

POWER PLANTS & ENERGY

SELECTED PROJECTS

ENKA
Engineering for a Better Future

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ENKA
Engineering for a Better Future



POWER PLANTS & ENERGY

ENKA enjoys a well-deserved international reputation for completing power plants to the highest quality standards within the required project time schedule. ENKA's success in the world construction league is entitled in 2013, with the "Best Global Project Award" in Power & Industrial Category. ENR (Engineering News Record Magazine) granted this award to ENKA for its 411 MW Yajva State District Power Plant EPC Project. In 2017, ENKA's Sulaymaniyah 1,500 MW Combined Cycle Power Plant in Iraq was recognized as the Global Best Project by ENR under the same category as well.

YAJVA STATE DISTRICT 411 MW CCPP PROJECT, RUSSIA

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NAJYBIA 500 MW GAS TURBINE POWER PLANT, IRAQ

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RIJNMOND 790 MW ENERGY CENTER, THE NETHERLANDS

AFŞİN ELBİSTAN B 4 X 360 MW THERMAL POWER PLANT, TÜRKİYE

SOUTHWEST 1,830 MW THERMIC POWER PLANTS, TÜRKİYE

TRAKYA 1,200 MW NATURAL GAS COMBINED CYCLE POWER PLANT, TÜRKİYE

BURSA 1,400 MW NATURAL GAS COMBINED CYCLE POWER PLANT, TÜRKİYE

INTRODUCTION

ENKA is among the world leaders in the power sector, as an **EPC** contractor with approximately **20 GW** capacity designed and built.

Total historical project value of fossil fuel fired plants constructed by ENKA to date is in excess of **US\$ 14 billion**.

ENKA's Power Plants EPC experience comprises the following:

- **6 Coal Fired Power Plants** with a total capacity of 4,070 MW
- **18 Natural Gas Fired CCPPs** with a total capacity of 17,238 MW
- **9 Natural Gas Fired SCPPs** with a total capacity of 5,477 MW
- **1 Solar Photovoltaic Power Plant** with a capacity of 45 MWp

ENKA Power Plants Business Line can undertake following scopes by directly utilizing in-house resources or solely owned ENKA subsidiaries:

- Detailed Engineering and Design
- Procurement of all Permanent Project Materials
- Fabrication of all Steel Structures and Piping (in Türkiye)
- Fabrication of Static Process Equipment (in Türkiye)
- Fabrication of Pressure Parts (in Türkiye)
- Modularization or Packaging of Process Units
- International Logistics Management of all Project Equipment & Material
- Construction and Installation Services in all Disciplines
- Commissioning and Start-up Services
- Operation and Maintenance Services

Through in-house management of the whole value chain, ENKA is able to minimize interface issues, increase overall safety, quality and schedule management.

This proven method adds considerable value to the clients by completing undertaken projects safely, in time and with high quality, all while minimizing the duration of commissioning & start-up, ensuring highest reliability of operation and significantly reducing maintenance costs of constructed facilities.

INVESTMENTS

GEBZE / ADAPAZARI NATURAL GAS CCPP, TÜRKİYE

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İZMİR ALİAĞA NATURAL GAS CCPP, TÜRKİYE

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ENKA POWER

PLANTS PERFORMANCE

PLANTS UPGRADES

SERVICES FOR ENERGY PROJECTS



ENKA is the largest Turkish
Electric Power Producer (IPP)

İZMİR ALİAĞA NATURAL GAS CCPP, TÜRKİYE

INVESTMENTS

TÜRKİYE BOO PROJECTS:
GEBZE 1,600 MW & ADAPAZARI 820 MW COMBINED CYCLE POWER PLANTS



PROJECT DETAILS

- LOCATION:
Adapazarı - Türkiye
- OWNER / CLIENT:
Gebze Elektrik Üretim Ltd. Şti.
Adapazarı Elektrik Üretim Ltd. Şti.
- PROJECT DURATION:
Apr 2000-Oct 2002
- CONTRACT TYPE:
Lump Sum-Turnkey
- CONTRACT VALUE:
Gebze & Adapazarı
US\$ 780 million (513+267)
- SIGNIFICANT FEATURES / ACCOMPLISHMENTS:
- First Build – Own – Operate (BOO) Power Plant Projects in Türkiye
 - Gebze is currently the largest operating CCPP in Türkiye
 - Both power plants were successfully completed on time
 - ENKA is the sole owner of the Gebze and Adapazarı Natural Gas Fired CCPPs since December 2005

PROJECT DESCRIPTION

Following a Build-Own-Operate (BOO) tender in 1997, ENKA together with its partner InterGen was awarded the right to build and operate the Gebze Power Plant with a nominal capacity of 1,600 MW and the Adapazarı Power Plant with a nominal capacity of 820 MW. ENKA with its joint venture partner Bechtel was the Turnkey EPC contractor for these projects.

ENKA SCOPE OF SERVICES

ENKA Bechtel Joint Venture's scope as the EPC contractor covered all the Works including design, engineering, equipment supply, construction, commissioning and putting into operation of these 2 natural gas fired combined cycle power plants.

Over seven thousand workers have participated in the construction of the Gebze and Adapazarı power plants at different times, with peak of 2,220. A permanent technical staff remained behind for Operations and Maintenance. Construction of the Gebze and Adapazarı power plants was completed in 2002.

	GEBZE	ADAPAZARI
Type of Plant	Combined Cycle Power Plant	Combined Cycle Power Plant
Capacity	1,600 MW	820 MW
Type of Fuel	Natural Gas	Natural Gas
Configuration	2x (2x2x1)	1x (2x2x1)
Shaft	Multi Shaft	Single Shaft
Gas Turbine Generator	GE Unit: 4 Sets Model: 9FA Rating Per Unit: 250 MW	GE Unit: 2 Sets Model: 9FA Rating Per Unit: 250 MW
Steam Turbine Generator	Alstom Unit: 2 Sets Model: ND41 Rating Per Unit: 281 MW	Alstom Unit: 1 Set Model: ND41 Rating Per Unit: 281 MW
HRSG	CMI Unit: 4 Sets Type: Vertical Assisted Circulation; 3 Pressure with Reheat	CMI Unit: 2 Sets Type: Vertical Assisted Circulation; 3 Pressure with Reheat
Cooling Type	Natural Draft Dry Cooling Towers 2 Cooling Towers (Height: 135 m.)	Natural Draft Dry Cooling Towers 2 Cooling Towers (Height: 135 m.)

TÜRKİYE BOO PROJECTS:
İZMİR 1,580 MW NATURAL GAS COMBINED CYCLE POWER PLANT



PROJECT DESCRIPTION

Following a Build-Own-Operate (BOO) tender in 1997, ENKA together with its partner InterGen was awarded the right to build and operate the İzmir Power Plant with a nominal capacity of 1,580 MW. ENKA with its joint venture partner Bechtel was the Turnkey EPC contractor for the plant.

ENKA SCOPE OF SERVICES

ENKA Bechtel Joint Venture's scope as the EPC contractor covered all the works including design, engineering, equipment supply, construction, commissioning and putting into operation this natural gas fired combined cycle power plant.

Five thousand workers have participated in both the manufacturing of components and construction of the İzmir power plant. During the construction phase, at the peak time, the various companies employ approximately 1,700 workers. A permanent technical & administration team has been now staffed for the plant Operation and Maintenance. Construction of the İzmir power plant was completed in 2003.

Type of Plant	Combined Cycle Power Plant
Capacity	1,580 MW
Type of Fuel	Natural Gas
Configuration	2x (2x2x1)
Shaft	Multi Shaft
Gas Turbine Generator	General Electric Unit: 4 Sets Model: 9FA Rating Per Unit: 240 MW
Steam Turbine Generator	Alstom Unit: 2 Sets Model: ND41 Rating Per Unit: 282,5 MW
HRSG	CMI Unit: 4 Sets Type: Vertical Assisted Circulation 3 Pressure with Reheat HP: 132 bar, 278 t/h, 566 °C IP: 31 bar, 39 t/h, 314 °C RH: 28 bar, 315 t/h, 563 °C LP: 5 bar, 40 t/h, 288 °C
Cooling Type	Low Profile Forced Draft Wet Cooling Towers (using seawater as a cooling medium)

PROJECT DETAILS

- LOCATION:
İzmir Aliğa - Türkiye
- OWNER / CLIENT:
İzmir Elektrik Üretim Ltd. Şti.
- PROJECT DURATION:
Aug 2000-Mar 2003
- CONTRACT TYPE:
Lump Sum-Turnkey
- CONTRACT VALUE:
US\$ 505 million
- SIGNIFICANT FEATURES / ACCOMPLISHMENTS:
- First Build – Own – Operate (BOO) Power Plant Projects in Türkiye
 - The power plant was successfully completed on time
 - ENKA is the sole owner of the İzmir Natural Gas Fired CCPPs since December 2005



ENKA is capable of **32,000** GWh/ year with **4** GW gas fired combined cycle power plants built, owned and operated in Türkiye

ENKA POWER

PLANTS PERFORMANCE

The three gas-fired combined cycle power plants which ENKA built, owns and operates in Adapazarı and İzmir have an annual generation capacity of 32 billion kWh. ENKA Power Plants has generated over 465 billion kilowatt-hours of electricity during their commercial operation period in Türkiye.

Meticulous planning and close supervision have enabled the company to complete all planned and unplanned maintenance work on the GE 9FA +e machines in the shortest possible time.

The power plant in Adapazarı achieved a global record of 99.8% availability in F-class gas turbine technology in 2011 and repeated its own record again in 2015. This is nearly seven percentage points higher than the industry average.

In addition, the insurer Factory Mutual Global (FM) has awarded all three power plants “highly protected risk” status in recognition of the company’s commitment to the reduction of potential losses through a stringent program of risk mitigation and prevention.

4,000 MW INSTALLED
COMBINED CYCLE CAPACITY

SUPPLYING **10%** of
TÜRKİYE's ELECTRICITY



In 2011, ENKA's Adapazari Power Plant was selected as the Power Plant of the Year with an availability of **99.8%** by the Power Magazine

ENKA POWER

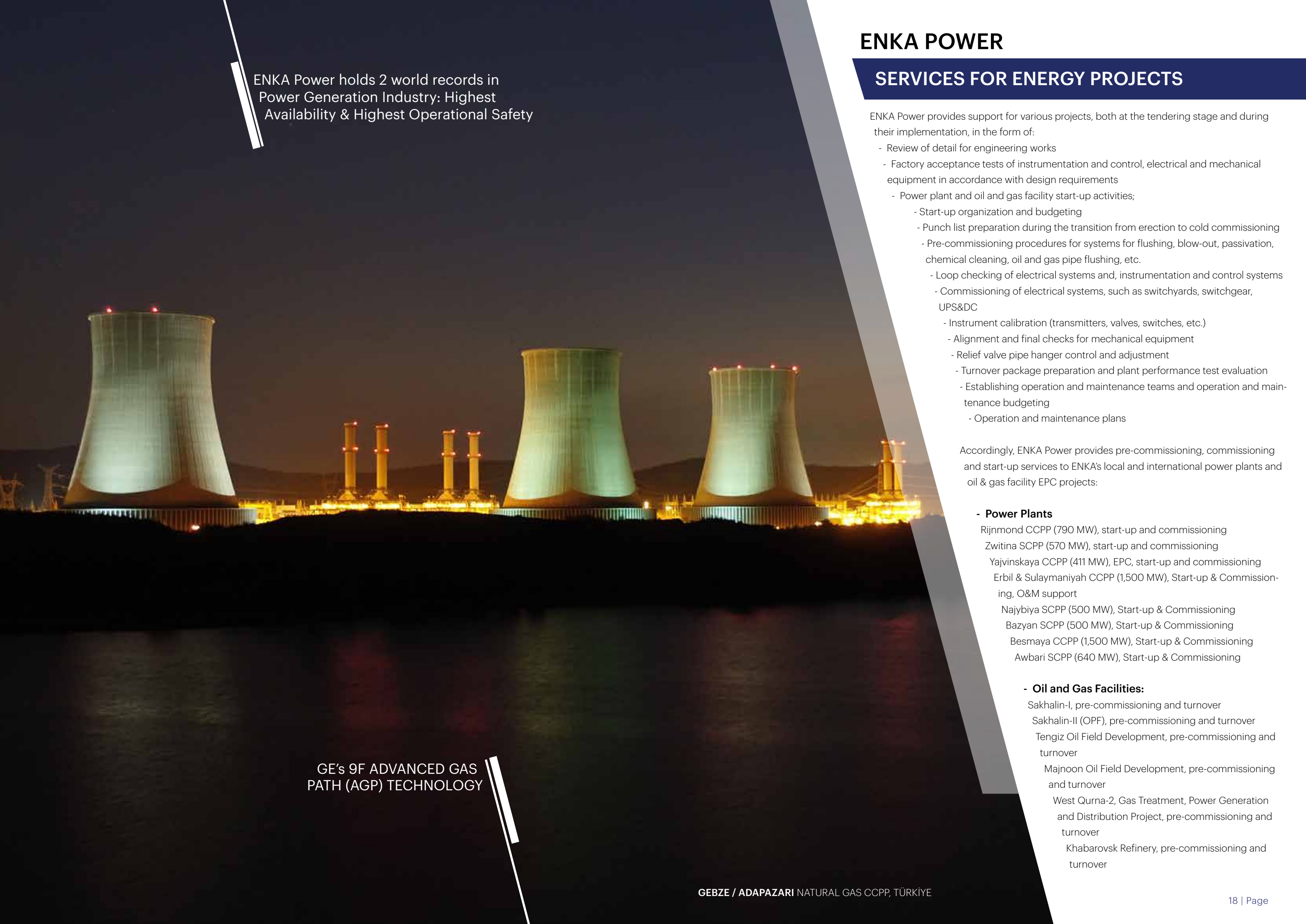
PLANTS UPGRADES

ENKA has been continuously improving its power plants with upgrades to ensure higher availability and reliability, lower emissions, better performance and greater flexibility. With this purpose, the power plants implemented below upgrades with the support of in-house engineering services.

