized services.

### Static equipment design, covering:

- Pressure vessels, heat exchangers, columns, reactors, heating and power boilers and tank design.

### Rotating equipment design, covering:

- Compressors, gas and steam turbines, pumps, turbo expanders, HVAC, etc..

### Material selection, covering:

- Material selection guides
- Cathodic protection
- Painting

### Field assistance for construction and start-up Solid handling designs, covering:

- Solids Conveying, Transport, Storage and Processing Systems in the fields of Chemical, Petrochemical, Mining and Mineral Processing Industries
- Cranes

### HVAC systems design and engineering works, covering:

- Industrial Applications such as control, switch-gear, battery, laboratory, warehouses and workshop buildings.
- Administration buildings.

## Electrical Engineering

Enppi has a fully experienced team in electrical system design, with wide experience in both onshore & offshore applications; covering :

- Power generation and distribution
- Electrical systems analytical studies
- Relay coordination studies
- Overhead transmission lines design
- UPS systems
- Solar power units
- Plant power distribution & cabling systems
- Lighting systems
- Lightning protection facilities
- Navigational aid systems
- Grounding systems
- Heat tracing systems
- Hazardous Area Classification, Plans & Elevations and Electrical enclosure selection criteria
- Field assistance for construction and start-up.



## Instruments & Control and Telecommunications Engineering

The company's competencies in Instrument & Control and Telecommunication Engineering cover:

- Field instruments & Process Measurements.
- Final Control Elements: Control Valve Sizing & Selection, On-Off Valves, Shut Down & Blow Down Valves.
- Process Control Applications (Burner Management System, Boiler Control, Compressor Control, etc..).
- Process Control Systems (DCS, PLC)
- Pneumatic, Hydraulic Controls
- Safety Instrumented System (SIS)
- High Integrity Pressure Protection System (HIPPS)
- SCADA & Communication Systems
- Pipeline Management System
- Fiscal Metering Systems
- Automatic Tank Gauging
- Oil & Gas Wellhead Control System.
- Tele-communication Systems such as:
  - Private Automatic Branch Exchange (PABX), VoIP
  - Public Address & Alarm System (PA&A)
  - Fiber Optic Cables / System
  - Wireless Systems (Satellite, Microwave, VHF UHF)
  - Security Systems (Closed Circuit Television (CCTV),
  - Access Control System & Intrusion Detection System)
  - Video Conference.
- Field Assistance for Construction and Start-up



## Civil / Structural / Architectural Engineering

Enppi possesses considerable design experience in different phases of Civil / Structural / Architectural Engineering design, covering the following activities for plant facilities and other onshore structures:

- General site preparation drawings
- Road and paving drawings
- Building design (architectural / structural detailed drawings)
- Detailed drawings (steel / concrete) and MTO preparation
- Tanks and basins drawings
- Foundation drawings
- General specifications, MRQs & MRPs preparation
- Field assistance for construction and start-up



## Offshore Structures Engineering

Enppi offshore structural design capabilities cover the following areas:

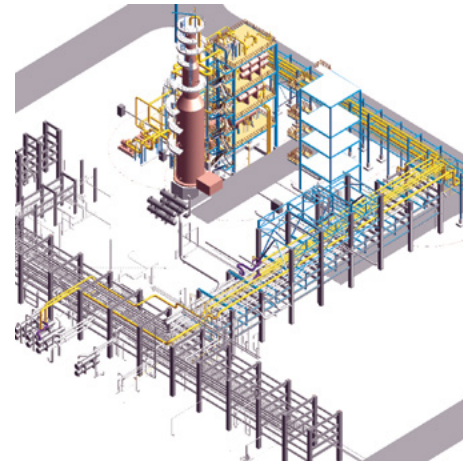
- Offshore fixed platforms analysis and design
- Deep & shallow foundation engineering
- Dynamic & fatigue assessments
- Earthquake Analysis
- Nonlinear Analysis
- Finite element Analysis
- Construction support engineering
- Transportation & Installation engineering
- Weight & COG engineering
- Structural Integrity Management
- Ports & Terminals engineering
- Subsea structural engineering
- Specification & Fabrication drawings
- Field assistance for construction and start-up



## Piping Engineering

Enppi piping engineering design covers:

