Baghdad Besmayah 1,500 MW Combined Cycle Power Station Project, Iraq

ENKA IN IRAQ
OIL & GAS, PETROCHEMICALS
- Produced Water Treatment Facility Project
- West Qurna 1 Initial Oil Train (IOT) Project
- West Qurna 2 Fuel Gas Treatment, Power Generation & Distribution Project
- MEI Works for Majnoon Oil Field Development
- Brownfield Works for Majnoon Oil Field Development
- North Rumala Crude Oil Turbo Pump Station (PS-1) Project

POWER PLANTS & ENERGY
- Samawa 750 MW Combined Cycle Power Plant Project
- Dhi Qar 750 MW Combined Cycle Power Plant Project
- Baghdad 1,500 MW Combined Cycle Power Station Project
- Erbil 500 MW Conversion to CCPP Project
- Sulaymaniyah 500 MW Conversion to CCPP Project
- Najiba 500 MW Gas Turbine Power Plant Project
- Bazyan 500 MW Simple Cycle Power Plant Project

MARINE WORKS, DAMS & PIPELINE
- Port of Umm Qasr – BMT Container Terminal Yard 5, Quay Wall & Marine Works
- Bekme Dam
- Turkey Crude Oil Pipeline Expansion

INDUSTRIAL PLANTS
- Kubaisa Cement Plant
- Tasluja Cement Plant
- Kerbela Cement Plant
- Falluja White Cement Plant
- Badoosh Cement Plant
- New Badoosh Cement Plant / Operation & Maintenance
PROJECT DETAILS

LOCATION:
West Qurna 1 Oil Field, Basra, Iraq

OWNER / CLIENT:
ExxonMobil Iraq Limited

PROJECT DURATION:
Dec 2019 – April 2022

CONTRACT TYPE:
Lump Sum Turn Key

CONTRACT VALUE:
US$ 69.9 million

PROJECT DESCRIPTION

On October 31, 2019, ENKA signed an agreement with ExxonMobil Iraq Limited to construct a Produced Water Treatment Facility with a capacity of 210,000 barrels of water per day, located within the West Qurna-1 oil field near the city of Basra in Iraq.

The project includes the detailed engineering, procurement, construction, and commissioning of three water treatment trains, one produced water tank, one local equipment room, transfer pumps and all associated systems.

The treated produced water will be sent to the Water Injection Storage Tank that feeds the High Pressure Water Injection Pump System for injection wells.

The Produced Water 2 Treatment Facility project is scheduled to begin operation in April 2022.

ENKA SCOPE OF SERVICES

The project includes the detailed engineering, procurement, construction, and commissioning of three water treatment trains, one produced water tank, one local equipment room, transfer pumps and all associated systems.

### Major Quantities

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WEST QURNA 1 INITIAL OIL TRAIN (IOT) PROJECT

PROJECT DESCRIPTION

West Qurna is one of the largest oil fields in Iraq with an estimated 43 billion barrels of recoverable reserves. In January 2010, ExxonMobil Iraq Limited (EMIL), an affiliate of Exxon Mobil Corporation, signed an agreement with the South Oil Company of the Iraq Ministry of Oil to rehabilitate and redevelop the West Qurna I field. Located approximately 50 kilometers north-west of Basra, the Field currently produces around 400 kbopd through existing facilities located at DS-6, 7 and 8.

EMIL envisaged and initiated the Initial Oil Train (IOT) Project to add oil production facilities capable of safely producing and exporting an additional 100,000 stock tank barrels of crude oil from the Field. The Initial Oil Train Facility was designed to process full well stream fluids from the production wellhead area and separate them into associated gas, untreated produced water, and stable product crude for export. IOT was constructed adjacent to existing DS-8.

UNIQUE CHALLENGES

The Owner performed Unexploded Ordnance (UXO) and Explosive Remnants of War (ERW) clearance activities to ensure safe operations in and around the plot selected for the Facility. ENKA brought its “Zero Accidents” philosophy to its execution first and foremost and build a strong safety and security plan to be strictly implemented throughout the project duration to protect our workforce, our customer, as well as the environment and communities surrounding the Project. Safety was ENKA’s top priority.

The plant was designed based on the concept of modular packages and modular erection as reasonably as practical within logistics constraints. The majority of the equipment was designed and fabricated in modular skids. The pipe racks were designed and fabricated in modular sections including stuffing of pipe rack modules with pipes, pipe supports and cable trays.

Multiple project offices such as the main field office at the WQ1 jobsite, multiple engineering excellence centers including Main Project Office in Abu Dhabi, UAE, fabrication and module yards in Turkey and UAE were utilized for the project. With extensive planning and proper interface management, ENKA was to minimize the disruption and ensure seamless execution.

ENKA SCOPE OF SERVICES

ENKA and its regional partner have supplied front-end engineering design (FEED), detailed design engineering, procurement, fabrication, construction, commissioning and start-up services. The new facility is capable of producing an annual average of 100,000 stock tank barrels of crude oil per day. The final customer of the new facility constructed adjacent to the existing degassing station facility DS8 is the Basra Oil Company (BOC) of Iraq.
**PROJECT DESCRIPTION**

West Qurna – 2 is a giant oil field in Iraq and the second largest undeveloped field in the world in terms of its hydrocarbon reserves. Recoverable reserves contained in two major formations, Mishrif and Yamama, are estimated at 13 billion barrels. In 2009, a consortium lead by LUKOIL won a tender for the development of the field. As part of the oil field development, Lukoil Mid-East Limited, the lead operator on behalf of the operating consortium has envisaged a Gas Turbine Power Plant (GTTP) to supply power to all oil production facilities. GTTP Project scope consisted of engineering, procurement, construction, commissioning and start-up of a 3x42 MW Simple Cycle Power Generation Plant and Power Distribution System. Project included three (3) GE MS6001B API Class Heavy Duty Dual Fuel Gas Turbine Generators-Simple Cycle 42 MW each at ISO conditions, associated balance of plant, a gas treatment and compression system, a liquid fuel unloading, storage and distribution system, 33 kV / 132 kV GIS switchgear and yard, power management system, buildings, utilities and infrastructure.

**UNIQUE CHALLENGES**

The Project has higher level of operational intelligence and reliability compared to a standard power plant due to being the single source of electric power for a giant oil field. Plant is designed under strict oil and gas standards and specifications (API) with significant design margins and redundancy requirements. Project started from a farm land being cultivated by farmers. ENKA, while executing the work, successfully managed cultural relations with locals to avoid any clashes, maintained good relations with the neighboring villages. Plant was located adjacent to the 400 kbd Central Processing Facility (CPF) and construction was partly performed during commissioning of the CPF in a high hydrocarbon environment.

Remote location and high temperatures during summer months created unique challenges for the project workforce peaked at 925 people. ENKA set up and implemented a robust safety and security approach was deployed and implemented by ENKA throughout the project duration to protect our workforce, our customer, as well as the environment and communities surrounding the Project. Project was completed with 3.6 million workhours without a loss time accident indicating the fact that measures taken were effective.