- Combustion Remote Tuning : Combustion stability and efficient combustion tuning
- Cooling Optimization Package : Upgrade of hardware and control system
- Compressor Enhancement Package : Enhanced compressor hardware integrity
- Rotor Life Time Management Program : Extended gas turbine life time and optimized maintenance
- Enhanced Hazardous Gas Detection System : Effective and proactive troubleshooting and updated equipment protection level
- Excitation System Upgrade : Hardware and software upgrade, effective and proactive troubleshooting and improved spare part management
- LSB Feathering : Enhanced steam turbine reliability and start-up flexibility

Furthermore, Advanced Gas Path (AGP) and DLN2.6+ Upgrade, the most recent industry-leading technological upgrade by General Electric (GE), have been successfully implemented to the gas turbines. AGP and DLN 2.6+ technology upgrades significantly enhance operating capability of gas turbines with following performance improvements:

- Higher performance and availability
- Lower CO₂ and NO_x emission and smaller carbon footprint
- Extended parts life with industry's longest gas path maintenance intervals
- Greater operational flexibility
- Additional peak output capability
- Broader operation range
- Increased start-up reliability and efficiency
- Reduced start-up time
- Extended turn-down for off-peak fuel savings and fast dispatch



ENKA Power holds 2 world records in
Power Generation Industry: Highest
Availability & Highest Operational Safety

GE's 9F ADVANCED GAS
PATH (AGP) TECHNOLOGY

ENKA POWER

SERVICES FOR ENERGY PROJECTS

ENKA Power provides support for various projects, both at the tendering stage and during their implementation, in the form of:

- Review of detail for engineering works
- Factory acceptance tests of instrumentation and control, electrical and mechanical equipment in accordance with design requirements
- Power plant and oil and gas facility start-up activities;
 - Start-up organization and budgeting
 - Punch list preparation during the transition from erection to cold commissioning
 - Pre-commissioning procedures for systems for flushing, blow-out, passivation, chemical cleaning, oil and gas pipe flushing, etc.
 - Loop checking of electrical systems and, instrumentation and control systems
 - Commissioning of electrical systems, such as switchyards, switchgear, UPS&DC
 - Instrument calibration (transmitters, valves, switches, etc.)
 - Alignment and final checks for mechanical equipment
 - Relief valve pipe hanger control and adjustment
 - Turnover package preparation and plant performance test evaluation
 - Establishing operation and maintenance teams and operation and maintenance budgeting
 - Operation and maintenance plans

Accordingly, ENKA Power provides pre-commissioning, commissioning and start-up services to ENKA's local and international power plants and oil & gas facility EPC projects:

- Power Plants

Rijnmond CCPP (790 MW), start-up and commissioning
Zwitina SCPP (570 MW), start-up and commissioning
Yajvinskaya CCPP (411 MW), EPC, start-up and commissioning
Erbil & Sulaymaniyah CCPP (1,500 MW), Start-up & Commissioning, O&M support
Najybiya SCPP (500 MW), Start-up & Commissioning
Bazyan SCPP (500 MW), Start-up & Commissioning
Besmaya CCPP (1,500 MW), Start-up & Commissioning
Awbari SCPP (640 MW), Start-up & Commissioning

- Oil and Gas Facilities:

Sakhalin-I, pre-commissioning and turnover
Sakhalin-II (OPF), pre-commissioning and turnover
Tengiz Oil Field Development, pre-commissioning and turnover
Majnoon Oil Field Development, pre-commissioning and turnover
West Qurna-2, Gas Treatment, Power Generation and Distribution Project, pre-commissioning and turnover
Khabarovsk Refinery, pre-commissioning and turnover

CONTRACTING PROJECTS

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MISURATA 650 MW SIMPLE CYCLE POWER PLANT, LIBYA

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NIZHNEKAMSK 495 MW COMBINED CYCLE POWER PLANT, RUSSIA

KAZAN 250 MW COMBINED CYCLE POWER PLANT, TATARSTAN - RUSSIA

SAMAWA 750 MW COMBINED CYCLE POWER PLANT - PHASE 1, IRAQ

DHI QAR 750 MW COMBINED CYCLE POWER PLANT - PHASE 1, IRAQ

BESMAYA 1,500 MW CCPP PROJECT, IRAQ

SULAYMANIYAH 1,500 MW COMBINED CYCLE POWER PLANT, IRAQ

ERBIL 1,500 MW COMBINED CYCLE POWER PLANT, IRAQ

NAJYBIA 500 MW GAS TURBINE POWER PLANT, IRAQ

BAZIAN 500 MW SIMPLE CYCLE POWER PLANT, IRAQ

BEREZOVSKAYA 800 MW COAL FIRED POWER PLANT, RUSSIA

YAJVA STATE DISTRICT 411 MW CCPP, RUSSIA

ZWITINA 570 MW GAS TURBINES POWER PLANT, LIBYA

AWBARI 640 MW GAS TURBINE POWER PLANT, LIBYA

RIJNMOND 790 MW ENERGY CENTER, THE NETHERLANDS

AFŞİN ELBİSTAN B 4 X 360 MW THERMAL POWER PLANT, TÜRKİYE

SOUTHWEST 1,830 MW THERMIC POWER PLANTS, TÜRKİYE

TRAKYA 1,200 MW NATURAL GAS CCPP, TÜRKİYE

BURSA 1,400 MW NATURAL GAS CCPP, TÜRKİYE

BESMAYA 1,500 MW CCPP, IRAQ

BAZIAN-II POWER PLANT CONVERSION PROJECT



PROJECT DETAILS

LOCATION
Sulaymaniyah, Iraq

OWNER / CLIENT
Taurus Arm for Power Generation

PROJECT DURATION
July 2025 – February 2028

CONTRACT TYPE
Lump Sum, Turnkey

PROJECT DESCRIPTION

ENKA has signed a lump sum turnkey contract with Taurus Arm for Power Generation for the conversion of the existing Bazian Power Plant into a combined cycle facility, located in Sulaymaniyah, Iraq.

The project involves the conversion of an existing approximately 490 MW@23degC simple cycle power plant - currently operating with two General Electric 9F gas turbines using natural gas and fuel oil - into a high-efficiency 740@23degC MW combined cycle power plant. The scope includes the addition of two unfired heat recovery steam generators (HRSGs), one steam turbine generator, W-type air-cooled condenser (ACC) and all associated auxiliaries and balance of plant (BoP) systems. This ACC is the first and biggest W-type air-cooled condenser(ACC) in Iraq.

The upgraded Bazian-II Power Plant is expected to deliver increased power output and improved thermal efficiency without requiring additional fuel input, contributing to the sustainable energy development of the region.

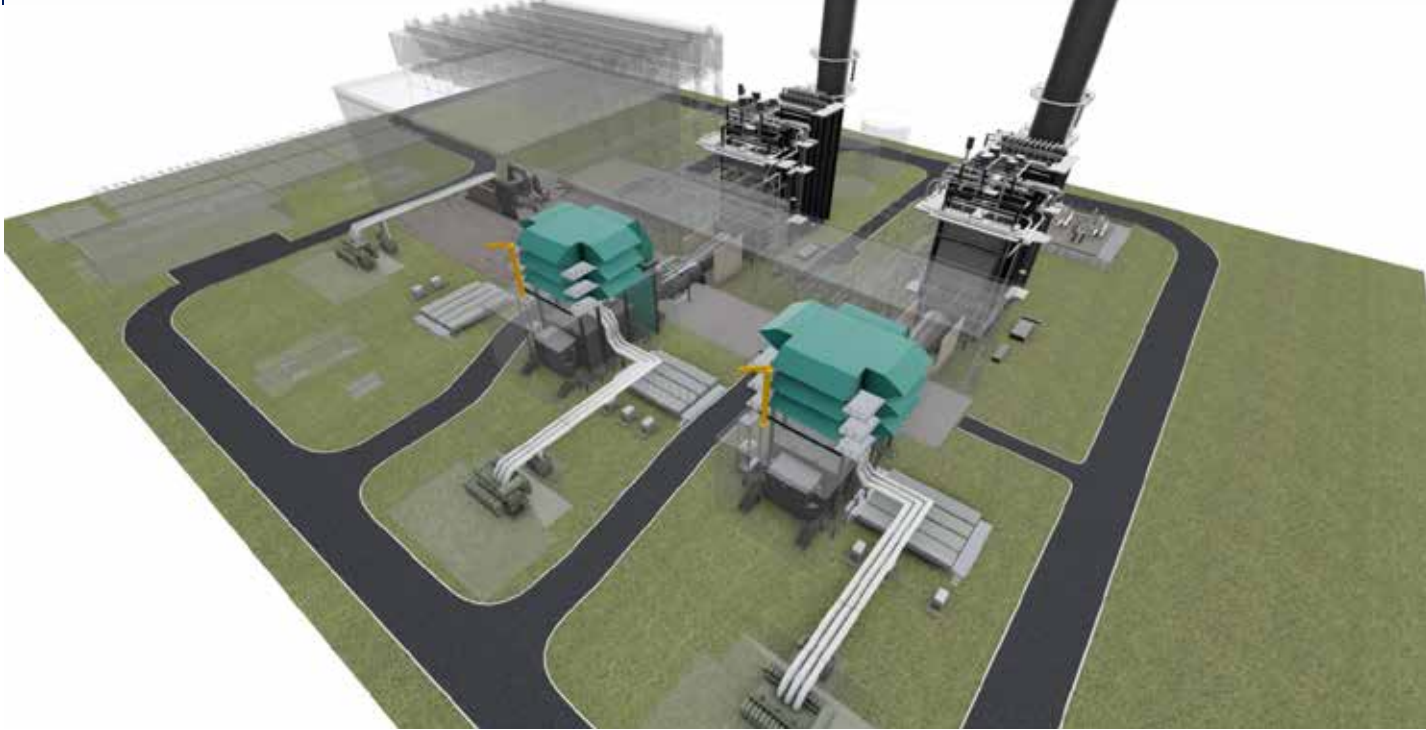
This project marks a significant step toward meeting the growing electricity demand in the region while enhancing energy efficiency and environmental performance.

ENKA SCOPE OF SERVICES

Under the terms of the contract, ENKA is responsible for the planning, design, detailed engineering, procurement, construction, installation, interconnection, pre-commissioning, commissioning, start-up, performance testing, and final handover of the upgraded facility to the Owner.

As part of the contract, ENKA will also provide training for the owner’s operation and maintenance personnel and prepare comprehensive operation and maintenance manuals to ensure the plant’s long-term, safe, and reliable performance.

NASIRIYAH 921.8 MW COMBINED CYCLE POWER PLANT



PROJECT DESCRIPTION

The consortium formed by our 100% owned subsidiary Entrade GmbH and Siemens Energy Global GmbH & Co. KG has signed a turnkey contract with the Ministry of Electricity of Iraq for the construction of a 921.8 MW natural gas combined cycle power plant in Nasiriyah, Iraq.

The plant will be constructed on a lump sum turnkey basis and the scope of the consortium includes engineering, procurement, construction and commissioning works for the power plant to have a safe and reliable operation in accordance with the EPC contract terms. The project is based on a power island configuration for two (2) Siemens SGT5-4000F gas turbines, one (1) SST5-5000 steam turbine, three (3) air-cooled generators SGen5-2000P for the steam & gas turbines, and two (2) drum type heat recovery steam generators. In addition to power block equipment, air cooled condenser, 132 kV gas insulated switchgear, step-up transformers and other BoP mechanical and electrical equipment will also be provided.

The gas turbines are capable of using only natural gas and H2 as an optional future source.

The project helps to meet the urgent power needs of Iraq and improve the living conditions in the cities and surroundings.

ENKA SCOPE OF SERVICES

ENKA's scope of work consists of design, detailed engineering, procurement and delivery of all project material and balance of plant equipment; installation and construction, interconnection, pre-commissioning, commissioning & start-up, demonstration of parallel operation with the grid at the required net output, training of the operating and maintenance personnel, and preparation of integrated operation and maintenance manuals according to the division of work with Siemens for the power plant.

PROJECT DETAILS

LOCATION
Nasiriyah - Iraq

OWNER / CLIENT
The Ministry of Electricity of Iraq

PROJECT DURATION
Mar 2026 – July 2029

CONTRACT TYPE
Lump Sum, Turn-key

NORTH BENGHAZI 1,320 MW SIMPLE CYCLE POWER PLANT



PROJECT DETAILS

LOCATION
Benghazi, Libya

OWNER / CLIENT
General Electricity Company of Libya (GECOL)

PROJECT DURATION
May 2024–July 2028

CONTRACT TYPE
Lump Sum, Turnkey

PROJECT DESCRIPTION

The contract had been signed between General Electricity Company of Libya (GECOL) and ENKA on May 27th, 2024. The project entails the construction of a simple cycle power plant, with a gross output capacity of up to 1320 MW in North Benghazi.