- Plot plans and equipment location plans
- Piping general arrangement drawings for the above ground piping
- Orientation drawings of tower, vessel, tank, etc...
- Piping isometrics drawings
- Stress analysis reports for critical lines using Caesar II program
- Piping supports distribution and design
- Piping material specification and supply specification for packages
- MRQs and MRPs preparation for piping bulk and valves
- Underground Composite Drawing
- Detailed design of underground piping systems
- Update of drawings and 3D CADD model to “AS-BUILT” status
- Detailed and block plastic model building
- Field assistance for construction and start-up



## Pipeline Engineering

Enppi Pipeline Engineering design is responsible for onshore/offshore pipelines covers :

- Pipeline design basis
- Pipeline mechanical design
- Route selection
- Planimetry and profile
- Riser/Spools Layout
- Crossing details
- Field assistance for construction and start-up
- Subsea Equipment
- Analysis reports
- Standard details
- Material requisitions and Specifications
- Bidders evaluations



The following section gives detailed description of the various deliverables:

### For onshore & offshore pipelines:

- Pipeline specifications
- Material selection and wall thickness calculations
- Stress analysis studies
- P/L alignment sheets
- Pipeline approach drawings
- Thermal expansion calculations
- Buckling calculations
- Coating and wrapping
- Cathodic protection
- Material take-off
- Material requisitions and purchase orders



### For Offshore Pipelines:

- Stability analysis
- P/L Alignment drawings
- Field Layouts
- Deepwater technology
- Free span analysis
- Seabed irregularities analysis
- Upheaval buckling analysis
- Latest buckling analysis
- Installation analysis
- Trenching study
- Pipeline survey, installation and trenching bid packages
- Riser and spool piece design
- Cathodic protection



## Procurement

Enppi's strategy in procurement is to provide quality goods and services, at the right time, at the lowest cost, produced and delivered safely. We have the experience, the tools, and the know-how for procurement services by providing integrated, reliable, and cost-efficient supply chain management services to ensure the success of projects.

We have capabilities in:

- Procurement Management
- Purchasing and contracting services
- Purchase orders expediting and subcontracts administrations
- Supplier quality surveillance
- Material Logistics
- Material control on site



Enppi's supply management services leverage today's technologies and logistics' methods to make efficient decisions which streamline the supply management process.

We have a global track record of ensuring timely and accurate material receipt through innovative expedition and quality assurance with vendors to minimize receiving delays and errors. We optimize transportation networks, operating hand-in-hand with global freight forwarders with dedicated assets. We offer the expertise, processes and tool utilization needed to facilitate frequent status updates on all material control information including material quantities required.