**PROJECT DETAILS**

**LOCATION:** West Qurna Oil Field, Basra - Iraq  
**OWNER / CLIENT:** Lukoil Mid-East Limited  
**PROJECT DURATION:** Dec 2011 - Jul 2014  
**CONTRACT VALUE:** Lump Sum Turn Key  
**CONTRACT TYPE:** EPC/EPCC, plus supply only for US$ 387 million (Stage1: 3x42 MW)  
**COMPANY:** ENKA  
**PROJECT BRIEF:** GTPP West Qurna 2 Fuel Gas Treatment, Power Generation & Distribution

**ACCOMPLISHMENTS:**

- Provided significant training opportunities and turned many local craft with little or no disciplined industrial construction work experience into productive workers.  
- Achieved 40% Iraqi content on project workhours.  
- Clear all project cargo without any disputes with forwarders or customs authorities with careful planning and strictly following the rules and requirements.  
- Successful transportation of oversized cargo. The compliance with frequently changing Iraqi customs regulations and bureaucracy involved in timely customs clearance of goods was a major challenge. ENKA managed to clear all project cargo without any disputes with forwarders or customs authorities with careful planning and strictly adhering to the laws and requirements.  
- Created a lost time accident indicating the fact that measures taken were effective.  
- A robust safety and security infrastructure was maintained a safe and high quality job site inclusive of a good camp with recreational utilities’ networks; all associated buildings including a maintenance shop, all roads and other paved areas including hard and soft landscaping; all security fencing, gates and gate house, CCTV cameras and perimeter lighting. ENKA further provided training for the O&M personnel who will be operating and maintaining the plant.

**ENKA SCOPE OF SERVICES**

ENKA has self performed the full front end engineering design (FEED), detail engineering, procurement, construction, commissioning, start-up and performance testing scope for the project utilizing in-house resources on a lump sum turn-key basis. Specific content of the plant included; three (3) GE MS6001B Heavy Duty Dual Fuel Gas Turbine Generators - Simple Cycle - 42 MW each - ISO conditions; one complete set of 132 kV Gas Insulated Switchgear; one complete set of 33 kV Gas Insulated Switchgear; one complete set of 6.6 kV Air Insulated Switchgear, step up and step down power transformers, a Black start system, PMS (Power Management System); a Central Electrical Control Room; a Gas Treatment Plant (45,000 Nm³/hour capacity) and compression system included with fuel gas buffer storage in order to allow automatic fuel switchover without having any power interruption or load reduction on gas turbines; liquid fuel tank storage and transfer system, a water treatment plant; firefighting and protection systems, utilities’ networks; all associated buildings including a maintenance shop, all roads and other paved areas including hard and soft landscaping; all security fencing, gates and gate house, CCTV cameras and perimeter lighting. ENKA further provided training for the O&M personnel who will be operating and maintaining the plant.

**PROJECT DATA**

**TYPE OF PLANT:** Simple Cycle Power Plant  
**CAPACITY:** 126 MW  
**TYPE OF FUEL:** Primary: Raw Gas, Back-up: Diesel  
**CONFIGURATION:** 3x42 MW  
**GAS TURBINE GENERATOR:** General Electric, Unit: 3 Sets, Model: MS6001B API-Class Heavy Duty, Rating Per Unit: 42 MW

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PROJECT DESCRIPTION

Majnoon is one of the richest oil fields in the world with an estimated 38 billion barrels of oil in place located 60 km (37 mi) north of Basra City, in southern Iraq. In January 2010, the Iraqi Ministry of Oil awarded Shell, Petronas and Missan (state owned company) a 20-year contract to provide technical assistance in the development of the Majnoon field. Shell Iraq Petroleum Development B.V. envisaged a two phase development for the field. Phase I consisted of reaching First Commercial Production (FCP) and Phase II focused in the development of the full field (FFD). As part of First Commercial Production, a new 100k bopd Central Processing Facility (CPF) composed of 2x50k bopd trains, four new well pads, various new wells, and storage facilities were planned.

UNIQUE CHALLENGES

Majnoon is located close to the Iranian border, and given the history of the area, the project site was characterized by high level of unexploded ordnance (UXO) and Explosive Remnants of War (ERW). The Owner performed mine clearance activities to ensure safe operations and ENKA performed construction activities in strict compliance with the UXO clearance and de-mining sequence of the project site. A robust safety and security approach was deployed and implemented by ENKA throughout the project duration to protect our workforce, our customer, as well as the environment and communities surrounding the Project.

The Owner have divided the construction works into multiple contracts such as “Earthworks and Roads”, “Concrete, Piling and other Civil Works”, “Pipelines”, “Heavy Lift”, etc. ENKA, as the “Mechanical, Piping, Structural Steel, Electrical and Instrumentation” works Contractor, have interfaced with SIPD Operations, Owner’s engineer as well as all other contractors during the execution of the project.

The plant was designed based on the concept of modular packages and modular erection as reasonably as practical within logistics constraints. The majority of the equipment was designed and fabricated in modular skids. The pipe racks were designed and fabricated in modular sections including stuffing of pipe rack modules with pipes, pipe supports and cable trays. Extensive coordination and planning efforts between Owner’s engineer, vendors, civil works contractor, heavy lift contractor, pipeline contractors as well as sound materials management were required.

MEI (MECHANICAL, ELECTRICAL, INSTRUMENT AND TELECOMMUNICATION) WORKS FOR MAJNOON OIL FIELD DEVELOPMENT

PROJECT DETAILS

LOCATION:
Majnoon Oil Field, Basra - Iraq
OWNER / CLIENT:
Shell Iraq Petroleum Development B.V.
PROJECT DURATION:
Jul 2011 – Dec 2013
CONTRACT TYPE:
All in Unit Rate fixed unit price and Reimbursable with Fixed Day Rates
CONTRACT VALUE:
US$ 208 million
SIGNIFICANT FEATURES / ACCOMPLISHMENTS:
• Largest greenfield central processing facility to be built in Iraq in the last decade.
• Commercial production targets planned for the field were achieved, allowing the Owner to begin exports.
• The increase in production is providing revenue that could help further regenerate Iraq.
• 3 million workhours without a Lost Time incident.
• Provided significant training opportunities and turned many local craft with little or no disciplined industrial construction work experience into productive workers.
• Achieved 51% Iraqi content on project labor headcount.

ENKA SCOPE OF SERVICES

ENKA was contracted by Shell Iraq Petroleum Development B.V. to carry out structural, mechanical, piping, electrical, instrumentation and telecommunication, painting and insulation works for the Project, covering areas for the Central Processing Facilities and Well Pads Facilities. Scope included construction of underground pipe and cable trenches, installation of all underground piping and cables, installation, aligning and welding of pre-fabricated steel structures, modularized packages, process skids, field assembly, erection and installation of various static and rotating equipment and storage tanks, erection of interconnecting piping between pipe racks and skids/equipment, fabrication and erection of piping on sleepers, assembly and installation of modular substations, electrical equipment and instruments, installation of complete electrical and instrumentation systems, performance of all piping and equipment insulation and painting works, pre-commissioning of the plant and all subsystems and providing commissioning support to SIPD Commissioning and Start-Up Team.

MEI (MECHANICAL, ELECTRICAL, INSTRUMENT AND TELECOMMUNICATION) WORKS FOR MAJNOON OIL FIELD DEVELOPMENT

Commodity | UoM | Total
--- | --- | ---
Structural Steel Works | ton | 1,600
Piping | ton | 2,500
Mechanical Installations | ton | 4,000
Module Erection | ton | 1,000
Field Erected Storage Tanks | ton | 1,000
Cabling | m | 1,000,000
Painting & Insulation | m² | 20,000
**PROJECT DETAILS**

**LOCATION:** Majnoon Oil Field, Basra - Iraq  
**OWNER / CLIENT:** Shell Iraq Petroleum Development B.V.  
**PROJECT DURATION:** Jul 2012 – Dec 2013  
**CONTRACT TYPE:** All-in Fixed Unit Rate and Reimbursable with Fixed Day Rates  
**CONTRACT VALUE:** US$ 39 million  
**SIGNIFICANT FEATURES / ACCOMPLISHMENTS:**  
- Oil production capacity through existing facilities rehabilitated to 100k bopd and increased to 120k bopd with debottlenecking upgrades.  
- The increase in production is providing revenue that could help further regenerate Iraq.  
- Provided significant training opportunities and turned many local craft with little or no disciplined industrial construction work experience into productive workers.  
- Achieved 51% Iraqi content on project labor headcount  
- Raised awareness relating to health, safety, environment, security and quality amongst direct hired personnel and subcontractors.  
- 751 thousand workhours without a Lost Time Incident.