The project will be constructed by ENKA on a “turnkey” basis and the scope of work includes all required engineering, procurement, construction, erection, installation and commissioning works for the safe and reliable operation of the power plant under all conditions in accordance with the terms of the contract. In addition, ENKA İnşaat ve Sanayi A.Ş. will provide training to the employees of the General Electricity Company of Libya, which will operate the power plant.

The project is based on a power island configuration for 4 sets of SGT5-PAC 4000F Siemens gas turbines and turbine generator units. The gas turbines are dual- fuel type; the main fuel will be natural gas and the backup fuel will be liquid fuel.

When completed, the power plant will generate an estimated 1320 MW of gross electricity at ISO conditions with natural gas based on current assumptions. The generated power will be transmitted to a new 400 kV gas-insulated substation (GIS) to supply Libyan national power transmission lines.



KAMENO SOLAR PHOTOVOLTAIC POWER PLANT



PROJECT DETAILS

LOCATION
Burgas - Bulgaria

PROJECT DURATION
Sep 2023 – July 2025

CONTRACT TYPE
Engineering, Procurement,
Construction (EPC)

PROJECT DESCRIPTION

Town Up 8 LTD, a wholly owned subsidiary of ENKA, undertook a Solar Photovoltaic Power Plant in Burgas, Bulgaria. With a capacity of 45 MWp, the plant was designed to have an annual electricity generation capacity of 63 GWh/year.

The investment project of the company was realized on a total area of 470,000 m2 and all construction works were carried out by subcontractors. The main quantities of the project within the project scope of work were as follows:

- › Approximately 80,000 solar panels
- › 120 inverters
- › Approximately 1,750 tonnes of steel structure
- › 1 Substation centre building
- › 8 units field transformer and switchgear centre
- › Approximately 600 km of solar cable.

The estimated completion duration of the project is about 15 months.

ENKA KIRKLARELİ ELEKTRİK ÜRETİM A.Ş.
850 MW NATURAL GAS COMBINED CYCLE POWER PLANT



PROJECT DESCRIPTION

ENKA Kırklareli Elektrik Üretim A.Ş., a wholly owned subsidiary of ENKA, has undertaken the construction of the 850 MW Natural Gas Combined Cycle Power Plant project in Kırklareli as its own investment and EPC contractor. The power plant will be based on 1x1x1 configuration, equipped with one GE's 9HA.02 gas turbine and hydrogen cooled generator (H78), one D650 steam turbine and air-cooled generator (A78), one triple pressure reheat heat recovery steam generator (HRSG) to be supplied by GE, one air cooled condenser (ACC), one gas regulating metering station (RMS), and all associated equipment and systems. Natural gas will be used as fuel and the plant will have an electricity generation capacity of 850 MW when commissioned.

Major Quantities	Commodity	UoM	Total
	Excavation	m ³	803,144
	Backfill	m ³	329,838
	Concrete	m ³	70,000
	Formwork	m ²	101,297
	Rebar	tons	8,051
	Steel Structure	tons	6,595
	Cladding	m ²	46,984
	Piping	tons	1,160

Type of Plant	Combined Cycle Power Plant
Capacity	850 MW
Type of Fuel	Primary: Natural Gas
Configuration	1 Gas Turbine (Model: 9HA.02) 1 Steam Turbine (Model: STF-D650) 1 Heat Recovery Steam Generator (Model: Heat Recovery Steam Generator (HRSG) three pressure reheat)

PROJECT DETAILS

LOCATION
Kırklareli - Türkiye

OWNER / CLIENT
ENKA Kırklareli Elektrik Üretim A.Ş.

PROJECT DURATION
Nov 2022 – Nov 2025

CONTRACT TYPE
Engineering, Procurement,
Construction & Commissioning
(EPCC)

DRADENAU COMBINED HEAT AND POWER PLANT



PROJECT DETAILS

LOCATION
Hamburg-Germany

OWNER / CLIENT
Hamburger Energiewerke GmbH

PROJECT DURATION
Sep 2021 – Feb 2026

CONTRACT TYPE:
EPC Contract with the Open Book Components

PROJECT DESCRIPTION

The ARGE Uniper-ENKA Dradenau (UEJV) partnership has undertaken the Dradenau Combined Heat and Power Plant (CHP) in the port area of the Free and Hanseatic City of Hamburg, Germany under the contract awarded by Hamburger Energiewerke GmbH (former Wärme Hamburg GmbH) on September 14th, 2021.

The partnership ARGE Uniper-ENKA Dradenau (UEJV) is the EPC contractor of the project as a fully integrated joint venture and is responsible for all deliverables and services for the Dradenau CHP plant such as planning, engineering, design, procurement, manufacturing, delivery, construction, erection, commissioning, testing and project management.

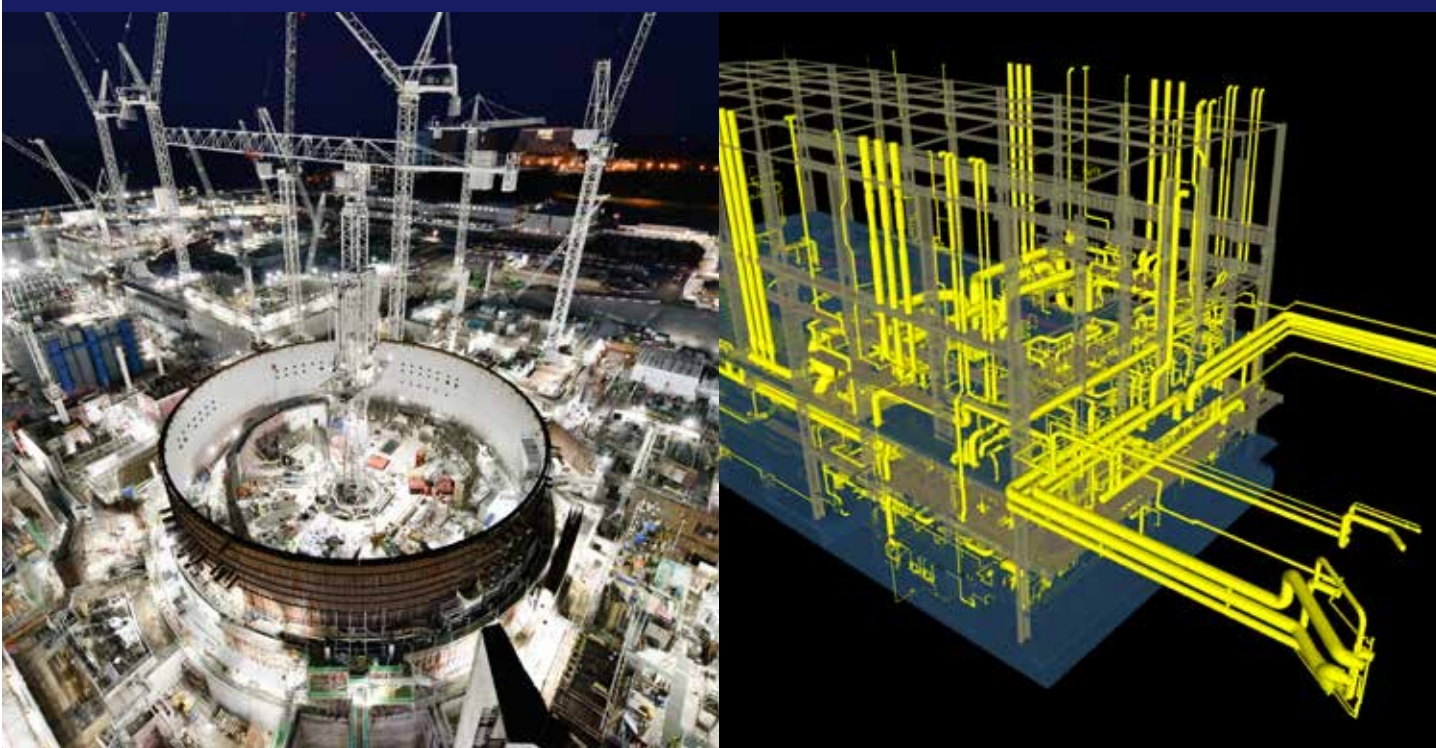
The duration of the contract is 39 months from signing. The project aims to replace the coal-fired CHP plant in Wedel by a new and climate-friendly CHP plant in Dradenau ("KWK-Anlage Dradenau").

The Dradenau CHP Plant will use heat from two sources:

- Heat from a natural gas-fired combined cycle power plant to be built at the site of the planned combined heat and power plant in Dradenau.
- Heat from third party feeders, such as heat from thermal waste recovery, industrial waste heat, waste heat from sewage treatment plant processes, etc.

The project is based on 2x2x1 configuration equipped with two Siemens SGT-800 gas turbines, one steam turbine, and two heat recovery steam generators (HRSG) with one additional gas steam generator. When completed, the plant will achieve an electrical output of 180 MW and 260 MW district heating capacity.

HINKLEY POINT C (HPC) NUCLEAR POWER PLANT TURBINE ISLAND - PIPING PREFABRICATION & ERECTION AND INSULATION & PAINTING WORKS



PROJECT DESCRIPTION

The first new nuclear power plant to be built in the UK in over 20 years, Hinkley Point C (HPC) is a 3,200 MW nuclear power plant with two on-site EPR reactors. The plant will provide zero-carbon electricity and help secure a diverse and balanced energy supply for the UK. Arabelle Services UK Ltd (former GE Steam Power Ltd) supplies two conventional power islands for Hinkley Point C nuclear power plant. The turbine halls will contain the Arabelle turbine, the largest and most powerful steam turbine to be in operation, and other critical equipment.

In September 2021, ENKA signed a contract with Arabelle Services UK Ltd for the prefabrication and erection of piping systems for the conventional power island. ENKA's responsibilities include the installation of high-pressure piping and their supports, the prefabrication, delivery, and installation of intermediate-pressure and low-pressure piping, the prefabrication and assembly of HDPE and GRP piping as well as their supports, and installation and assembly of fire protection equipment and piping systems. ENKA will also provide commissioning support and material management services to Arabelle Services UK Ltd. Pipe spool prefabrication, supply and prefabrication of pipe supports are to be carried out at ENKA subsidiary Cimtas Pipe's facilities, with the products shipped from there to the construction site.

In July 2024, ENKA entered into a contract with Arabelle Services UK Ltd for the check of design, procurement, and delivery of insulation materials, as well as the installation of thermal insulation for both piping and equipment in the turbine hall. Additionally, pipe painting and electrical heat tracing are included as optional scopes in the package.

PROJECT DETAILS

LOCATION:
Bridgwater, Somerset-UK

OWNER / CLIENT:
Arabelle Services UK Ltd.

PROJECT DURATION:
September 2021 – May 2027
(Piping Prefabrication & Erection Works)
July 2024 – November 2028
(Insulation & Painting Works)

CONTRACT TYPE:
Fixed Lump Sum & Re-measured Quantities

TRIPOLI WEST 671 MW SIMPLE CYCLE POWER PLANT



PROJECT DETAILS

LOCATION
Tripoli-Libya

OWNER / CLIENT
General Electricity Company of Libya (GECOL)

PROJECT DURATION
May 2021–June 2025

CONTRACT TYPE
Lump Sum Turnkey

CONTRACT VALUE:
EUR 417 Million

SIGNIFICANT FEATURES / ACCOMPLISHMENTS:

The project helps meet the urgent power needs of Libya and improve the living conditions in the cities and surroundings.

The project was honored with the Merit Award in the Power/ Industrial category at the 2023 Global Best Projects Awards by ENR.

PROJECT DESCRIPTION

While the contract had been signed between General Electricity Company of Libya (GECOL) and Siemens - ENKA consortium on December 7th, 2017, the project commenced in May 2021 due to security concerns.

The project entails a simple cycle power plant with a gross output capacity of up to 671 MW. The plant was constructed on a lump sum turnkey basis and the scope of the consortium included engineering, procurement, construction and commissioning works for the power plant to operate safely and reliably under all conditions in accordance with the EPC contract terms.

The project is based on a power island configuration for 4 sets of SGT5-PAC 2000E Siemens gas turbines and turbine generators (CTG) units. The gas turbines are dual fuel type. The main fuel is light distillate oil (LDO) and the back-up fuel is natural gas planned for future use.

The works within the base scope of the main contract have been successfully completed and handed over to the owner.

In addition to the main contract scope, engineering, procurement, construction, testing and commissioning works for two units of 10,000 m3 light distillate oil (LDO) storage tanks and the fuel gas regulating and metering station (RMS) and final gas filtering skids have been awarded to the consortium as additional variation orders.

The variation orders would provide the owner with the following;

- Two units of 10,000 m3 LDO storage tanks, the owner will be able to store additional LDO for the operation of the plant with enhanced flexibility.
- Fuel gas regulating and metering station (RMS) and final gas filtering skids will allow the gas turbines to operate with natural gas when the gas will be available at the plant site.

The works within the additional variation orders are in progress.

UNIQUE CHALLENGES

The project was designed to operate under the difficult conditions of Libya with the most reliable technology in the market. Appropriate level of redundancy is included in each system so that no single auxiliary plant component failure shall

TRIPOLI WEST 671 MW SIMPLE CYCLE POWER PLANT

result in the total loss or limitation of the plant generating capability. ENKA's engineering team worked on the plant design to satisfy all of owner's needs while meeting the requirements of geographical conditions. The plant is designed for base load with light distillate oil and three shifts operation. The intended operating regime for the immediate future is base load, operating [7000] hours with maximum [50] starts per annum.