## Project Management and Control

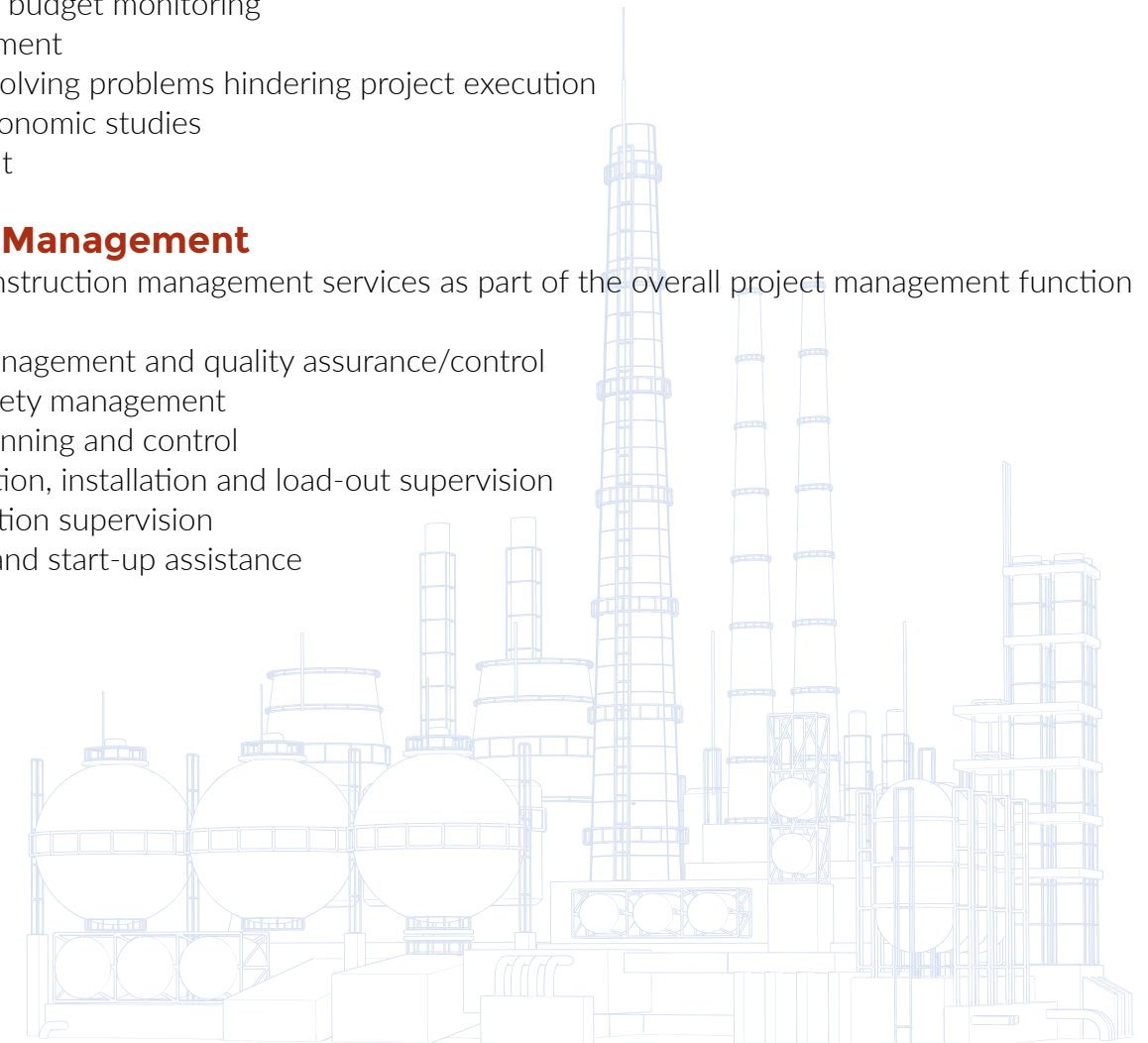
The design and execution of large scale onshore and offshore projects necessitates the strict adherence to sound management and control practices. In such projects, Enppi provides specialized management, control and quality assurance services covering:

- Contracts/subcontracts preparation and administration
- Overall project management and control
- Front-end planning and detailed project scheduling
- Engineering coordination and control
- Cost control and budget monitoring
- Change management
- Identifying and solving problems hindering project execution
- Technical and economic studies
- Risk management

## Construction Management

Enppi provides construction management services as part of the overall project management function covering:

- Construction management and quality assurance/control
- Construction safety management
- Construction planning and control
- Onshore fabrication, installation and load-out supervision
- Offshore installation supervision
- Commissioning and start-up assistance



# Software Applications

The latest software programs have been widely used in Enppi to optimize the efficiency of the different disciplines' processes.

## Process Technology Programs

|                                 |                          |
|---------------------------------|--------------------------|
| Dnv Phast                       | Pipeline Stodio          |
| Smart plant P & ID "Intergraph" | Olga                     |
| Flare Net                       | Pipenet                  |
| Flare Sim                       | Pipephase                |
| Fri                             | Pipesim                  |
| Hextran                         | Process Eng. Suite (Pes) |
| HTRI                            | Sil Core                 |
| Hysys                           | Smart Plant P & Id       |
| Network Inplant                 | Primatech                |

## Mechanical Engineering Program

|              |                        |
|--------------|------------------------|
| Cadna        | Pv Elite               |
| Compress     | Signal Ffs             |
| E-Tank / ITS | Solid Works Simulation |

## Civil / Structural / Architectural Engineering Programs

|                |                            |
|----------------|----------------------------|
| Afes           | Pds 3d ( Frameworks Plus ) |
| Arch           | Safe                       |
| Autodesk Revit | sap 2000 V15.0.1           |
| Etabs          | Staad Pro                  |

## Electrical Engineering Programs

|                                                      |                                              |
|------------------------------------------------------|----------------------------------------------|
| ETAP 12.0.0<br>Electrical Transient Analyzer Program | Smartplant® 3D Cable<br>Management Interface |
| PLS-CADD and PLS-Pole                                | Micro-Station                                |
| DIALUX                                               | AutoCAD                                      |
| PDS                                                  | Electrical Load Analysis (ELA)               |
| PDMS                                                 | Oracle and Electrical Cable Sizing           |