**PROJECT DESCRIPTION**

Majnoon is one of the richest oil fields in the world with an estimated 38 billion barrels of oil in place located 60 km (37 mi) north of Basra City, in southern Iraq. In January 2010, the Iraqi Ministry of Oil awarded Shell, Petronas and Missan (state owned company) a 20-year contract to provide technical assistance in the development of the Majnoon field. Shell Iraq Petroleum Development (SIPD) B.V., the lead operator on behalf of the operating consortium, has envisaged a two phase development for the field. Phase I consisted of reaching First Commercial Production (FCP) and Phase II focused in the development of the full field (FFD). As part of Phase I, a number of surveys have been carried out to assess the status of the existing process facilities, namely DS-1, DS-2 and associated wells, and several work packages were developed to rehabilitate them to their original design intent of 100k bopd. In addition to the rehabilitation works, DS-1 and DS-2 were planned for various debottlenecking upgrades to increase the production capacity to 120k bopd. Project consisted of implementation of all rehabilitation and upgrading work packages.

**UNIQUE CHALLENGES**

The Project was executed through separate call-offs for discrete work packages with rehabilitation and upgrading activities performed either in total plant shutdown, partial shutdown or normal operation mode. The plants were isolated wherever required, drained, flushed, purged and prepared to carry out specified works. When complete or partial shut downs were not feasible or allowed, construction works were performed whilst the plants remained operational. ENKA adhered to Shell’s Simultaneous Operation (SIMOPS) procedures strictly to ensure safety of plants and personnel during the execution of discrete scopes. Detailed method statements and construction schedules were prepared for each work package in order not to disturb ongoing operations. ENKA have coordinated all interfaces with SIPD Operations, ERW Contractor, Iraqi authorities and other contractors as required.

A robust safety and security approach was deployed and implemented throughout the project duration to protect our workforce, our customer, as well as the environment and communities surrounding the Project.

**BROWNFIELD WORKS FOR MAJNOON OIL FIELD DEVELOPMENT**

Majnoon is located close to the Iranian border, and given the history of the area, the project site was characterized by high level of unexploded ordnance (UXO) and Explosive Remnants of War (ERW). The Owner performed mine clearance activities to ensure safe operations and ENKA performed construction activities in strict compliance with the UXO clearance and de-mining sequence of the project site.

**ENKA SCOPE OF SERVICES**

ENKA was engaged by Shell Iraq Petroleum Development B.V. to provide structural, mechanical, piping, electrical, instrumentation, painting and insulation construction services for the various work packages developed for rehabilitation and upgrading of existing crude oil processing facilities at DS-2. Major tasks included erection and installation of chemical injection, metering, instrument air, foam, nitrogen generator packages, hot and cold flares, several static and rotating equipment, with all associated structural, piping, electrical and instrumentation works, performing tie-ins and hot taps as required, conducting all inspections and testing, and providing support to the Owner for pre-commissioning and commissioning activities.
**PROJECT DETAILS**

**LOCATION:** North Rumaila, near Basra - Iraq

**OWNER / CLIENT:** South Oil Company

**PROJECT DURATION:** Dec 2013 – Apr 2016

**CONTRACT TYPE:** Lump Sum Turn Key

**CONTRACT VALUE:** US$ 59 million

**SIGNIFICANT FEATURES / ACCOMPLISHMENTS:**
- 721,000 workhours without a Lost Time Incident.
- Project shall increase oil export capacity from North Rumaila significantly, helping Iraq to reach commercial production targets planned for the field, and generate much needed revenues.
- Highest quality and standards have been targeted for this signature project for South Oil Company with special care to HSE resulting in no LTI since the commencement.

**PROJECT DESCRIPTION**

PS-1 Depot, located approximately 60 km west of Basra, is one of the major crude oil storage depots in Iraq housing ten storage tanks each with 82,000 m³ capacity. Oil produced at the super-giant Rumaila oil field, which comprises over one third of Iraq's total production, is collected here and pumped to Al Fao Terminal, located 140 km away, for export via a 48” Pipeline. PS-1’s operations are critical for maintaining uninterrupted export of oil to sustain oil sales which constitutes almost all of Iraq’s income.

A modernization and expansion program developed by South Oil Company of Iraq is underway to restore integrity, operability and reliability as well as increase oil export capacity. Main part of this program is the Crude Oil Turbo Pump Station (PS-1) Project consisting of EPC delivery of a pump station adjacent to the existing pump station complete with all balance of plant equipment and systems.

The new pumping station has two 13 MW Gas Turbine Driven Turbo Pump Units, delivering oil 6,100 m³/hr at a pressure of 685 meters at the 42” discharge.

**UNIQUE CHALLENGES**

The Project has been designed to a high level of operational intelligence and reliability due to being a critical facility for oil exports from a giant oil field. Plant is designed under strict oil and gas standards and specifications (API) with appropriate design margins and redundancy requirements.

Construction works were performed whilst the adjacent existing pump station remained operational. ENKA adhered to respective Simultaneous Operation (SIMOPS) procedures strictly to ensure safety of the plant and personnel during the execution. Detailed method statements and construction schedules were prepared in order not to disturb ongoing operations: ENKA have coordinated all interfaces with SOC’s Operations Team as required. Additionally, connections to existing headers and pipelines were implemented with hot tapping operations without the interruption of shutting down and emptying those section of pipes or manifolds. Existing pump station continued to be in operation whilst tie-ins were being done.

A robust safety and security approach was deployed and implemented throughout the project duration to protect our workforce, our customer, existing facilities as well as the environment and communities surrounding the Project.

**ENKA SCOPE OF SERVICES**

ENKA Teknik, a wholly owned subsidiary of ENKA, has been awarded the EPC contract for the Crude Oil Turbo Pump Station for PS-1 Depot by South Oil Company. ENKA Teknik provided full detail engineering, procurement, construction, commissioning scope for the new station consisted of; two 13 MW Turbine Units, Fuel Gas Booster Compressing and Regulation Station, Compressed Air System (Instrument and Service Air), Crude Oil Drain Tank, Waste Water Tank, low voltage power distribution and control system, a Station shelter complete with overhead cranes for maintenance.

Project’s engineering and design effort was carried out at ENKA’s main office in Istanbul, Turkey.

**Major Quantities**

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DHI QAR 750 MW COMBINED CYCLE POWER PLANT PROJECT

PROJECT DESCRIPTION
ENKA entered into a consortium agreement with General Electric (GE) on January 3rd 2017 to undertake works on the Dhi Qar Combined Cycle Power Plant project which was awarded to GE by the Ministry of Electricity of Iraq under a contract signed on February 5th 2017. The contract, which was awarded on an Engineering, Procurement and Construction (EPC) basis, includes design works, manufacturing, deliveries to site, construction and assembly works, operation, commissioning, start up and testing. The gas turbines and generators and their off-base auxiliaries, which were previously acquired by the employer, are to be installed and commissioned by the GE-ENKA consortium in simple cycle mode and then converted to combined cycle through the addition of a steam tail and associated equipment. The power plant has a 4x4x1 configuration and will be capable of using three different fuels, with natural gas as the primary fuel and light distilled oil and heavy fuel oil as back-up fuels. The fuel storage and treatment facilities for the liquid fuels are also included in the scope of the work. The gross output at ISO conditions will be 750 MW. The four 9E gas turbine and generator sets (4X125 MW) and auxiliaries were purchased by the employer from General Electric under the “Mega Deal” project in December 2008. These are to be installed by the consortium as free issued equipment.