The fast-track agreement was signed with the owner under the requirement to provide electricity to Libya as quickly as possible therefore an aggressive schedule was targeted for the completion of the project, despite the most widespread Covid-19 pandemic.

ENKA SCOPE OF SERVICES

ENKA's scope of work consisted 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.

Siemens scope of supply, the simple cycle power island part of the plant is made up of 4 sets of Siemens gas turbine (SGT5-2000E), Siemens gas turbine generator (SGen5-100A), auxiliaries and mechanical systems (base module, dual fuel module, air intake structure, exhaust gas diffuser, generator cooling fin-fan cooler, lube oil fin-fan cooler, compressor cleaning unit, etc.), electrical equipment and control system (GT control system, 3 containers of power control centers, SEE/SFC transformers, CEMS unit, DCS system, etc.).

Type of Plant	Simple Cycle Power Plant
Capacity	671 MW
Type of Fuel	Primary: LDO, Back up: Natural Gas (In Future)
Configuration	4 sets of Siemens Gas Turbine (SGT5-2000E) and Turbine Generators
Gas Turbine Generator	Siemens Gas Turbine (SGT5-2000E) rating per unit: 187 MW

Major Quantities	Commodity	UoM	Total
	Excavation	m³	60,000
	Reinforced Concrete	m³	22,700
	Reinforcing steel	ton	2,300
	Structural Steel	ton	2,700



MISURATA 650 MW SIMPLE CYCLE POWER PLANT



PROJECT DETAILS

LOCATION
Misurata - Libya

OWNER / CLIENT
General Electricity Company of Libya (GECOL)

PROJECT DURATION
June 2021 – May 2025

CONTRACT TYPE
Lump Sum Turnkey

CONTRACT VALUE:
EUR 331 Million

SIGNIFICANT FEATURES / ACCOMPLISHMENTS:
Awarded with the “Distinction” prize by British Safety Council in “International Safety Awards 2023”.

PROJECT DESCRIPTION

While the contract had been signed between General Electricity Company of Libya (GECOL) and a consortium of Siemens - ENKA on December 7th, 2017, the project commenced in June 2021 due to security concerns.

The project entails the construction of a simple cycle power plant, with a gross output capacity of 650 MW. The plant was constructed on a lump sum turnkey basis and the scope of the consortium includes engineering, procurement, construction and commissioning works for the power plant to operate safely and reliably under all conditions in accordance with the EPC contract terms.

The project is based on a power island configuration for 2 sets of Siemens SGT5-PAC 4000F gas turbines and turbine generators (GTG) units. The gas turbines are dual fuel engines which use two types of fuel. The main fuel is natural gas (NG) and the back-up fuel is light distillate oil (LDO).

The commissioning of power island was completed and the reliability run test for unit 1 has commenced, while reliability run of the last unit was commenced within January 2023.

In addition to the main contract scope, engineering, procurement, construction, and commissioning works for a light distillate oil (LDO) treatment plant and a hydrogen generation system have been awarded to the consortium as additional variation orders.

The variation orders would provide the owner with the following;

- The LDO treatment plant could be able to be utilized as back-up fuel for the operation of the gas turbines.
- The hydrogen generation system will generate the hydrogen gas required for the cooling system of the generators of the power island system.

The works under the additional variation orders are in progress.

MISURATA 650 MW SIMPLE CYCLE POWER PLANT

UNIQUE CHALLENGES

The project was designed to operate under the difficult conditions of Libya with the most reliable technology in the market. The appropriate level of redundancy is included in each system so that no single auxiliary plant component failure shall result in the total loss or limitation of the plant generating capability. ENKA's engineering team worked on the plant design to satisfy all of owner's needs while meeting the requirements of geographical conditions. The plant is designed for base load with natural gas and three shifts operation. The intended operating regime for the immediate future is base load, operating [7000] hours with maximum [50] starts per annum. In addition, the plant is capable of operating maximum [1000] hours with maximum [5] starts per annum on base load with light distillate oil.

The fast-track agreement was signed with the owner under the requirement to provide electricity to Libya as quickly as possible therefore an aggressive schedule was targeted for the completion of the project, despite the most widespread Covid-19 pandemic.

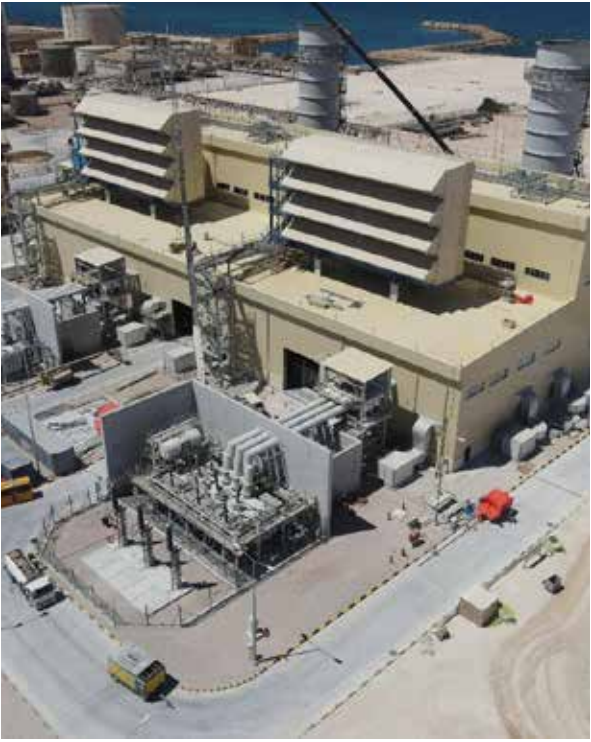
ENKA SCOPE OF SERVICES

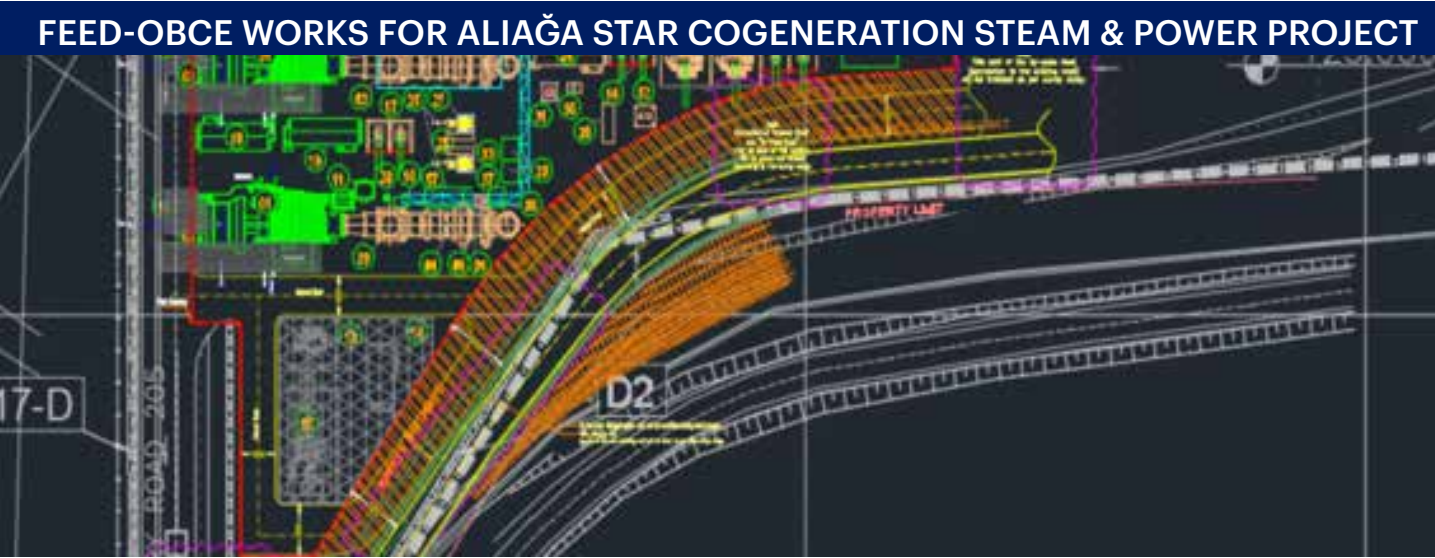
ENKA's scope of work consisted of design, detailed engineering, procurement, delivery of all project material, installation and construction, interconnection, pre-commissioning, commissioning & start-up, demonstration of parallel operation with the grid at the required net output, performance testing,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

Siemens scope of supply, the simple cycle power island part of the plant, is made up of sets 2 consists of Siemens gas turbine (SGT5-4000F), Siemens gas turbine generator (SGen5-2000H), auxiliaries and mechanical systems (base module, dual fuel module, air intake structure, exhaust gas diffuser, generator cooling fin-fan cooler, lube oil fin-fan cooler, seal oil fin-fan cooler, compressor cleaning unit, etc.), electrical equipment and control system (GT control system, 2 power control centers, SEE/SFC transformers, CEMS unit, DCS system, etc).

Type of Plant	Simple Cycle Power Plant
Capacity	650 MW
Type of Fuel	Primary Fuel Natural Gas / Backup: LDO
Configuration	2 Sets of Siemens Gas Turbine (SGT5-4000F) and Turbine Generators
Gas Turbine Generator	Siemens Gas Turbine (SGT5-4000F) rating per unit: 329 MW

Major Quantities	Commodity	UoM	Total
	Excavation	m³	80,000
	Reinforced Concrete	m³	19,000
	Reinforcing steel	ton	2,000
	Structural Steel	ton	2,000





PROJECT DETAILS

LOCATION
İzmir - Türkiye

OWNER / CLIENT
SOCAR Türkiye Akaryakıt Depolama A.Ş.

PROJECT DURATION
June 2020 - Feb 2021

PROJECT DESCRIPTION

The Joint Venture (JV) between ENKA-ÜSTAY (ÜSTAY YAPI TAAHHÜT VE TİCARET AŞ.) was awarded the Front End Engineering Design and Open Book Cost Estimation works for the Aliğa STAR Cogeneration Steam and Power Project.

The JV prepared the FEED package including the Open Book Cost Estimation (OBCE) study as a second and final stage of the project's bid process that would be the basis of the Contractor's EPC commercial proposal.

The FEED-OBCE works covered the conceptual and basic design, the Open Book LSTK Price Development of the STAR Cogeneration Plant based on two different Gas Turbine Generator technologies (Siemens' SGT-800-57 and GE's 6F.03) as well as support to owner in obtaining the permits.

Type of Plant	Cogeneration Steam & Power Plant
Cogeneration Cycle	80 - 100 MW electrical output, single pressure level 200t/h process steam
Combined Cycle	90 - 110 MW electrical output, in total 160-180 t/h of steam at several pressure levels



NIZHNEKAMSK 495 MW COMBINED CYCLE POWER PLANT, RUSSIA



NIZHNEKAMSK 495 MW COMBINED CYCLE POWER PLANT

PROJECT DETAILS

LOCATION
Nizhnekamsk, the Republic of Tatarstan - Russia

OWNER / CLIENT
Public Joint-Stock Company "Nizhnekamskneftekhim" (A member of TAIF Group)

PROJECT DURATION
Aug 2023 - Oct 2022

CONTRACT VALUE:
EUR 349 Million

SIGNIFICANT FEATURES / ACCOMPLISHMENTS:

Awarded with the "Distinction" prize by British Safety Council in "International Safety Awards 2020"

Selected as "Award of Merit" winner in ENR's 2021 Global Best Projects competition in the Power / Industrial Category

PROJECT DESCRIPTION

ENKA and Siemens entered into a consortium agreement for the project on January 12th, 2017 to undertake the construction of the Nizhnekamsk Combined Cycle Gas Turbine Thermal Power Plant (CCGT-TPP) awarded by Nizhnekamskneftekhim under a contract dated December 18th, 2017. The plant is constructed in the industrial hub in the southeast of the city of Nizhnekamsk, on the left bank of the Kama River in the Republic of Tatarstan in the Russian Federation. The contract of the project on the basis of EPC includes engineering, manufacturing, delivery to site, erection and painting works, operation, commissioning, start-up and testing of the plant. The plant has a configuration of 2 gas turbines, 1 steam turbine and 2 heat recovery steam generators (HRSGs). The main fuel is natural gas, whereas the associated gas derivatives (syngas) that are by-products of Nizhnekamskneftekhim's production processes are also used as fuel. Engineering, procurement and construction works were completed as of December 31st, 2021. Also, start-up and commissioning works have been fully completed and the official operation permit has been obtained as of October 17th, 2022. A total of 1,711 days and approximately 9,500,000 person-hours were spent without lost time incident (LTI) until the project completion date of October 17th, 2022.

ENKA SCOPE OF SERVICES

The works were performed on an engineering, procurement and construction (EPC) basis. They include engineering, manufacturing, deliveries to site, erection and painting works and the operation, commissioning, start-up and testing of the plant.

Type of Plant	Combined Cycle Power Plant
Capacity	495 MW
Type of Fuel / Configuration	Syngas / 2x2x1
Gas Turbine Generator	Siemens Unit: 2 Sets, Model: SGT5-2000 Gas Turbines
Steam Turbine Generator	Siemens Unit: 1 Set, Model: SST-600
HRSG	TBD Unit: 2 Sets, Model: SST-600
Cooling Type	Natural Draft Cooling Tower



KAZAN 250 MW COMBINED CYCLE POWER PLANT

PROJECT DESCRIPTION

ENKA and Siemens Energy had formed a consortium for the implementation of 250 MW Combined Cycle Power Plant in Kazan in the Republic of Tatarstan, the Russian Federation for PJSC Kazanorgsintez. The contract was signed between Siemens Energy and the client on October 2nd, 2019 for the delivery, installation and commissioning of one SGT5-2000E gas turbine, one SST-600 steam turbine, one heat recovery steam generator and all associated systems.