### Instrumentation, Control and Telecommunication Engineering

|                                       |                |
|---------------------------------------|----------------|
| Aveva Instrumentation                 | Smart Plant 3D |
| Aveva (PDMS)                          | PDS 3D Model   |
| Aveva Cable Design                    | CONVAL         |
| Smart Plant Instrumentation (Intools) | INSTRUCALC     |

### Projects Control Programs

| Planning Division                       | Cost Division                                |
|-----------------------------------------|----------------------------------------------|
| Primavera P6 Team member / Collaborator | The Decision Tools Suite Professional @ Risk |
| Primavera Project Management            | Comfar Iii Expert                            |
| Primavera Risk Analysis                 |                                              |
| Risky Project Professional              |                                              |

### Procurement Programs

|                                 |                       |
|---------------------------------|-----------------------|
| Site Material Management System | Vendor E-registration |
|---------------------------------|-----------------------|

### Pipeline Programs

|                                                                                                                           |                                                    |
|---------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|
| OFFPIPE (Ver. 2.07), Non-linear finite element method for offshore installation analysis for Pipelines, Risers and Cables | AUTOPIPE-PLUS (Ver 8.06), stress analysis software |
| SAGE PROFILE (Ver 6.4)                                                                                                    | AGA/PRCI (Ver 3.0)                                 |

### Subsea Software Programs

|               |           |
|---------------|-----------|
| FLEXCOM       | USFOS     |
| AUTOPIPE PLUS | SACS      |
| SAGE PROFILE  | TEKLA     |
| AGA-PRCI      | E3D       |
| OFFPIPE       | GRLWEAP   |
| CS8           | OLGA      |
| PLAXIS        | PIPEPHASE |
| SMART 3D      | PIPESIM   |
| SESAM MARINE  |           |

### Plant Design & Piping Programs

|                                               |                                                |
|-----------------------------------------------|------------------------------------------------|
| Aga, Prci                                     | Offpipe                                        |
| Autodesk Navisworks Simulats                  | Orthogen                                       |
| Autopip                                       | PDMS                                           |
| Aveva Area Based Automatic Drawing Production | PDS 3D                                         |
| Aveva Final Designer                          | Sage Profile                                   |
| Aveva Laser Model Interface                   | Sewer Cad                                      |
| Aveva Multi Discipline Supports               | Smart Plant 3D                                 |
| Aveva Pdms                                    | Smart Plant Review -Api                        |
| Aveva Review                                  | Smart Plant Review-Photo Realism               |
| Caesar II                                     | Smart Plant Review- Simulation &Visual Effects |
| Isogen                                        | Smart Plant Sketch                             |
| Lmi                                           | Smart, Plant Review                            |
| Microstation / J                              | Vpe Workbench                                  |

# QEHS Management System



In line with our commitment to continuous growth and sustainable development for the future, Enppi works in the best possible manner to balance Quality, Environment, Energy and Health & Safety (QEHS) considerations into our daily business decisions and operations.

Enppi achieved certification to the revised standard ISO 9001:2015, ISO 14001:2015, ISO 45001: 2018, ISO 50001:2018 for QEHS management systems and also implements API Spec Q1 for quality management system in petroleum, petrochemicals and natural gas industries.

All our operations are covered by ISO 9001:2015, ISO 14001:2015, ISO 45001: 2018, ISO 50001:2018, API **Spec Q1**.



## Quality Management System (QMS)

In compliance with the needs defined by the international codes and standards and in order to achieve a competitive edge in the global oil and gas sector, Enppi moves towards expanding alliances with its customers to continually boost productivity and keep our projects on-schedule and within budget aiming to achieve customer satisfaction.

Our applied Quality Management Systems provide strict controls, monitor work, track projects and streamline procurement and materials management activity.

The acquisition of globally acknowledged certification/accreditation is a crucial step toward continual improvement for achieving customer satisfaction through providing high quality services with time commitment and at competitive cost.



It is worth mentioning that Enppi has established a quality management system certified to ISO 9001 since 1995. In 2014, Enppi has implemented API spec Q1 of the American Petroleum Institute as sector specific certification for Quality Management System for oil and gas companies to become one of the leading companies in the world to implement these international standards.