In late 2018, the work was divided into two phases to overcome financing and budget challenges. Phase 1 broadly envisions the completion of the simple cycle plant, including the 132 kV air insulated switchyard (AIS) and 400kV gas insulated switchyard (GIS) together with common balance of plant of a size and capacity to accommodate the combined cycle operation. Phase 2 broadly involves the completion of the combined cycle plant by adding on the necessary equipment.

ENKA SCOPE OF SERVICES
ENKA is responsible for the conceptual design and detailed engineering of the entire civil works, the piling works and the mechanical and electrical works for Balance of Plant (BoP). ENKA will also procure, manufacture and deliver the BoP equipment and provide construction services including the overall civil works, the piling works, the erection and installation of BoP and power block equipment and the testing and commissioning activities required to achieve successful operation on a turnkey basis.

SAMAWA 750 MW COMBINED CYCLE POWER PLANT PROJECT

PROJECT DESCRIPTION
ENKA entered into a consortium agreement with General Electric (GE) on January 3rd 2017 to undertake works on the Samawa Combined Cycle Power Plant project which was awarded to GE by the Ministry of Electricity of Iraq under contract No.1 dated February 5th 2017. The contract, which was awarded on an Engineering, Procurement and Construction (EPC) basis, includes design works, manufacturing, deliveries to site, construction and assembly works, operation, commissioning, start up and testing. The gas turbines and generators and their off-base auxiliaries, which were previously acquired by the employer, are to be installed and commissioned by the GE-ENKA consortium in simple cycle mode and then converted to combined cycle through the addition of a steam tail and associated equipment. The power plant has a 4x4x1 configuration and will be capable of using three different fuels, with natural gas as the primary fuel and light distilled oil and crude oil as back-up fuels. The fuel storage and treatment facilities for the liquid fuels are also included in the scope of the work. The gross output at ISO conditions will be 750 MW. The four 9E gas turbine and generator sets (4X125 MW) and auxiliaries were purchased by the employer from General Electric under the “Mega Deal” project in December 2008. These are to be installed by the consortium as free issued equipment.

In late 2018, the work was divided into two phases to overcome financing and budget challenges. Phase 1 broadly envisions the completion of the simple cycle plant, including the 132 kV air insulated switchyard (AIS) and 400kV gas insulated switchyard (GIS) together with common balance of plant of a size and capacity to accommodate the combined cycle operation. Phase 2 broadly involves the completion of the combined cycle plant by adding on the necessary equipment.

ENKA SCOPE OF SERVICES
ENKA is responsible for the conceptual design and detailed engineering of the entire civil works, the piling works and the mechanical and electrical works for Balance of Plant (BoP). ENKA will also procure, manufacture and deliver the BoP equipment and provide construction services including the overall civil works, the piling works, the erection and installation of BoP and power block equipment and the testing and commissioning activities required to achieve successful operation on a turnkey basis.
**PROJECT DESCRIPTION**

The Ministry of Electricity of Iraq contracted Mass Group Holding Ltd. to build a mega power plant to provide the state capital with reliable and sustainable electrical power. The plot selected for the plant is located to the south east of Baghdad around 25 km from the centroid.

Besmaya Combined Cycle Project will consist of 2 power blocks which will produce 1,500 MW of power at 400 kV transmission level. Each block will consist of two (2) GE 9F series combustion turbine generators which may be operated in open cycle or combined cycle via the use of a bypass stack. In combined cycle mode, the exhaust from the combustion turbines will be directed to Heat Recovery Steam Generators and the steam produced will drive a Steam Turbine Generator. Waste heat will be rejected using a combination of fin-fan coolers and wet cooling tower equipment. Other facilities which will support the power block operation include oil unloading, storage and transfer system, fuel gas conditioning and pressure reduction, plant electrical system including generator step-up transformers, main control system – DCS, water treatment plant and administrative/O&M areas.

The plant is ready to produce power from the Simple Cycle Phase.

**UNIQUE CHALLENGES**

The project is being designed as a world-class power generation facility utilizing the latest technology in the market. Appropriate level of redundancy is included in each system so that no single failure of an auxiliary plant component shall result in the total loss of the unit generating capability. ENKA’s engineering team is working on the plant design to satisfy all of Owner’s needs and mitigating design criteria changes due to unforeseen factors.

The city of Baghdad suffered significant damage for the last several decades and just yet rebuilding its infrastructure. It is not possible to rely on the existing infrastructure in the area. Therefore, ENKA has established a self-sufficient temporary construction facilities complex at the jobsite to sustain construction works without any disruption or interruption.

**CONTRACT VALUE:**

Lump Sum Turn Key

**PROJECT DURATION:**

Oct 2014 – Feb 2018

**OWNER / CLIENT:**

Baghdad - Iraq

**LOCATION:**

Baghdad 1,500 MW Combined Cycle Power Station Project - Besmaya

**BAGHDAD 1,500 MW COMBINED CYCLE POWER STATION PROJECT - BESMAYA**

One of the major challenges of the project is to work in a social environment suffering civil violence and instability. ENKA has prepared and is implementing a robust security plan based on risk avoidance through careful planning and defensive protection measures. ENKA’s approach to security consists of; good community relations, counter-measures to reduce the risk by deterring, detecting or delaying the threat, and taking extra mitigation measures should any incident occur. The aim of our security system is to provide a secure environment for staff, operators and subcontractors through the effective use of counter-measures, while remaining sympathetic to the facility’s operation, layout and the environmental restrictions.

Over 60,000 tons of project materials and equipment will be shipped to the jobsite through congested Umm Qasr port and partially northern routes. Significant planning and route surveys are required for the successful transportation of oversized cargo. The compliance with frequently changing Iraqi customs regulations and bureaucracy involved in timely customs clearance of goods is a major challenge. ENKA shall leverage its vast experience in Iraq to clear all project cargo without any disputes with customs authorities with careful planning and strictly adhering to the laws and requirements.

**ENKA SCOPE OF SERVICES**

ENKA’s scope of work consists of design, detailed engineering, procurement, shipment/delivery of all project materials, installation and construction, interconnection, pre-commissioning, commissioning & start up, demonstration of parallel operation with the grid at the required net output, performance testing, training of the operating and maintenance personnel, and preparation of integrated operation and maintenance manuals according to the division of works for the power plant.

The simple cycle part of the plant will be made up of 4 GE 9F 3-series gas turbines and all auxiliaries. The combined cycle part of the plant will consist of four Heat Recovery Steam Generators (HRSG), two nominally rated 250 MW Steam Turbine Generators (STG) incl. condensers, six GSUs, two wet cooling towers, and all the requisite equipment and systems to make the plant a safe, reliable, efficient combined cycle power generating facility.

<table>
<thead>
<tr>
<th>Commodity</th>
<th>UoM</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Piping Erection</td>
<td>ton</td>
<td>3,000</td>
</tr>
<tr>
<td>Equipment Erection</td>
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<tr>
<td>Cabling</td>
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<tr>
<td>Concrete</td>
<td>m²</td>
<td>60,000</td>
</tr>
<tr>
<td>Structural Steel</td>
<td>ton</td>
<td>9,000</td>
</tr>
</tbody>
</table>

**PROJECT DETAILS**

**LOCATION:** Baghdad - Iraq

**OWNER / CLIENT:** Mass Group Holding Ltd.

**PROJECT DURATION:** Oct 2014 – Feb 2018

**CONTRACT TYPE:** Lump Sum Turn Key

**CONTRACT VALUE:** Confidential

**SIGNIFICANT FEATURES / ACCOMPLISHMENTS:**

- First IPP Project in Central Iraq
- The project will help improve the living conditions in the Iraqi capital and surrounding areas.
- It is not possible to rely on the existing infrastructure.
- The Ministry of Electricity of Iraq contracted Mass Group Holding Ltd. to build a mega power plant.
- The project will consist of 2 power blocks which will produce 1,500 MW of power at 400 kV transmission level.
- Each block will consist of two (2) GE 9F series combustion turbine generators.
- Waste heat will be rejected using a combination of fin-fan coolers and wet cooling tower equipment.
- The city of Baghdad suffered significant damage for the last several decades and just yet rebuilding its infrastructure.
- ENKA has established a self-sufficient temporary construction facilities complex at the jobsite to sustain construction works without any disruption or interruption.