ENKA SCOPE OF SERVICES

Within the framework of this "Cooperation Agreement" ENKA is to perform the engineering, procurement, construction and commissioning (EPCC) works. Siemens is to supply the gas and steam turbines and to construct the high voltage lines as well as the switchyard.

The plant will be capable of using natural gas as the primary fuel and the associated gas derivatives (syngas) that are by-products of PJSC Kazanorgsintez's production processes. The project consists of 4 divisions:

- Combined cycle gas turbine, main construction area,
- Linear facility; utility and gas pipelines (5 pipelines up to 3.5 km),
- Gas mixing station and 2 gas pipelines in the territory of the client's existing facility,
- Connection to switchyard and electricity distribution works (in the Siemens Energy's scope).

Type of Plant	Combined Cycle Power Plant
Capacity	250 MW
Type of Fuel / Configuration	Main Fuel: Natural Gas, with associated gas derivatives (syngas) 1x1x1
Gas Turbine Generator	Siemens Unit: 1 Set, Model: SGT5-2000E Gas Turbine
Steam Turbine Generator	Siemens Unit: 1 Set, Model: SST-600
HRSG	TBD (design and procurement process ongoing)
Cooling Type	Wet Type Natural Draft

PROJECT DETAILS

LOCATION
Kazan - Tatarstan, Russia

OWNER / CLIENT
PJSC Kazanorgsintez

PROJECT DURATION
Aug 2023 – Aug 2025

CONTRACT TYPE
Lump Sum Turn Key

SAMAWA 750 MW COMBINED CYCLE POWER PLANT - PHASE I



PROJECT DETAILS

- LOCATION:
Samawa - Iraq
- OWNER / CLIENT:
Ministry of Electricity of Iraq
- PROJECT DURATION:
Mar 2019 - June 2021
- CONTRACT TYPE:
Lump Sum-Turnkey
- CONTRACT VALUE:
US\$ 336 million
- SIGNIFICANT FEATURES / ACCOMPLISHMENTS:
- Awarded with the Distinction” prize by British Safety Council in “International Safety Awards 2021”
 - Selected as “Award of Merit” winner in ENR’s 2022 Global Best Projects competition in the Power Category
 - A total of 8.4 million person-hours and 1,613 days had been worked on the project without any lost time incident (LTI).

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 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 envisages 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.

ENKA SCOPE OF SERVICES

ENKA was 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 also procured, manufactured and delivered the BoP equipment and provided 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.

DHI QAR 750 MW COMBINED CYCLE POWER PLANT - PHASE I



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 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 (4X125MW) 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 envisages 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.

ENKA SCOPE OF SERVICES

ENKA was 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 also procured, manufactured and delivered the BoP equipment and provided construction services including the overall civil works, the piling works, the erection and installation of BoP and power block equipment, and the testing & commissioning activities required to achieve successful operation on a turnkey basis.

PROJECT DETAILS

- LOCATION:
Nasiriyah - Iraq
- OWNER / CLIENT:
Ministry of Electricity of Iraq
- PROJECT DURATION:
Mar 2019 - June 2021
- CONTRACT TYPE:
Lump Sum-Turnkey
- CONTRACT VALUE:
US\$ 335 million
- SIGNIFICANT FEATURES / ACCOMPLISHMENTS:
- A total of 8.7 million person-hours and 1,613 days had been worked on the project without any lost time incident (LTI).

BESMAYA 1,500 MW COMBINED CYCLE POWER STATION - BAGHDAD



PROJECT DETAILS

- LOCATION:
Baghdad - Iraq
- OWNER / CLIENT:
Mass Group Holding Ltd.
- PROJECT DURATION:
Oct 2014 – Feb 2018
- CONTRACT TYPE:
Lump Sum Turnkey
- CONTRACT VALUE:
US\$ 569 Million
- SIGNIFICANT FEATURES / ACCOMPLISHMENTS:
- The project helped to meet the urgent power needs of Baghdad and improve the living conditions in the Iraqi capital and surroundings.
 - First IPP Project in Central Iraq.
 - The number of person-hours worked without lost time incident (LTI) was 5.3 million.

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 centrum.

Besmaya Combined Cycle Project consists of 2 power blocks which are to produce 1,500 MW of power at 400 kV transmission level. Each block consists of two (2) GE 9F series combustion turbine generators which are to 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 is directed to Heat Recovery Steam Generators and the steam produced drives a Steam Turbine Generator. Waste heat is rejected using a combination of fin-fan coolers and wet cooling tower equipment. Other facilities which 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.

UNIQUE CHALLENGES

The project was designed as a world-class power generation facility utilizing the latest technology in the market. The appropriate level of redundancy is included in each system so that no single failure of an auxiliary plant component results in the total loss of the unit generating capability. ENKA's engineering team worked on the plant design to satisfy all of owner's needs and mitigated 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 was not possible to rely on the existing infrastructure in the area. Therefore, ENKA had established a self-sufficient temporary construction facilities complex at the jobsite to sustain construction works without any disruption or interruption.

BESMAYA 1,500 MW COMBINED CYCLE POWER STATION - BAGHDAD

One of the major challenges of the project was to work in a social environment suffering civil violence and instability. ENKA had prepared and implemented 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 was 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 were shipped to the jobsite through congested Umm Qasr port and partially northern routes. Significant planning and route surveys were 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 was a major challenge. ENKA leveraged 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 consisted 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 is made up of 4 GE 9F 3-series gas turbines and all auxiliaries. The combined cycle part of the plant consists 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.

Type of Plant	Combined Cycle Power Plant
Capacity	1,500 MW
Type of Fuel	Primary: Fuel Gas, Back up: Diesel
Configuration	2x(2x2x1)
Gas Turbine Generator	General Electric Unit: 4 Sets, Model: 9FA.03, Rating Per Unit: 265 MW
Steam Turbine Generator	General Electric Unit: 2 Sets, Model: D200 33.5" LSB, Rating Per Unit: 250 MW
HRSG	CMI Unit: 4 Sets, Type: Vertical - 2 Stages-HP, LP, with diverter damper and by-pass stack (101.48kg/s at 536.53C Rating: 7.08kg/s at 242.16C)
Cooling Type	Combination of Fin Fan Coolers and Wet Cooling Tower Wet Cooling Tower Capacity (12,626 kg/s, 14 cells)

Major Quantities	Commodity	UoM	Total
	Piping Erection	ton	3,000
	Equipment Erection	ton	35,000
	Cabling	m	1,000,000
	Concrete	m³	60,000
	Structural Steel	ton	9,000





PROJECT DETAILS

LOCATION:
Sulaymaniyah, Northern Region of Iraq

OWNER / CLIENT:
Mass Group Holding Ltd.

PROJECT DURATION:
July 2013 – July 2016

CONTRACT TYPE:
Lump Sum Turnkey

CONTRACT VALUE:
US\$ 434 Million

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 person-hours without a Lost Time Incident
- Global Best Project of 2017 by Engineering News-Record (ENR) under the Power/Industrial category

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.

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.

ENKA SCOPE OF SERVICES

The major works under the contract were 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 included 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.

Type of Plant	Combined Cycle Power Plant
Capacity	1,500 MW
Type of Fuel	Natural gas as the primary and Diesel as the secondary source
Configuration	2x(4x4x1)
Steam Turbine Generator	General Electric Unit: 2 Sets, Model: C7, Rating Per Unit: 252 MW
HRSG	CMI Unit: 8 Sets, Type: Vertical - Natural Circulation Cold Casing
Cooling Type	Air Cooled Condenser, GEA, Unit: 2 Sets, Type: Each with 40 cells

Major Quantities	Commodity	UoM	Total
	Piping Erection	ton	2,000
	Equipment Erection	ton	36,000
	Cabling	m	1,100,000
	Concrete	m³	45,000
	Structural Steel	ton	5,800



ERBIL 1,500 MW COMBINED CYCLE POWER PLANT



PROJECT DETAILS

LOCATION:
Erbil, Northern Region of Iraq

OWNER / CLIENT:
Mass Group Holding Ltd.

PROJECT DURATION:
Apr 2012 – Oct 2015

CONTRACT TYPE:
Lump Sum Turnkey

CONTRACT VALUE:
US\$ 488 Million

SIGNIFICANT FEATURES /
ACCOMPLISHMENTS:

- “First Conversion Project from Simple Cycle to Combined Cycle” in Iraq.
- “First Combined Cycle Power Plant” in Iraq.
- “Largest Power Plant” in Iraq with its 1,500 MW output.
- The plant is providing approximately 25% power demand of Northern Region of Iraq.
- 5 million person-hours without a Lost Time Incident.
- 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.

PROJECT DESCRIPTION

MGH - 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 Northern Iraq’s largest power plant. The plant is located about 20 km south of the city of Erbil, northern 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 consisted of the conversion of a live simple cycle plant to a combined cycle plant project under brownfield 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 on 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 security concerns. By organizing regular video conferences ENKA kept the designers up to date and involved in the site’s day-to-day activities. Another challenge was obtaining 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 1,500 MW COMBINED CYCLE POWER PLANT

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 included 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.

Type of Plant	Combined Cycle Power Plant
Capacity	1,500 MW
Type of Fuel	Natural gas as the primary and Diesel as the secondary source
Configuration	2x(4x4x1)
Steam Turbine Generator	General Electric Unit: 2 Sets, Model: C7, Rating Per Unit: 252 MW
HRSG	CMI Unit: 8 Sets, Type: Vertical - Natural Circulation Cold Casing
Cooling Type	Air Cooled Condenser, GEA, Unit: 2 Sets, Type: Each with 40 cells

Major Quantities	Commodity	UoM	Total
	Piping Erection	ton	1,850
	Equipment Erection	ton	36,000
	Cabling	m	1,050,000
	Concrete	m³	45,000
	Structural Steel	ton	6,000



NAJBIA 500 MW GAS TURBINE POWER PLANT



PROJECT DETAILS

- LOCATION:
Al Najybia, Basra - Iraq
- OWNER / CLIENT:
Ministry of Electricity, Iraq
- PROJECT DURATION:
May 2013 – May 2015
- CONTRACT TYPE:
Lump Sum Turnkey
- CONTRACT VALUE:
US\$ 271 million
- SIGNIFICANT FEATURES / ACCOMPLISHMENTS:
- 1 million person-hours 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 more hours of electricity per day.
 - Part of largest power investment (Mega Deal) by Iraqi government in the post war era.

PROJECT DESCRIPTION

The Najybia Power Plant Project, located near Basra, is part of a master plan developed and implemented by the 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 types of fuel, Heavy Fuel Oil (HFO), Natural Gas and Light Distillate Oil (LDO), complete with all Balance of Plant (BOP) systems to support the safe and efficient operation of CTG units. Heavy fuel oil (HFO) is used as the main fuel for CTG operation whereas; natural gas and light distillate oil (LDO) are used as backup fuels. The 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 the site by the owner.

UNIQUE CHALLENGES

The Najybia 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 person-hours without a Lost Time Incident”

NAJBIA 500 MW GAS TURBINE POWER PLANT

Location and high temperatures during summer months created unique challenges for the project workforce peaked at 1,400 people. ENKA set up and maintained a safe and high-quality job site inclusive of a good camp and provided high-quality catering services. 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 project site is located on the banks of the Shatt Al Arab River and is surrounded by water canals. Weak soil conditions necessitated a significant amount of piling for foundations. As part of the EPC Contract, ENKA through its piling specialist subsidiary Kasktas have installed Ø800mm piles over 65,000 meters in total length.

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 LFO 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.

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

Major Quantities	Commodity	UoM	Total
	Earthworks	m³	119,000
	Piling	m	69,000
	Concrete	m³	102,000
	Structural Steel	ton	1,600
	A/G Piping	ton	1,600
	Mechanical Equipment	ton	9,400
	Cabling	m	858,000
	Insulation & Paint	m²	70,000
	Buildings	m²	6,638



BAZYAN 500 MW SIMPLE CYCLE POWER PLANT



PROJECT DETAILS

- LOCATION:
Sulaymaniyah - Iraq
- OWNER / CLIENT:
Qaiwan Group
- PROJECT DURATION:
Sep 2014 – Mar 2016
- CONTRACT TYPE:
Lump Sum Turnkey
- CONTRACT VALUE:
US\$ 222 million
- 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 person-hours without a Lost Time Incident.

PROJECT DESCRIPTION

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

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

The power capacity of the plant is 500 MW generated by four GE-9E-3 gas turbines, an air-insulated switchyard of 132kV, a 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 the necessary number of employees to the job site took longer than originally anticipated in the contract schedule. ENKA with successful coordination of procurement, logistics and risk management activities managed to bring 1,500 trucks to the site in a very short time period and arranged their unloading at an extremely small laydown. 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 the contract schedule.

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

“Ability to supply of 15 days (47,000 m³) fuel oil on site,,

BAZYAN 500 MW SIMPLE CYCLE POWER PLANT



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.