- For every project the company executes, QMS covers the following:
- Issuing Project Quality Plan
- Developing Project KPIs
- QMS auditing

Enppi takes an additional responsibility in encouraging customers, suppliers and contractors to consider the QMS requirements in their activities. Also, Enppi offers a wide range of QMS consultation and training services related to:

- ISO 9001 requirements
- Quality management system auditing
- API spec. Q1 requirements
- Self-assessment
- Documentation management



## Environmental Management System (EMS)

As a part of Enppi's contribution towards sustainable development, Enppi has established, implemented and maintained an environmental management system as per ISO 14001. The system objectives are compliance with all applicable environmental legal and other requirements, minimizing pollution and conservation of resources. For every project the company executes, the EMS covers the following:

- Establishment and implementation of environmental - policy and objectives
- Aspects/impacts analysis
- Identification of legal and other requirements
- Development and implementation of environmental - management plans
- Emergency preparedness and response
- Environmental management system auditing

Enppi encourages customers, suppliers and contractors to consider the environmental impacts of their activities, mainly through one or more of the following actions:

- Organizing and conducting awareness sessions / courses
- Requesting suppliers and contractors to declare their environmental policies & commitment to environmental protection
- Following up supplier/contractor implementation of environmental management systems
- Working with customers to design environmentally friendly projects

**Enppi also has wide experience in EMS related services as awareness and training, environmental management systems auditing and environmental performance evaluation.**

## Health & Safety Management System (HSMS)

Enppi recognizes the importance of protecting the health and safety of its employees, customers, suppliers and contractors personnel within work premises over which it has control. Enppi implements and continually improves a health and safety management system in accordance with ISO 45001 to achieve improvement in the overall company health and safety performance, including prevention of injury and ill health. For every project the company executes, HSMS covers the following:

- Establishment and implementation of Health & Safety policy and objectives
  - Provision of safe working environment
  - Hazards identification
  - Risk assessment
  - Implementation of necessary control measures to ensure that risks are reduced as low as reasonably practicable
  - Identification and compliance with applicable Health & Safety legal and other requirements
  - Development and implementation of Health & Safety management plans
  - Emergency preparedness and response
  - Encouragement of customers, suppliers and contractors to consider Health & Safety requirement in their activities
  - HSMS auditing
- FMEA technique
- Perform safety audits
  - Provide training courses related to health and safety:
    - ISO 45001 requirements
    - Loss prevention
    - HAZOP (basic and advanced)
    - Risk analysis techniques
    - Fire protection systems
    - Hazardous area classification
    - Detection and alarm systems
  - Preparation of Safety case studies

**Related services provided by Enppi can be summarized as follows:**

- Design of fire protection systems
- Review plot plans (layout with respect to safety distance and prevailing wind)
- Quantitative risk analysis using "PHASt Software / Fault Tree Analysis and Event Tree Analysis"
- Qualitative risk analysis by HAZOP review,





## Energy Management System (EnMS)

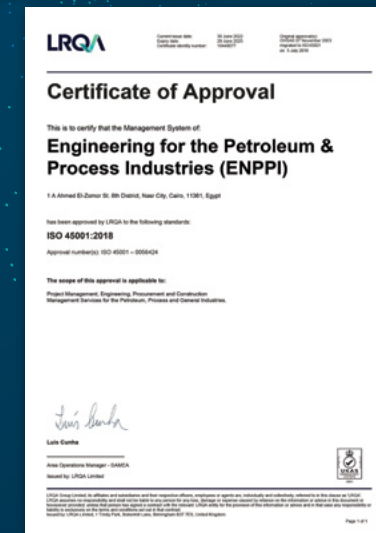
In terms of Enppi role as a leader in the field of projects in the region and in order to keep pace with global and national trends for energy efficiency improvement, Enppi has developed, implemented and maintained EnMS as per the international standard ISO 50001 since 2012 and became the first company in the sector acquiring an accredited ISO 50001 certificate.

### Enppi EnMS services includes

- 1- Establishing energy management systems.
- 2- Conducting Energy Reviews.
- 3- Determining:
  - Energy baseline, Energy targets and action plans.
  - Energy performance indicator.
- 4- Energy studies including definition/prioritization of opportunities for energy efficiency improvement.
- 5- Designing and procurement of energy efficient products and energy management system solutions.
- 6- Conducting training energy courses and workshops.
- 7- Conducting Energy Audits.

## CERTIFICATES

### Enppi Headquarters







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