**BAGHDAD 1,500 MW Combined Cycle Power Station Project - Besmaya**

<table>
<thead>
<tr>
<th>Commodity</th>
<th>UoM</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Piping Erection</td>
<td>ton</td>
<td>3,000</td>
</tr>
<tr>
<td>Equipment Erection</td>
<td>ton</td>
<td>35,000</td>
</tr>
<tr>
<td>Cabling</td>
<td>m</td>
<td>1,000,000</td>
</tr>
<tr>
<td>Concrete</td>
<td>m²</td>
<td>60,000</td>
</tr>
<tr>
<td>Structural Steel</td>
<td>ton</td>
<td>9,000</td>
</tr>
</tbody>
</table>
ERBIL 500 MW CONVERSION TO COMBINED CYCLE POWER PLANT PROJECT

PROJECT DESCRIPTION
MHG - Mass Group Holding Ltd. signed an EPC contract with ENKA to convert its Erbil Independent Power Project (IPP) from simple-cycle to combined-cycle technology.

The primary Erbil Gas Power Station was developed by MGH - Mass Group Holding Ltd. as a simple-cycle project with a capacity of 1,000 MW which is Iraqi Kurdistan’s largest power plant. The plant is located about 20 km south of the city of Erbil, Kurdistan Region of Iraq.

Erbil Gas Power Station had eight GE - 9E gas turbines at the beginning of the project. Four of them were built in 2009 and the other four gas turbines have been recently completed. All were under operation during project execution.

The combined-cycle gas turbines (CCGT) conversion by ENKA added 500 MW to the project by using steam turbines manufactured by GE.

UNIQUE CHALLENGES
The project consists of conversion of live simple cycle plant to a combined cycle plant project under brown field conditions.

ENKA worked under unstable grid conditions and successfully managed to minimize the negative impacts of the grid on the power plant by implementing tailor-designed control.

During the last quarter of the project execution, ENKA worked under significant civil instability and terror activity in the region without interruption and with no effect to contract schedule. ENKA prepared and organized an ever ready evacuation plan by minimizing the potential risk factors to its employees.

The US based engineering subcontractor could not send their engineers to the site due to the security concerns. By organizing regular video conferences ENKA kept the designers up to date and involved in the site day-to-day activities. Another challenge was to obtain residency permits, which took more time than originally anticipated.

Logistics was also one of the major challenges of the project, including not only the delays and obstacles in transportation due to force majeure events near the Turkish – Iraqi border but also the frequently changing Iraqi Customs regulations was also successfully managed with no effect to contract schedule although 51 thousand tons of project materials and equipment had been brought to the site.

ERBIL 500 MW CONVERSION TO COMBINED CYCLE POWER PLANT PROJECT

ENKA SCOPE OF SERVICES
ENKA executed design, procurement, installation and start-up of eight HRSG’s, two nominally rated 250 MW STG’s, two GSUs, an air cooled system and all other equipment to convert the simple cycle plant into two blocks of 4x4x1 combined cycle configuration, including all civil and erection works. Erbil Combined Cycle Power Project is designed to work on two types of fuel – natural gas as the primary and diesel as the secondary source – and utilizes the exhaust heat produced by the existing Erbil Gas Power Station. Erbil Combined Cycle Power Plant is capable of being dispatched for any combination of base-load operation throughout its design service life. Each block consists of four HRSGs, a GE steam turbine generator set and a 40-cell Air Cooled Condenser (ACC) system. The scope of works under the contract also includes a 400 kV switchyard for which the interconnection point is a dead-end structure to be erected by the Ministry of Electricity.

ENKA workforce reached to 2,100 employees during the peak periods of the project. ENKA, further provided training for the O&M personnel who will be operating and maintaining the plant.
SULAYMANIYAH 500 MW CONVERSION TO COMBINED CYCLE POWER PLANT PROJECT

PROJECT DESCRIPTION

MGH - Mass Group Holding Ltd signed an EPC contract with ENKA to convert its Sulaymaniyah Independent Power Project (IPP) from simple-cycle to combined-cycle technology.

The existing simple cycle Sulaymaniyah Gas Power Station was developed by MGH - Mass Group Holding Ltd. with a capacity of 1,000 MW with eight GE - 9E gas turbines. The combined-cycle gas turbines (CCGT) conversion added 500 MW to the project making the overall capacity of 1,500 MW, by using steam turbines manufactured by GE.

Sulaymaniyah Combined Cycle Power Project is designed to work on two types of fuel - natural gas as the primary and diesel as the secondary source and will utilize the exhaust heat produced by the existing Sulaymaniyah Gas Power Station. Each block consists of four HRSGs, a GE steam turbine generator set and a 40-cell Air Cooled Condenser (ACC) System.

UNIQUE CHALLENGES

The project consists of conversion of live simple cycle to a combined cycle power plant project under brown field conditions. ENKA worked under unstable grid conditions nevertheless successfully managed to minimize the negative impacts of the grid on the power plant by implementing tailor-designed control.

One of the major challenges of the project was to work under major civil unrest in the region. ENKA prepared and implemented a solid safety and security plan based on risk avoidance through careful planning and defensive protection measures to cope with the challenges. Our security approach consisted of good community relations, counter-measures to reduce the risk by deterring, detecting or delaying the threat, and an ever ready evacuation plan should any incident occur.

Through this approach, ENKA minimized the potential risk factors and managed to work without interruption and with no effect to contract schedule.

Due to the circumstances, at times, shipments to the jobsite were interrupted and high labor turnovers were experienced causing ENKA to apply and obtain visas for the new workforce multiple times.

ENKA SCOPE OF SERVICES

The major works under the contract are the design, engineering, procurement, shipment/delivery, installation construction, interconnection, pre-commissioning, commissioning and start-up of eight HRSG's, two nominally rated 250 MW GE STG's, two GSUs, an air cooled system and all other balance of plant equipment to convert the simple cycle plant into two blocks of 4x4x1 combined cycle configuration as well as demonstration of parallel operation with the grid at the required net output, performance testing, classroom training of the operating and maintenance personnel, and preparation of integrated operation and maintenance manuals. The scope also includes a 400 kV switchyard for which the interconnection point will be a dead-end structure to be erected by the Ministry of Electricity.

ENKA workforce reached to 1,245 employees during the peak periods of the Project. ENKA further provided training for the O&M personnel who will be operating and maintaining the plant.

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structural Steel</td>
<td>5,800</td>
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<tr>
<td>Concrete</td>
<td>45,000</td>
</tr>
<tr>
<td>Cabling</td>
<td>2,000</td>
</tr>
<tr>
<td>Equipment Erection</td>
<td>36,000</td>
</tr>
<tr>
<td>Piping Erection</td>
<td>2,000</td>
</tr>
</tbody>
</table>

Similarly, US based engineering subcontractor, European and Japanese vendors restricted their engineers to visit the jobsite due to security concerns. ENKA handled all of these challenges by true commitment of the project team to the project’s success, extensive planning and careful recruiting program and by carrying adequate redundancy at each phase of the execution.

Flexible logistics management approach had been used during project execution by creating alternative shipping solutions and making timely and accurate decisions and adapting to the frequently changing Iraqi Customs regulations. As of mid-November 2015, 38 thousand tons of project material and equipments had been transported to the site.