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	

Major Quantities	Commodity	UoM	Total
	Piping Erection	ton	260
	Equipment Erection	ton	12,000
	Cabling	m	395,000
	Concrete	m³	25,000
	Structural Steel	ton	500



BEREZOVSKAYA 800 MW COAL FIRED POWER PLANT



PROJECT DETAILS

LOCATION:
Sharypovo, Krasnoyarsk Region
- Russia

OWNER / CLIENT:
E.ON Russia

PROJECT DURATION:
June 2012 – Sep 2015

CONTRACT TYPE:
Cost Plus Fee

CONTRACT VALUE:
US\$ 172 million

SIGNIFICANT FEATURES /
ACCOMPLISHMENTS:

- 9.24 million person-hours without Lost Time Incident.
- Construction of the third power block of 800 MW capacity resumed after 20 years of a halt due to the collapse of the Soviet Union.
- Plant capacity increased to 2,400 MW.
- Berezovskaya Power Plant is the only power plant in Russia with 800 MW power units where coal is used as fuel, all the rest of the heat power plants with same power units are operated using gas.
- Being fed with brown coal from the open pit mine that is 14 km away, Berezovskaya Power Plant is vital for development of the Eastern Siberia's power industry.

PROJECT DESCRIPTION

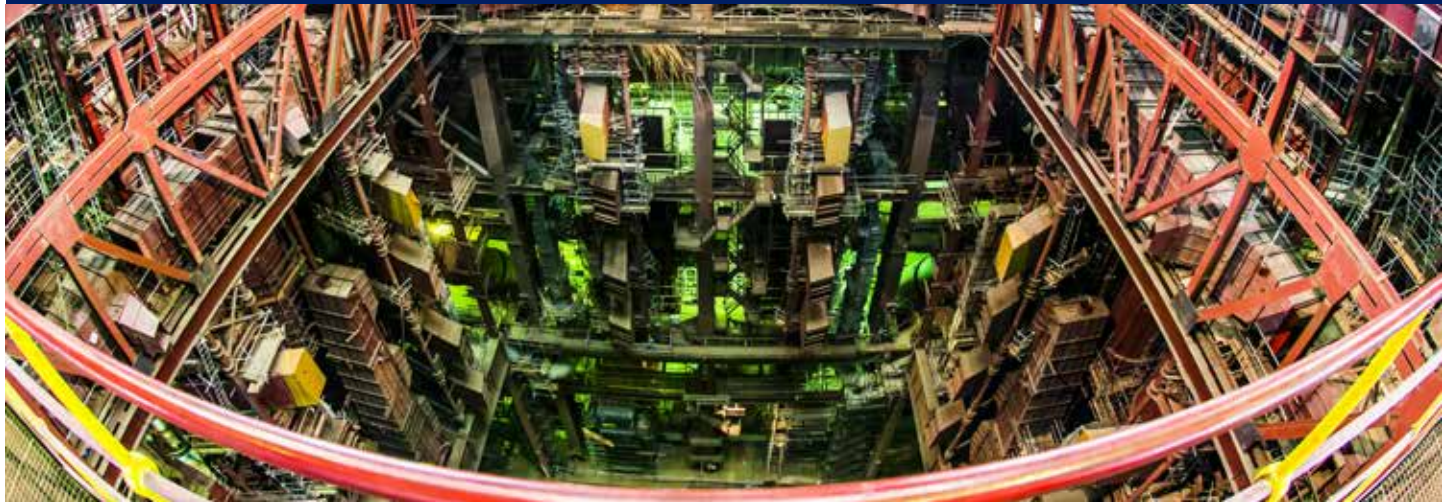
Berezovskaya Coal Fired Power Plant Project consisted of the construction of the 3rd power block with the capacity of 800 MW to increase the overall plant capacity to 2,400 MW. The first and the second blocks were built and put into operation in 1988 and 1991, respectively. The project for the construction of the third block went underway at the beginning of the 1990s however was halted due to the collapse of the Soviet Union. E.ON acquired the Berezovskaya power station in 2007, with the intention of resuming its expansion. The project included the full construction of a coal-fired 800 MW power block (except the main building itself which was already constructed along with 1st and 2nd power blocks) including the boiler, turbine, air preheaters as well as relevant piping, auxiliary equipment, supporting steel structures, dust/gas/air ducts, strengthening of the main building structures, renovation of the building façade.

Energoproekt of Russia was initially selected as the EPC contractor, however later in the project, E.ON Russia took responsibility and self-managed the project until the end.

UNIQUE CHALLENGES

The majority of the erection works at the Berezovskaya Power Plant Project was carried on inside a 72m x 81m x 117m (height) enclosed building right next to two operating coal-fired units. Inevitably; i) the works were executed at extreme heights causing safety hazards and, ii) coal dust from operating blocks was present at the workplaces, which endanger the health of the workers. ENKA overcame these hazards by prioritizing HSE in cooperation with the owner. Another challenge faced due to working inside an enclosed building was that the work fronts were limited due to specific erection sequences which also brought about interfaces between crews executing different lines of work. ENKA was able to manage this by proper planning of the works. Further, even though the erection was being done inside a closed building, the erection sequence and the erection methods governed that in order to minimize the number of lifts (circa 2,000 ea with the weight of lifted blocks differing from 50 kg to 185 tons), the elements were to be preassembled to blocks of maximum liftable weights and sizes. Hence the preassembly works were mainly executed outdoors, which required ENKA to use its vast winterization experience.

BEREZOVSKAYA 800 MW COAL FIRED POWER PLANT



ENKA SCOPE OF SERVICES

ENKA's scope as the mechanical erection works contractor for the construction of the Berezovskaya Coal Fired Power Plant Project consisted of pre-installation preparatory works, assembly works (enlarged assembly of the parts of the boiler and auxiliary equipment), installation works, preassembly of wall modules (boiler pressure parts), field welding joints touch-up painting works, and hydraulic testing of the boiler. ENKA workforce reached to 1,527 people during the peak periods of the project.

“9.24 million person-hours without Lost Time Incident.”

Major Quantities	Commodity	UoM	Total
	Ductwork Erection	ton	3,784
	Steel Structure Erection	ton	5,177
	Equipment Installation	ton	3,629
	Piping Erection	ton	3,074
	Pressure Parts Erection	ton	4,119
	Pressure Parts Preassembly	ton	1,387



YAJVA STATE DISTRICT 411 MW COMBINED CYCLE POWER PLANT



PROJECT DETAILS

LOCATION:
Yajva District, Perm Region - Russia

OWNER / CLIENT:
E.ON Russia

PROJECT DURATION:
July 2008 – Aug 2011

CONTRACT TYPE:
Lump Sum Turnkey

CONTRACT VALUE:
US\$ 460 million

SIGNIFICANT FEATURES / ACCOMPLISHMENTS:

- 2.03 million person-hours without a Lost Time Incident.
- ENKA with this project, has been awarded the Best Global Project Prize in the Power & Industrial category in 2013 Global Best Projects competition of the renowned Engineering News Record (ENR) magazine.
- The project was completed before the original contract schedule, within original budget as well as in full compliance with international and applicable Russian norms and standards consequently yielding to world class quality and full satisfaction of the owner.
- The project is the first extension to the Yajva Power Plant since 1965 and increased its capacity to 1,036 MW.
- First Siemens F Class Turbine commissioned in Russia with one of the nation's best operating records.

PROJECT DESCRIPTION

The Yajva Combined Cycle Natural Gas Power Plant Project consisted of a single shaft Siemens 1xSCC5-4000F-1S Power Train comprising of a Gas Turbine, Steam Turbine, Generator and Condenser, a vertical natural circulation type un-fired boiler manufactured by CMI as well as all auxiliary equipment such as steam/water cycle, a water treatment plant, controls systems, electrical systems, instrumentation, gas compressors, an administration building, a natural draft cooling tower and a 220 kV switchyard.

ENKA was selected as the EPC contractor by the owner.

UNIQUE CHALLENGES

Yajva CCPP Project represents a first within the “Privatization and Reform” program of Russia consisting of power plant projects with a new generation capacity in excess of 24,000 MWe in total. This strategic investment for the owner had an aggressive EPC schedule which included development and approval of the permit engineering (to meet TEO and Glasgovekspertiza requirements), in other terms, a feasibility study and full compliance with Russian standards and norms of the project’s technical designs and documents. Under these circumstances, ENKA’s project team did not have any options for rework or recovery from an error during the execution of the project. Committed to delivering the project on time and with the highest quality, the team quickly mobilized, planned and managed this challenging initiative working closely with the owner as a true project partner consistently responding to their concerns and preferences, as well as complying with the local norms and regulations.

Main plant equipment was manufactured according to European standards and needed approval for compliance with Russian standards and norms. ENKA established a Russian documentation team, in the early stages of the project, working closely with the owner on applications for various certifications such as Rostechnadzor (RTN) for conformity and permit to use.

The remote location of the project and the climate effects on heavy transportation were also one of the major challenges, considering the river channels to be used for equipment transport are open only between May and October. Further, the heavy equipment had to be road transported for 50 km from the unloading point to the job site.

YAJVA STATE DISTRICT 411 MW COMBINED CYCLE POWER PLANT

ENKA with its vast work experience in Russia, prepared a transportation plan together with a local design institute, in the early stage of the project, having all local authorities involved, in order to avoid any setbacks during operation.

During construction, unconventional erection methods utilized to gain schedule advantage. For instance, majority of the HRSG building structural steel erection was completed earlier than the erection of the HRSG itself, consuming more workhours and utilization of larger size cranes, however in return provided one month gain in schedule. For any material with delayed deliveries, alternatives were investigated and second orders were placed. Flexibility in work order was applied during start-up and commissioning of facilities.

In the end, the facility was commissioned and handed over to E.ON Russia, right on the original contract schedule and price, without any claims, without any Lost Time Incident (LTI) and in full compliance with international and applicable Russian norms, standards and permits.

ENKA SCOPE OF SERVICES

ENKA’s scope as the EPC contractor of the Yajva Combined Cycle Power Plant Project covered all the works including permitting, engineering, procurement, construction, start-up, testing and commissioning of the plant. ENKA workforce reached 860 people during the peak periods of the Project. ENKA further provided training for the O&M personnel who will be operating and maintaining the plant.

“ Best Global Project Prize in the Power & Industrial category in 2013 Global Best Projects competition of the renowned Engineering News Record (ENR) magazine. ”

Type of Plant	Combined Cycle Power Plant
Capacity	411 MW
Type of Fuel	Natural Gas
Configuration	1x1x1
Gas Turbine Generator	Siemens Unit: 1 Set, Model: SGTF5-4000F, Rating Per Unit: 300 MW
Steam Turbine Generator	Siemens Unit: 1 Set, Model: SST5-3000, Rating Per Unit: 125 MW
HRSG	CMI Unit: 1 Set, Type: Vertical Natural Circulation type Un-fired boiler, 2,567,520 kg/h
Cooling Type	Wet type mechanical draft Cooling Tower (12,626 kg/s, 14 cells)

Major Quantities	Commodity	UoM	Total
	Structural concrete	m³	11,426
	Piling	ea	1,078
	Steel Structure Erection	ton	3,074
	Piping Prefabrication & Erection	ton	959
	Main Equipment	ton	5,906
	Other Equipment Installation	ton	249
	Siding & Roofing	m²	22,964
	Cabling	km	357
	Conduits, cable trays, ladders	km	19
	Terminations	ea	61,305



ZWITINA 570 MW GAS TURBINES POWER PLANT



PROJECT DETAILS

LOCATION:
Zwitina, Benghazi - Libya

OWNER / CLIENT:
GECOL (General Electricity Company of Libya) / GESCO (Global Electricity Services Company of Libya)

PROJECT DURATION:
Apr 2008 – Aug 2010

CONTRACT TYPE:
Lump Sum Turnkey

CONTRACT VALUE:
EUR 89 million

SIGNIFICANT FEATURES / ACCOMPLISHMENTS:

- 1.7 million person-hours without a Lost Time Incident.
- On schedule completion.
- Project significantly lowered power shortages in the vicinity of project area and the region.
- Part of Strategic Investment by Libyan Government to cover growing Electricity Demand of Libya.

PROJECT DESCRIPTION

Zwitina Power Plant is designed for Simple Cycle Operation. The plant consists of 2 Combustion Turbine Generators (CTG) each nominally rated at 285 MW power-producing capacity at generator output terminals at ISO conditions. The base fuel is natural gas while diesel oil is also available as backup fuel. The CTG’s are Siemens Model SGT5-PAC-4000F.

Overall plant design, sub-systems design and selected equipment are suitable for future conversion into Combined Cycle Operation. Power island equipment (i.e. Combustion Turbine – Generator packages and their auxiliary packages) have been procured directly by GESCO (Global Electricity Service Company of Libya) while ET was responsible for complete plant engineering, procurement of Balance of Plant (BOP) equipment and material, natural gas pipeline and complete site works (construction and erection), commissioning and start-up.

UNIQUE CHALLENGES

The Zwitina Power Plant has been planned to assist elimination of the great power shortage, especially in Eastern Libya as well as to feed the newly established 400 kV National Electricity Network all over the Libya territory.

The project site is located just near the sea in a sandy coastal area. The underground water level is just 80 cm below the project ground level therefore piling and continuous dewatering are needed during civil construction. Comprehensive insulation systems have been applied against salty sea water absorption to the infrastructure of the facilities.

At the end of successful commissioning and putting into operation, each unit’s actual capacity is reached 305 MW. This figure is more than the design capacity (285 MW) and very rare and exceptionally good output compared to the other similar model turbine applications all over the world.

ZWITINA 570 MW GAS TURBINES POWER PLANT



ENKA SCOPE OF SERVICES

ENKA Teknik’s (a fully owned subsidiary of ENKA) scope as the EPC contractor of the Zwitina Power Plant Project covered all the works including engineering, procurement, construction, commissioning and start-up of the 2x285 MW Simple Cycle Power Plant. ENKA Teknik’s workforce reached 430 people during the peak periods of the project. Furthermore, ENKA Teknik provided onshore and offshore training for the owner’s O&M personnel who will be operating and maintaining the plant.

The specific scope of Services provided by ENKA Teknik included: complete Basic and Detail Design with in-house resources, supply of Balance of Plant system and equipment such as Main Step up, Unit and Auxiliary Distribution Transformers, 16” Natural Gas Pipeline with hot taping to 36” Gas Pipe, Pressure Reducing and Metering Station, Compressed Air System, Fire Fighting and Detection, Fire Water station with Fire Water ring, Completely Closed CTG Buildings, LDO forwarding Pump Station, LDO Treatment Plant, Ignition Gas Storage, Overhead Travelling Maintenance Crane (130 tons capacity), HV (220 kV), MV and LV systems with cabling, Distributed Control System with Overhead Line Protection and RTU extension to National Control Center of Libya.

Type of Plant	Simple Cycle Power Plant
Capacity	570 MW
Type of Fuel	Base fuel is natural gas while diesel oil is also available as backup fuel
Configuration	2x285 MW
Gas Turbine Generator	Siemens Unit: 2 Sets, Model: SGT5-PAC-4000F, Rating Per Unit: 285 MW

Major Quantities	Commodity	UoM	Total
	Reinforced Concrete	m³	14,091
	Structural Steel	ton	1,600
	Building Area	m²	5,872
	HV (220 kV) Cables	m	669
	MV, LV and Instrument Cables	mt.	154,000
	CS and SS Piping	mt.	16,000
	Turbine and Auxiliaries	ton	3,200
	Exhaust Stack and Auxiliaries	ton	650
	Transformers and Electrical Items	ton	900
	Other Mechanical Items and Equipment	ton	710
	Natural Gas Pipe Line with hot taping (16”)	km	11



AWBARI 640 MW GAS TURBINE POWER PLANT



PROJECT DETAILS

LOCATION:
South West of Sebha City in the Southern Region of Libya

OWNER / CLIENT:
General Electricity Company of Libya (GECOL)

PROJECT DURATION:
Dec 2010 – Nov 2017

CONTRACT TYPE:
Lump Sum Turnkey

CONTRACT VALUE:
EUR 180 million

SIGNIFICANT FEATURES / ACCOMPLISHMENTS:

- After the first force majeure occurred in Feb 2011, we were the first Contractor which had resumed site activities in October 2012, not only in the southern region but throughout the whole of Libya.
- Engineering, Procurement and Site Works progress had been ahead of Contractual Schedule by six (6) months and had reached up to 98% physical completion by the time the site had to be evacuated in September 2014 with great effort in lieu of the prevailing circumstances in Libya.

PROJECT DESCRIPTION

In line with the Libyan Government’s ambitious target of increasing its power generation capacity to meet the demand of industry and the growing population, the General People’s Committee of Electricity, Water and Gas (GPCOEWG) issued several tenders in 2007 for new power plant projects.

Sebha 855 (3x285) MW Gas Turbine Power Plant Project is one of these projects and is awarded to GESCO – ENKA Teknik Consortium by General Electricity Company of Libya (GECOL) in December 2007 and this contract scope is modified in February 2010 to establish 4x160 MW Gas Turbines Project located in Awbari Region. Awbari simple cycle gas power plant project aims for constructing a power plant with a total capacity of 640 MW and to be operated by crude oil as the main fuel & LFO. The plant is planned to be operated with gas in the future once the gas is available in the region.

The project is a turnkey project contracted between General Electric Company of Libya (GECOL) and Consortium of the Global Electricity Services Company (GESCO) and ENKA Teknik covering Engineering, Procurement, Delivery, Erection and Testing& Commission of the following:

- 4x160 MW Siemens turbine model SGT5-PAC 2000 E
- All related balance of plant equipment
- Process and non-process buildings
- Roads and fences
- Housing colony
- Crude oil transfer pipeline

AWBARI 640 MW GAS TURBINE POWER PLANT

UNIQUE CHALLENGES

The project had to be suspended first time in February 2011; hence, re-started in October 2012 and had to be suspended once again at 98% physical completion in September 2014 both owing to political turmoil in Libya.

We were the first contractor who resumed site activities not only in the southern region but also throughout the whole of Libya under unstable conditions of the country. Logistics to the site from other parts of Libya is a challenge where safety at the site and for all supplied materials are a major concern.

Although power had been of utmost importance for safety and limited site activities currently constrained with stocked construction material, ENKA struggled a lot while dealing with diesel supply due to the continuous run of generators. ENKA had successfully managed to continue the site works against the shortage of living and construction materials in the project region.

ENKA SCOPE OF SERVICES

Turn-key engineering, supply for BOP parts and complete plant (including 50 km of crude oil pipeline), construction, erection and commissioning of 4x160 MW Simple Cycle Power Generation Plant. The Power Island of the plant consists of 4 units of Siemens SGT5-PAC 2000E Combustion Turbine + SGen5-100A Generator sets.

The plant is designed and supplied to operate in simple cycle mode of operation, complete with all Balance of Plant (BOP) systems to support safe and efficient operation of CTG units.

- Other Supplies and Services
- Engineering, design and documentation for the complete project scope
 - Procurement and transportation
 - Construction and erection works (including vendor supervision)
 - Commissioning, testing, start-up and handover
 - Training services for plant operation & maintenance staff
 - Initial operation spare parts.

Major Quantities	Commodity	UoM	Total
	Earthworks	m³	95,114
	Concrete	m³	31,791
	Structural Steel	ton	5,300
	A/G Piping	ton	253
	Cabling	lm	206,500
	Mechanical Equipment	ton	2,860
	Insulation & Paint	m²	32,520
	Buildings	m²	11,000



RIJNMOND 790 MW ENERGY CENTER



PROJECT DETAILS

LOCATION:
Rotterdam - Netherlands

OWNER / CLIENT:
Rijnmond Energie CV

PROJECT DURATION:
Aug 2002 – June 2004

CONTRACT TYPE:
Lump Sum Turnkey

CONTRACT VALUE:
US\$ 362 million

SIGNIFICANT FEATURES /
ACCOMPLISHMENTS:

- First independent power plant in northwest Europe since the 1996 European Union Electricity Directive
- The plant is designed to export 125 ton/hr steam to the nearby Shell refinery and has capability to export 350 ton/hr.
- Substantial Completion was achieved as of June 20th 2004 within 22 months after NTP (Notice to Proceed) which represents 5 months schedule enhancement.

PROJECT DESCRIPTION

In 2002, ENKA in Joint Venture with its American partner Bechtel was awarded the Lump Sum Turnkey EPC contract for the Rijnmond Energy Center Project, a combined cycle cogeneration power plant in the Netherlands.

The Rijnmond Power Plant is a natural-gas-fueled facility with a nominal 790 MW net output and consists of two combustion turbine generators (CTGs), two fired heat recovery steam generators (HRSGs), and one lateral exhaust steam turbine generator (STG) in a 2x2x1 configuration. Plant cooling is provided by a mechanical draft, plume-abated cooling tower, with makeup water from the nearby Petroleum Haven, following processing through an Acti-floc clarifier.

ENKA SCOPE OF SERVICES

ENKA-Bechtel Joint Venture's scope as the EPC contractor of the Rijnmond Combined Cycle Power Plant Project covered all the works including design, engineering, equipment supply, construction and commissioning works of a 790 MW Natural Gas Combined Cycle Cogeneration Power Plant consisting of a 2x2x1 combined cycle arrangement.

ENKA workforce reached 860 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.

Type of Plant	Combined Cycle Power Plant
Capacity	790 MW
Type of Fuel	Natural Gas
Configuration	2x2x1
Shaft	Multi Shaft
Gas Turbine Generator	Siemens Unit: 2 Sets Model: V94.3A2 Rating Per Unit: 395 MW
Steam Turbine Generator	Alstom Unit: 2 Sets Model: DKYZZ3- 2N41B Rating Per Unit: 281 MW
HRSG	SFL Unit: 2 Sets Type: Horizontal-gas-flow, Natural Circulation type Three-pressure, reheat, each with 65m exhaust stack. HRSGs are equipped with duct burners to replace lost STG output when exporting steam.
Cooling Type	Wet type mechanical draft Cooling Tower

AFŞIN ELBİSTAN B 4 X 360 THERMAL POWER PLANT



PROJECT DESCRIPTION

In August 1998, EUAŞ, the state-owned company for electricity generation, awarded the turn-key construction of a conventional-type coal-fired thermal power plant, with a nominal capacity of 4x360 MW, to the consortium of Mitsubishi Heavy Industries Ltd. (MHI), ENKA İnşaat ve Sanayi A.Ş., Babcock Kraftwerkstechnik GmbH and GTT.

The project included the construction and installation of four steam turbojets, a flue gas desulphurization plant, a slag and ash handling system, a raw water supply system, a water treatment plant, a coal handling system, cooling system, all ancillary plants, generating plants with their auxiliaries, storage facilities and necessary workshops, operation and auxiliary buildings as well as all low, medium and high voltage switchgears, control and monitoring equipment and the power transformers.

The complete implementation of design as well as tests, trial runs, acceptance tests and maintenance until the temporary acceptance date, the training of all operating personnel and the provision of all necessary consumables were also included in the project.

ENKA SCOPE OF SERVICES

ENKA-MHI-BABCOCK-GTT (GAMA/TEKFEN/TOKAR JV) Consortium's scope covered design, engineering, equipment supply, construction, commissioning and putting into operation of 4x360 MW Afşin Elbistan B Thermal power plant.

ENKA's scope included the construction of the turbine building, cooling towers, process buildings, 154-380 kV switchyard, pipe and cable trenches; supply and construction of steel pipeline with a length of 2x33 km, high-level tank and pump station; construction and erection of ash handling facilities; pipe racks; supply and erection of the cooling water pipes; erection of the turbine-generator units, auxiliary facilities; electro-mechanical erection of the whole supply units (Balance of Plant) and erection of all the external process pipes.

PROJECT DETAILS

LOCATION:
Elbistan - Kahramanmaraş, Türkiye

OWNER / CLIENT:
Turkish Electricity Authority
General Directorate
Turkish Coal Authority General Directorate

PROJECT DURATION:
Jun 2000-Oct 2006

CONTRACT TYPE:
Lump Sum-Turnkey

MAIN QUANTITIES:
Total concrete works: 188,000 m³. Total equipment erection works: 45,000 tons

CONTRACT VALUE:
US\$ 1.6 billion

SOUTHWEST 1,830 MW THERMAL POWER PLANTS IN TÜRKİYE



PROJECT DETAILS

LOCATION:
Muğla & Kütahya - Türkiye

OWNER / CLIENT:
Turkish Electricity Authority

PROJECT DURATION:

Tunçbilek (1x150 MW)
Mar 1973 – Aug 1978

Yatağan (2x210 MW)
Apr 1977- June 1983

Yatağan (1x210 MW)
Oct 1980 – June 1985

Yeniköy (2x210 MW)
May 1981 – July 1987

Kemerköy (3x210 MW)
Sep 1984 – June 1995
(With suspensions)

CONTRACT TYPE:
Lump Sum-Turnkey

CONTRACT VALUE:
US\$ 91 million

PROJECT DESCRIPTION

TUNÇBİLEK (1X150 MW), YATAĞAN (3X210 MW), YENİKÖY (2X210 MW) AND KEMERKÖY (3X210 MW)

Following the decision of the Turkish government in the 1970s to utilize the lignite coal reserves in the southwest of Türkiye, ENKA accomplished the civil works and fabrication and erection of the steel structures of four thermal power plants with a total installed capacity of 1,830 MW.

Each of these plants are heavy industry structures with dams, water intake-discharge, water treatment and transmission systems, huge coal crusher units, several kilometres long coal and ash conveyors, large capacity boilers with coal grinding mills, heavy and sensitive turbine foundations that require a single-one-time construction, stacks built with special sliding form technology and with steel constructions in excess of 10,000 tons. Increasing awareness of environmental protection in the 1970s and 1980s led to the construction of taller stacks.

The main items of work in these US\$ 350 million power plants are 11 million m³ of excavation, 1 million m³ of concrete, and more than 50,000 tons of steel construction, fabrication and erection.

UNIQUE CHALLENGES

Yeniköy power plant's first unit was completed in December 1986. ENKA worked under brownfield conditions for the second unit which has then be synchronized in March 1987.

Kemerköy power plant's location had been selected to construct on a hilly land due to the sufficient soil carrying capacity, nearby to the lignite coal mines and to the sea for cooling water intake. ENKA successfully prepared the land before the construction by removing the hill and bringing the land to the project ground level as per the design requirement.

Concreting during hot weather has also become a challenge during the construction of a 300 m tall stack for Kemerköy Power Plant, nevertheless, ENKA completed the stack within only 120 days.

The projects of Tunçbilek, Yeniköy and Kemerköy consequently required the construction of the highest tall stacks in Türkiye which would also be the highest manmade structures of the country at the time. ENKA successfully managed the construction of the stacks with special sliding form technology. Kemerköy with its 300 m tall stack, it's still the highest among all coal-fired power plants in Türkiye.