PROJECT DETAILS

LOCATION
Sulaymaniyah, Kurdistan Region of Iraq

OWNER / CLIENT
Mass Group Holding Ltd

PROJECT DURATION
July 2013 – July 2016

CONTRACT VALUE:
Lump Sum Turn Key

CONTRACT TYPE:
July 2013 – July 2016

PROJECT DURATION:
Mass Group Holding Ltd.

OWNER / CLIENT:
of Iraq

Sulaymaniyah, Kurdistan Region

LOCATION:

SIGNIFICANT FEATURES / ACCOMPLISHMENTS:
- Sulaymaniyah Combined Cycle Power Project is designed to run on two types of fuel; mainly natural gas, and diesel fuel as standby. The Natural Gas is reaching the station via pipelines from Khor Mor gas field station, while the Diesel is transported to the plant via mobile trucks. Then the diesel is purified and treated before it can be used for the turbines.
- 3 million workhours without a Lost Time Incident
- Global Best Project of 2017 by Engineering News Record (ENR) under the Power/Industrial category
NAJYBIAH 500 MW GAS TURBINE POWER PLANT PROJECT

PROJECT DESCRIPTION

The Najybiah Power Plant Project, located near Basra, is part of a master plan developed and implemented by Republic of Iraq’s Ministry of Electricity to increase the power generation capacity to meet the rapid growth of demand in the country after 25 years of war and lack of investment.

The Project consisted of engineering, procurement, construction, commissioning and start-up of a 4x125 MW Power Generation Plant to operate in simple cycle mode of operation with three type of fuel, Heavy Fuel Oil (HFO), Natural Gas and Light Distillate Oil (LDO), complete with all Balance of Plant (BOP) systems to support safe and efficient operation of CTG units. Heavy fuel oil (HFO) is used as main fuel for CTG operation whereas; natural gas and light distillate oil (LDO) are used as back-up fuels. Plant has an overall storage capability of 5 days for both liquid fuels (HFO & LDO). Power is generated at 15 kV in the CTGs and stepped up by main transformers to the grid voltage via 132 kV and 400 kV GIS Substations. Project’s four (4) each GE Frame 9E Gas Turbine Generator Sets were free issued and delivered to site by the Owner.

UNIQUE CHALLENGES

The Najybiah power plant is expected to address the growing demand for power in the country and supply uninterrupted electricity to the people of Iraq. Due to lack of infrastructure and availability of reliable natural gas supply in the region, the plant was designed to function on three different types of fuel to ensure continuity of operations. Storage and distribution systems for the two liquid fuels were carefully designed by ENKA with appropriate design margins and redundancy requirements.

Project site is located on the northern part of Basra province on the banks of Shatt Al Arab River in a relatively high populated area. ENKA, while executing the work, successfully managed cultural relations with locals to avoid any clashes and maintained good relations with its neighbors.

“1 million workhours without a Lost Time Incident”

ENKA SCOPE OF SERVICES

ENKA has self performed the basic engineering, detail engineering, procurement, construction, commissioning, start-up and performance testing scope for the project utilizing in-house resources on a lump sum turn-key basis. Specific scope of services provided by ENKA included; complete basic and detailed design and engineering of the plant, supply of all balance of plant (BOP) systems and equipment, all civil works including GTG foundations and structural steel, fuel gas supply and regulating station, all HFO (raw, treated, certified) and LDO fuel tanks (2 ea x 9,050 m³, 2 ea x 4,540 m³, 2 ea x 1,125 m³, 2 ea x 3,245 m³ steel tanks), unloading, metering and fuel treatment systems, auxiliary boiler system, 400 kV and 132 kV GIS systems with step-up transformers, MV and LV substation with auxiliary transformers, instrument and plant air supply systems, black start and emergency diesel generators, Fire protection, detection, alarm and extinguishing systems, water storage, pre-treatment and demineralization plant, waste collection and treatment system, batteries and UPS system, ventilation and air conditioning (HVAC) systems, overhead cranes and maintenance hoists, power plant distributed control system (DCS), complete piping and field instrumentation, mechanical and electrical erection, complete civil and structural works, supply of spare parts, and start-up and commissioning of the plant. ENKA further provided training for the Operation and Maintenance (O&M) personnel who will be operating and maintaining the plant.

<table>
<thead>
<tr>
<th>Type of Plant</th>
<th>Simple Cycle Power Plant.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacity</td>
<td>500 MW</td>
</tr>
<tr>
<td>Type of Fuel</td>
<td>Heavy fuel oil (HFO) will be used as main fuel for CTG operation whereas; fuel gas and light distillate oil (LDO) will be used as back-up fuels.</td>
</tr>
<tr>
<td>Configuration</td>
<td>4x125 MW</td>
</tr>
<tr>
<td>Gas Turbine Generator</td>
<td>General Electric Unit: 4 Sets, Model: 9E Model, Rating Per Unit: 125 MW</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Commodity</th>
<th>UoM</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Earthworks</td>
<td>m³</td>
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</tr>
<tr>
<td>Piling</td>
<td>m</td>
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<tr>
<td>Concrete</td>
<td>m³</td>
<td>102,000</td>
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<tr>
<td>Structural Steel</td>
<td>ton</td>
<td>1,600</td>
</tr>
<tr>
<td>A/G Piping</td>
<td>ton</td>
<td>1,600</td>
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<tr>
<td>Mechanical Equipment</td>
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</tr>
<tr>
<td>Cabling</td>
<td>m</td>
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<tr>
<td>Insulation &amp; Paint</td>
<td>m²</td>
<td>70,000</td>
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<tr>
<td>Buildings</td>
<td>m²</td>
<td>6,638</td>
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</tbody>
</table>

LOCATION
Al Najybiah, Basra - Iraq

OWNER / CLIENT
Ministry of Electricity, Iraq

PROJECT DURATION
May 2013 – May 2015

CONTRACT TYPE
Lump Sum Turn Key

CONTRACT VALUE
US$ 2.7 million

SIGNIFICANT FEATURES / ACCOMPLISHMENTS
• 1 million workhours without a Lost Time Incident.
• Achieved 40% Iraqi content on direct project workhours.
• On-schedule completion of the project provided Iraqis in Basra and on the national grid with many hours of electricity per day.
• Part of largest power investment (Mega Deal) by Iraqi government in the post war era.

ENKA has self performed the basic engineering, detail engineering, procurement, construction, commissioning, start-up and performance testing scope for the project utilizing in-house resources on a lump sum turn-key basis. Specific scope of services provided by ENKA included; complete basic and detailed design and engineering of the plant, supply of all balance of plant (BOP) systems and equipment, all civil works including GTG foundations and structural steel, fuel gas supply and regulating station, all HFO (raw, treated, certified) and LDO fuel tanks (2 ea x 9,050 m³, 2 ea x 4,540 m³, 2 ea x 1,125 m³, 2 ea x 3,245 m³ steel tanks), unloading, metering and fuel treatment systems, auxiliary boiler system, 400 kV and 132 kV GIS systems with step-up transformers, MV and LV substation with auxiliary transformers, instrument and plant air supply systems, black start and emergency diesel generators, Fire protection, detection, alarm and extinguishing systems, water storage, pre-treatment and demineralization plant, waste collection and treatment system, batteries and UPS system, ventilation and air conditioning (HVAC) systems, overhead cranes and maintenance hoists, power plant distributed control system (DCS), complete piping and field instrumentation, mechanical and electrical erection, complete civil and structural works, supply of spare parts, and start-up and commissioning of the plant. ENKA further provided training for the Operation and Maintenance (O&M) personnel who will be operating and maintaining the plant.
BAZYN 500 MW SIMPLE CYCLE POWER PLANT PROJECT

PROJECT DESCRIPTION

The Qaiwan Group awarded ENKA the Bazyan Simple Cycle Power Plant Project on a EPC Turnkey basis, on 28th August 2014.