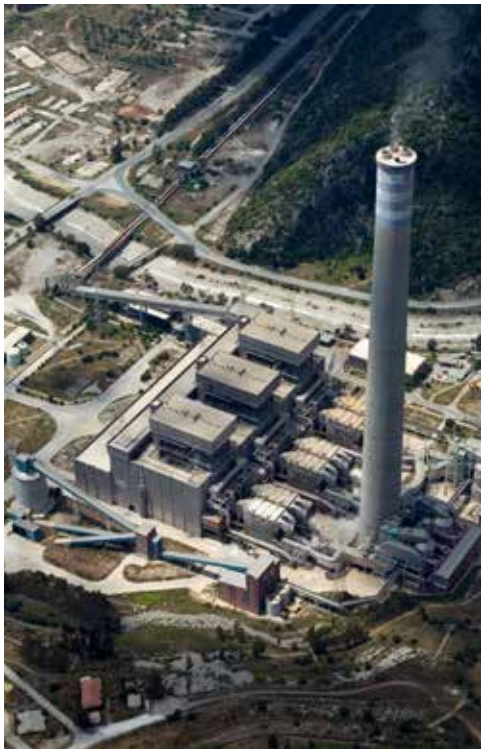
SOUTHWEST 1,830 MW THERMAL POWER PLANTS IN TÜRKİYE



ENKA SCOPE OF SERVICES

During the 1970s, when 150 MW Tunçbilek Power Plant construction was undertaken by ENKA in consortium with Elektrim Poland and KWU, it became obvious that Türkiye had to make many similar investments in the energy sector. In those days, there were only a few companies in Türkiye which could undertake the construction of projects with such difficult and high technology. In full consciousness of this fact, ENKA channelled its study and efforts into this sector. In fact, in a short period of time Yatağan, later Yeniköy and Kemerköy Power Plant sites were planned in the region where there are rich lignite reserves suitable for energy production. The 8x210 MW portion was tendered, three being in Yatağan, two in Yeniköy and three in Kemerköy. ENKA in consortium with Elektrim Poland consecutively converted these projects into energy-producing plants. By 1982, one-quarter of the total energy needs of Türkiye was supplied by these power plants.

The experience and skills gained through these projects enabled ENKA to extend the scope of its responsibility in subsequent turn-key power projects, either as a consortium member or a joint venture partner.



PROJECT DETAILS

SIGNIFICANT FEATURES / ACCOMPLISHMENTS:

- All of these power plants have been completed on or before schedule. ENKA, thus has proven its capacity and capability of providing construction services to highest prevailing international standards.

- By 1982, one quarter of the total energy needs of Türkiye was supplied by Yatağan, Yeniköy and Kemerköy Power Plants

- Kemerköy is not only a lean power plant project but it's a complex project including also wide range of supporting facilities, such as 550 m long cooling sea water supply system with 2.5 m diameter pipes and pump stations, 135 m long alongside quay, heavy duty harbor with mooring dolphins on the sea supported by steel piles, 16 km steam reformation, 1.5 km ash conveyors, 4.5 km coal conveyors, process water dam and ash dam at 60 m crest and 45 m crest heights, respectively.

- In Yeniköy Power Plant, a 400 m³ water reservoir was built in only three months.

- 200 m tall stack of Yeniköy was completed only in 80 days.

- 120 m tall stacks of Tunçbilek reached 200 m in Yeniköy, deserving the reputation of the tallest man-made structure in Türkiye in 1984, which was completed only in 80 days.

- 300 m tall stack construction has successfully completed in Kemerköy which obtained the tallest man-made structure reputation at the time which is still the tallest stack among all coal fired power plants in Türkiye.

TRAKYA 1,200 MW NATURAL GAS COMBINED CYCLE POWER PLANT



PROJECT DETAILS

- LOCATION:
Hamitabad - Kırklareli - Türkiye
- OWNER / CLIENT:
Turkish Electricity Authority
General Directorate.
- PROJECT DURATION:
Dec 1984 – Aug 1989
- CONTRACT TYPE:
Lump Sum Turnkey
- CONTRACT VALUE:
US\$ 316 million
- SIGNIFICANT FEATURES / ACCOMPLISHMENTS:
- First Combined Cycle Power Plant Project in Türkiye.

PROJECT DESCRIPTION

In the late 70s MTA, Mineral Investigation and Research Institute discovered natural gas resources in Trakya, northwest of Türkiye. In the early 80s T.P.A.O., Turkish Petroleum Inc., determined reserves up to 15 billion m3 of natural gas in the same area and soon afterwards the State Planning Organization commenced feasibility studies regarding alternative usages of the exploited gas. Finally, it was decided to erect a combined cycle power plant to utilize the natural gas in the most favourable way and TEK, Turkish Electricity Authority called for an international turn-key tender.

ENKA – Alstom (former BBC) Consortium was awarded the contract for a 1,200 MW Natural Gas Combined Cycle Power Plant. Depending on the new natural gas source-Gas Pipeline between the U.S.S.R. and Türkiye - the decision for the 100 % extension of the plant was given and construction works were started in December 1986.

Trakya Natural Gas Combined Cycle Power Plant is the first of its type in Türkiye and produces 7,2 billion kWh of electricity per year. The plant consists of 8 gas and 4 steam turbine each having an output of 100 MW and equipped with 2 Heller System Natural Draft Dry Cooling Towers each 135 m high. The plant has high thermal efficiency (~51 %) and the specific installation cost (cost/kW) is much lower than the comparable conventional steam power plants.

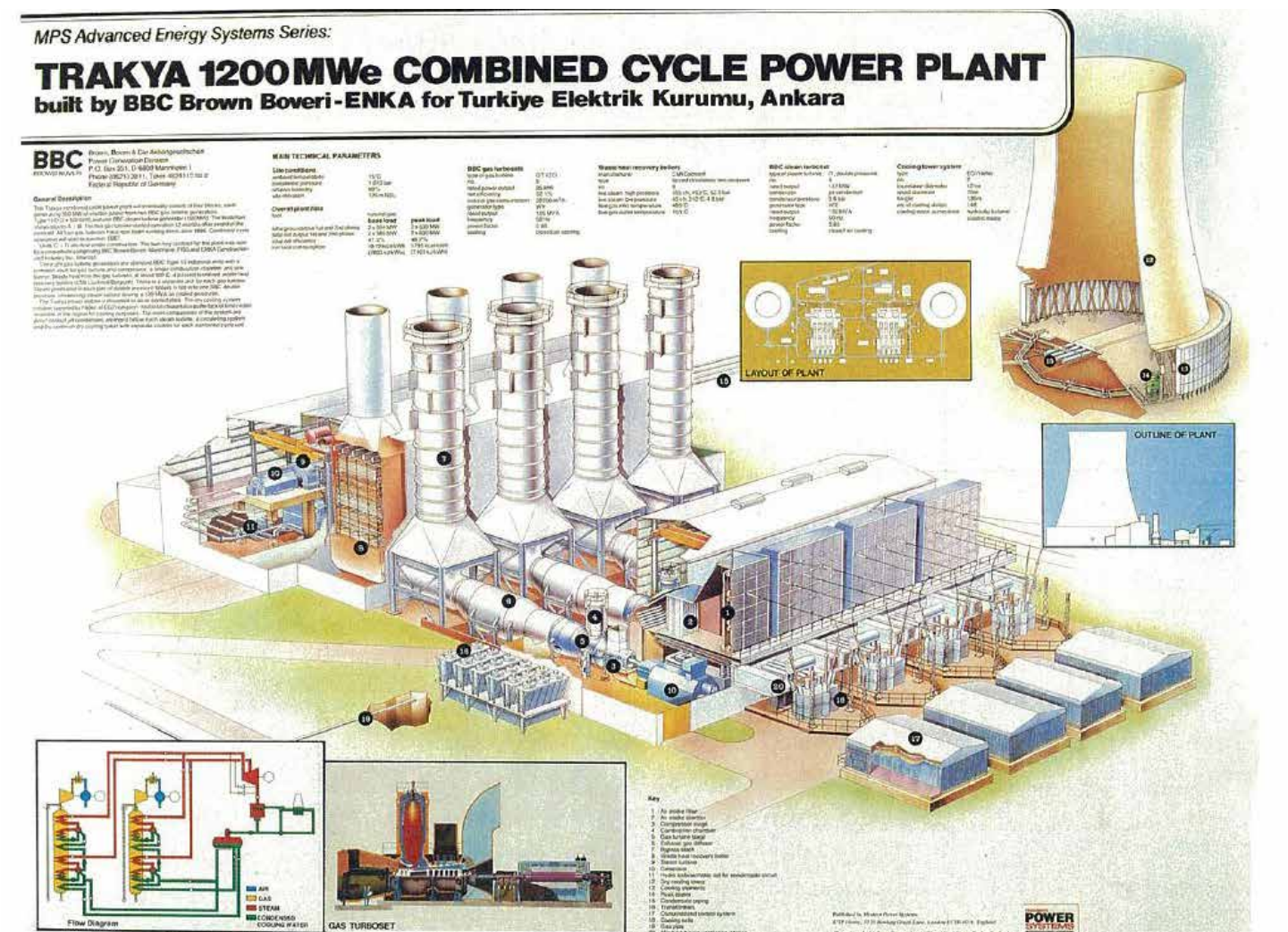
Major Quantities	Commodity	UoM	Total
	Earthworks	m³	1,250,000
	Concrete	m³	80,000
	Formwork	m²	200,000
	Reinforcing Steel	ton	7,000
	Structural Steel	ton	8,000
	Mechanical Equipment	ton	8,000
	Insulation & Paint	m²	43,000



TRAKYA 1,200 MW NATURAL GAS COMBINED CYCLE POWER PLANT

ENKA SCOPE OF SERVICES

- Gas Turbo-Sets,** Gas Turbine Building, Erection of 8 Gas Turbines and Auxiliaries, Manufacturing and Erection of 8 Exhaust Ducts and Chimneys (each 35 m high), Manufacturing and Erection of 8, 125 MVA 10,5 / 380 kV Step up Transformers and Auxiliary Transformers.
- Heat Recovery Steam Generators,** Boiler and Intermediate Building Design, Detailed Engineering, Manufacturing and Erection of 8 Boilers and Auxiliaries.
- Steam Turbo – Sets,** Steam Turbine and Cooling Water Pumphouse Building, Erection of 4 Steam Turbines and Auxiliaries, Manufacturing and Erection of 4, 125 MVA 10,5 / 380 kV Step up Transformers and Auxiliary Transformers, Partial Manufacturing and Complete Erection of Cooling Water System, Detailed Engineering and Construction of 135 m high 120 m base diameter 2 Natural Draft Dry Cooling Tower (concrete).
- Water Treatment Plant** (4x25 m³/h), Building, Design, Detailed Engineering, Manufacturing and Erection and Commissioning of all facilities and equipment for Treatment of Cooling and Make-up Water.
- Central Control Building,** Buildings, Complete Erection of all Switchgears and Control Panels and Desks.
- 380 kV/154 kV Switchyard,** Civil works and Steelstructure, Manufacture of Partial Equipment and Erection of the whole Switchyard, 380 kV Switchgear Building.
- Infrastructure,** Levelling of the Whole Area, Drainage Systems, Fire Fighting System, Cable Ducts including Cabling, and Roads.
- Auxiliaries,** HVAC systems, Raw Water Storage Basin, Fire Fighting Building, Oil Separator, Erection of Natural Gas Pipeline, Equipment Foundations.



BURSA 1,400 MW NATURAL GAS COMBINED CYCLE POWER PLANT



PROJECT DETAILS

LOCATION:
Ovaakça, Bursa - Türkiye

OWNER / CLIENT:
Turkish Electricity Generation &Transmission Co.Inc.

PROJECT DURATION:
May 1996-June 1999

CONTRACT TYPE:
Lump Sum-Turnkey

CONTRACT VALUE:
US\$ 512 million

MAIN QUANTITIES:
Excavation: 1,200,000 m³
Concrete: 92,000 m³
Formwork: 255,000 m²
Reinforcing Steel: 7,500 tons
Steel Structure: 6,000 tons
Mechanical & Electrical Equip. Fabrication: 2,500 tons
Mechanical and Electrical Equip. Erection: 40,000 tons

PROJECT DESCRIPTION

The Japanese-Turkish consortium of MHI-ENKA-MC-ITC was awarded the contract to build a 1,400 MW natural gas-fired combined cycle power plant in Bursa on a turn-key basis following a tender by TEAŞ in 1995. Using the latest technology, the Bursa Power Plant stood out as the largest and most efficient power plant of its period in Türkiye.

The project encompassed all civil works, sub and superstructures, and supply of auxiliary components. The scope of works also included the supply, installation, testing and putting into operation of the mechanical and electrical systems at the power plant. The main components were supplied from Japan by MHI. The project was financed by Japanese EXIM and a number of commercial banks.

The main plant consists of two power blocks. Each has a set of two combustion turbines/generators, two heat recovery steam generators, one steam turbine/generator and one closed cooling water system with a 135 m natural draft dry cooling tower.

The total net output of the combined cycle power plant is 1,409 MW, which is achieved by four gas turbines/generators each with a nominal capacity of 239 MW and two steam turbines/generators each with a nominal capacity of 238 MW. The annual power generation capacity of the plant is 10 billion kWh.



Major Quantities	Commodity	UoM	Total
	Earthworks	m³	1,250,000
	Concrete	m³	80,000
	Formwork	m²	200,000
	Reinforcing Steel	ton	7,000
	Structural Steel	ton	8,000
	Mechanical Equipment	ton	8,000
	Insulation & Paint	m²	43,000



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