The project was on a green-field site, located in the Sulaymaniyah Province of the Kurdistan Autonomous Region of Iraq.

The power capacity of the plant is 500 MW generated by four GE-9E-3 gas turbines, an air insulated switchyard of 132kV, fuel gas conditioning system, three Distillate Fuel Oil tanks, each of 15,000 m³ capacity, a water treatment plant and all Balance of Plant systems, complete with all accessories, including piping, wiring, instrumentation controls and panels and all other facilities and required capabilities.

UNIQUE CHALLENGES

The main challenge of the project was meeting the 15 month fast-track project schedule. The project mobilization phase took place at the peak of significant civil unrest in the region. Deploying necessary number of employees to the jobsite took longer than originally anticipated in the contract schedule. ENKA with a successful coordination of procurement, logistics and risk management activities managed to bring 1,500 trucks to site in a very short time period and arranged their unloading at an extremely small lay down. In nearly one year, 15,000 tons of project materials were shipped to the site. Double handling techniques were used during earthworks due to the small size of the job site. Delays to transportation plans due to force majeure events near the Turkish – Iraqi border were handled with no effect on contract schedule.

In this project, ENKA also successfully managed working with previously identified local suppliers and subcontractors without any bidding process.

Project Details:

LOCATION: Sulaymaniyah - Iraq
OWNER / CLIENT: Qaiwan Group
PROJECT DURATION: Sep 2014 – Mar 2016
CONTRACT TYPE: Lump Sum Turn Key
CONTRACT VALUE: Confidential
SIGNIFICANT FEATURES / ACCOMPLISHMENTS:
• Utilization of multi-fuel with natural gas as the primary fuel and light fuel oil (i.e. a type of diesel) as the back-up fuel in cases when natural gas is unavailable.
• Ability to supply of 15 days (47,000 m³) fuel oil on site.
• 3.5 million workhours without a Lost Time Incident. (As of January 2016)

ENKA SCOPE OF SERVICES

The scope of the work covers all engineering, design, procurement, manufacturing, shipment/delivery, construction, installation, testing, interconnection, pre-commissioning, commissioning, start-up, demonstration of parallel operation with the grid at the required net output and performance testing activities as well as preparation of O&M manuals and classroom training of the operating and maintenance personnel. As-built documentation and 12 months warranty services were also provided by ENKA. The design supports a plant operation with two types of fuel – liquid fuel gas and liquid fuel oil.

The ENKA workforce reached 1,135 employees during the peak periods of the project.

<table>
<thead>
<tr>
<th>Commodity</th>
<th>UoM</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Piping Erection</td>
<td>ton</td>
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</tr>
<tr>
<td>Equipment Erection</td>
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</tr>
<tr>
<td>Cabling</td>
<td>m</td>
<td>395,000</td>
</tr>
<tr>
<td>Concrete</td>
<td>m³</td>
<td>25,000</td>
</tr>
<tr>
<td>Structural Steel</td>
<td>ton</td>
<td>500</td>
</tr>
</tbody>
</table>

Type of Plant: Simple Cycle Power Plant
Capacity: 500 MW
Type of Fuel: Liquid Fuel Gas and Liquid Fuel Oil
Configuration: 4x125 MW
Gas Turbine Generator: General Electric Unit: 4 Sets, Model: 9E, Rating Per Unit: 125 MW

“Ability to supply of 15 days (47,000 m³) fuel oil on site.”
PROJECT DETAILS
LOCATION: Basra, Iraq
OWNER / CLIENT: Aloreen Investment Ltd
PROJECT DURATION: Dec 2018 - Sep 2020
CONTRACT TYPE: Lump Sum, Turn-key
CONTRACT VALUE: US$ 70 Million

PROJECT DESCRIPTION
ENKA was awarded the contract by Aloreen Company on 07th of May 2018. The contract has two effective dates which are Notice of the Commencement Date (NCD) and Notice to Proceed (NTP). The NCD and NTP were realized on 27th of June 2018 and 3rd of December 2018, respectively. Engineering, procurement and mobilization works have been commenced following notification of NCD and construction works have been commenced upon notification of NTP.

ENKA’s responsibilities under this contract include engineering, design, procurement, transport and logistics, construction.

The Port of Umm Qasr is located approximately 5.2 km south of Basrah. It is the largest sea and the only deep-water port of Iraq. The port has road links North-West to Basrah and South across the Kuwait border, plus a main line rail link North-West to Basrah. BMT Umm Qasr Yard-5 is situated at the northern end of the port.

ENKA SCOPE OF SERVICES
The scope of the project includes the design and construction of quay wall structure; dredging; bedding layer; concrete block fabrication and installation; cope unit construction; marine fixtures and accessories installation and backfilling behind quay wall.

<table>
<thead>
<tr>
<th>Commodity</th>
<th>UoM</th>
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</tr>
</thead>
<tbody>
<tr>
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<td>m³</td>
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</tr>
<tr>
<td>Backfilling</td>
<td>m³</td>
<td>524,124</td>
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<tr>
<td>Geotextile</td>
<td>m²</td>
<td>39,104</td>
</tr>
<tr>
<td>Revetment and scour protection</td>
<td>m²</td>
<td>27,499</td>
</tr>
<tr>
<td>Concrete</td>
<td>m³</td>
<td>132,598</td>
</tr>
<tr>
<td>Installation of Marine Fixtures and Accessories</td>
<td>ea</td>
<td>52</td>
</tr>
</tbody>
</table>
IRAQ - TURKEY CRUDE OIL PIPELINE EXPANSION

PROJECT DESCRIPTION

TURKISH PART

ENKA and its partner Toyo Engineering (Japan) undertook the turn-key contract with BOTAŞ, the Turkish state-owned company for pipeline transportation, and completed the construction in October 1984. The project was designed to increase the capacity of the existing 40-inch 1,000 km crude oil pipeline from 35 to 50 million ton/year. The design and construction works were carried out simultaneously in Turkey and Iraq. The major work items were the replacement of pumps at existing pump stations, construction of three new pump stations, installation of booster pumps, construction of an 80 km pipeline loop with diameters of 30 and 40 inches, modification of the dispatching center, extension of the existing metering station and the installation of a fourth metering station, two new pump stations complete with HV and MV substations, fire-fighting, telecontrol and telecommunication, instrumentation, station piping, and cathodic protection systems.

IRAQI PART

Design and construction of expansion project to increase the capacity of existing 40”, 1,000 km crude oil line from 35 million tons/year to 50 million tons/year. Replacement of pumps and motors at existing stations. Modification of dispatching center. Extension of the metering stations and addition of the 4th metering station. Construction of two new pump stations complete with high voltage substation, MV substation, fire-fighting/fire alarm system, telecontrol / telecommunication and instrumentation system, 4 x 3.6 MV, 11 KV pump/motor sets, station piping and cathodic protection systems. Tie-in of new stations to existing pipeline.

ENKA SCOPE OF SERVICES

ENKA`s scope included detailed engineering, procurement and construction. The Dam works consisted of a rock fill dam with an inclined impervious core, circa 600 m long at crest, height 204 m, Fill volume of 37 million m³, a spillway of 8,900 m³/s capacity, consisting of three tunnels of 12 m diameter and 700 m long with three radial gates, 2 bottom outlets of total discharge capacity of 750 m³/s, with a length of 1,200 m long each 2 diversion tunnels of 12 m diameter and a length of 1,100 m long each, 3 concrete lined tailrace tunnels of dia. 12 m and approximately 640 – 710 m long, a conventional underground powerhouse having 6 units with a total capacity of 1,560 MW and an underground transformer hall and a switchyard hall.

BEKHME DAM

PROJECT DESCRIPTION

Construction of civil works including supply and erection of the hydraulic steel structures for the Bekhme Dam Project and turnkey housing complex comprising of 350 villas and 17 social facilities such as Guest House, Restaurant, Club House, Supermarket, Dispensary, Kindergarten, School, Mosque, Bank, Post Office, Laundry and Offices. Due to the Gulf crises and the war this project had been stopped indefinitely since August 1990, when 32% of the work progress had already been completed.

ENKA SCOPE OF SERVICES

ENKA`s scope included detailed engineering, procurement and construction. The Dam works consisted of a rock fill dam with an inclined impervious core, circa 600 m long at crest, height 204 m, Fill volume of 37 million m³, a spillway of 8,900 m³/s capacity, consisting of three tunnels of 12 m diameter and 700 m long with three radial gates, 2 bottom outlets of total discharge capacity of 750 m³/s, with a length of 1,200 m long each 2 diversion tunnels of 12 m diameter and a length of 1,100 m long each, 3 concrete lined tailrace tunnels of dia. 12 m and approximately 640 – 710 m long, a conventional underground powerhouse having 6 units with a total capacity of 1,560 MW and an underground transformer hall and a switchyard hall.

PROJECT DETAILS

LOCATION

Mosul, Iraq

OWNER / CLIENT

State Commission for Dams - SCD Ministry of Irrigation

PROJECT DURATION

Sep 1986-Aug 1990

CONTRACT TYPE

Unit Rate

CONTRACT VALUE

US$ 1.5 Billion

SIGNIFICANT FEATURES / ACCOMPLISHMENTS:

- The largest Hydroelectric Dam project of Iraq

PROJECT DESCRIPTION

Construction of civil works including supply and erection of the hydraulic steel structures for the Bekhme Dam Project and turnkey housing complex comprising of 350 villas and 17 social facilities such as Guest House, Restaurant, Club House, Supermarket, Dispensary, Kindergarten, School, Mosque, Bank, Post Office, Laundry and Offices. Due to the Gulf crises and the war this project had been stopped indefinitely since August 1990, when 32% of the work progress had already been completed.

ENKA SCOPE OF SERVICES

ENKA`s scope included detailed engineering, procurement and construction. The Dam works consisted of a rock fill dam with an inclined impervious core, circa 600 m long at crest, height 204 m, Fill volume of 37 million m³, a spillway of 8,900 m³/s capacity, consisting of three tunnels of 12 m diameter and 700 m long with three radial gates, 2 bottom outlets of total discharge capacity of 750 m³/s, with a length of 1,200 m long each 2 diversion tunnels of 12 m diameter and a length of 1,100 m long each, 3 concrete lined tailrace tunnels of dia. 12 m and approximately 640 – 710 m long, a conventional underground powerhouse having 6 units with a total capacity of 1,560 MW and an underground transformer hall and a switchyard hall.

PROJECT DETAILS

LOCATION

Iraq

OWNER / CLIENT

State Commission for Dams - SCD Ministry of Irrigation

PROJECT DURATION

Sep 1986-Aug 1990

CONTRACT TYPE

Unit Rate

CONTRACT VALUE

US$ 1.5 Billion

SIGNIFICANT FEATURES / ACCOMPLISHMENTS:

- The largest Hydroelectric Dam project of Iraq

PROJECT DESCRIPTION

Construction of civil works including supply and erection of the hydraulic steel structures for the Bekhme Dam Project and turnkey housing complex comprising of 350 villas and 17 social facilities such as Guest House, Restaurant, Club House, Supermarket, Dispensary, Kindergarten, School, Mosque, Bank, Post Office, Laundry and Offices. Due to the Gulf crises and the war this project had been stopped indefinitely since August 1990, when 32% of the work progress had already been completed.

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**KUBAISA CEMENT PLANT**

**PROJECT DETAILS**

**LOCATION:** Kubaisa, Iraq  
**OWNER / CLIENT:** State Organization of Industrial Projects - SCP  
**PROJECT DURATION:** Jan 1986-Oct 1987  
**CONTRACT TYPE:** Lumpsum Turnkey  
**CONTRACT VALUE:** US$ 47 Million

**PROJECT DESCRIPTION**

The project's scope of works included the procurement and construction of all civil and building works with respect to the cement plant with the capacity of 1,000,000 tons/year. All civil and building works related with 100 percent extension of Kubaisa Cement Plant.

**ENKA SCOPE OF SERVICES**

ENKA, as construction contractor has undertaken all civil and building works related with the cement plant including detailed designs.

ENKA’s works consist of raw material crushing, storage and handling unit; cement packing, loading and dispatch unit; electrical power supply system; workshops; storage areas; administration building; camp facilities and other auxiliary facilities.

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**FALLUJA WHITE CEMENT PLANT**

**PROJECT DETAILS**

**LOCATION:** Falluja, Iraq  
**OWNER / CLIENT:** Iraqi Central Cement State Enterprise  
**PROJECT DURATION:** Jan 1986-Feb 1990  
**CONTRACT TYPE:** Lumpsum  
**CONTRACT VALUE:** US$ 3.4 Million

**PROJECT DESCRIPTION**

Technical management and consulting, design of preventive maintenance systems, supervision of spare parts manufacturing, periodical check of equipment and machinery, form design, etc.

**ENKA SCOPE OF SERVICES**

ENKA’s wholly owned subsidiary, ENKA Teknik managed and operated Falluja White Cement for the Client, Central Cement State Enterprise.
BADOOSH CEMENT PLANT

PROJECT DETAILS

LOCATION:
Mosul, Iraq

OWNER / CLIENT:
State Enterprise for Cement in Nineveh (SECIN)

PROJECT DURATION:
Dec 1981 – Apr 1984
Sep 1982 – Apr 1984
Dec 1982 – Dec 1985

CONTRACT TYPE:
Lumpsum Turnkey

CONTRACT VALUE:
US$ 6.7 Million

MAIN QUANTITIES:
Structural Steel: 2,500 tons

PROJECT DESCRIPTION
The scope of works consisted of design, engineering, fabrication and erection of the steel structure works of homogenisation buildings of the cement plant with a 3,000 tons daily capacity.

ENKA SCOPE OF SERVICES
Design, engineering, fabrication and erection of the steel structure works of homogenisation buildings. Totally 2,500 tons of steel structure works were performed.

NEW BADOOSH CEMENT PLANT / OPERATION & MAINTENANCE

PROJECT DETAILS

LOCATION:
Mosul, Iraq

OWNER / CLIENT:
State Enterprise for Cement in Nineveh (SECIN)

PROJECT DURATION:
Dec 1981 – Apr 1984
Sep 1982 – Apr 1984
Dec 1982 – Dec 1985

CONTRACT TYPE:
Lumpsum Turnkey

CONTRACT VALUE:
US$ 6.7 Million
US$ 432 Million
US$ 11.5 Million

MAIN QUANTITIES:
Excavation: 155,248 m³
Formwork: 84,080 m²
Reinforced steel: 3,846 tons
Sliding formwork: 24,476 m²
Concrete: 40,184 m³
Prestressing wire: 112 tons

PROJECT DESCRIPTION
Maintenance, operation and technical administration of grinding mills (separate contract).
Maintenance, operation and technical administration of quality control department (separate contract).
Overall maintenance, operation, technical administration of the 2nd extension of Badoosh Cement Plant (separate contract).
Sulaymaniyah 500 MW Conversion To CCPP - Iraq

35°39'35.2"N | 44°56'28.7"E

ENKA

İNŞAAT VE SANAYİ A.Ş.

Balmumcu Mah., Zincirlikuyu Yolu No: 10, 34349
Beşiktaş / İstanbul
Phone: +90 (212) 376 10 00 (pbx) Fax: +90 (212) 272 88 69
e-mail: enka@enka.com web: https://www.enka.com