

Energy Maintenance & Production Services



ENERGY MAINTENANCE

Driven by "pioneer attitude",
we follow our client's needs
through troubleshooting and lessons learned.
Our vision for innovation is based
on optimizing know-how capitalization
and on investments in new competencies skills.

Our company provides a wide range of activities, aimed to reduce asset life cycle costs in compliance with integrity goals. Support is given all along the production process: from wellhead to oil&gas treatment plant both in on-shore and off-shore sites.

Our aim is to provide turn-key solutions in the form of global contract based on full logistic means, necessary technical assets, technical support and permanent skilled staff, including proper local content strategies and training support.

Through a "full responsibility approach" we grant a wide range of technical solutions for any customer operational needs, such as:

- Operation & Maintenance
- General Maintenance Services
- Assistance to operation
- Rotating equipment maintenance
- Installation & Commissioning
- Maintenance and Inspection Engineering
- CMMMS
- Fabric maintenance
- Modifications, improvements and debottlenecking





TEMPA ROSSA, ITALY GENERAL MAINTENANCE

General Maintenance activities supporting the operations for TOTALENERGIES

Temparossa is a hydrocarbon field in the Southern Italy. Its current configuration consists in 6 well-sites with gathering network, one oil center and one LPG center.

Main assets:

- LPG centre
- Wellsites
- Flowlines
- Export pipelines
- Interconnection pipelines

Main activities for CPF and oilfield facilities:

- Preventive/corrective maintenance and inspection works
- Procurement of spare parts, tools, materials and services
- Clearance and logistics management
- Subcontractors management
- Fabric maintenance
- Modification, improvement and upgrades

Bonatti is involved since plant start-up.

MLE, ALGERIA CPF GENERAL MAINTENANCE SERVICES

General maintenance services, highly specialized technical assistance, HVAC, E&I, mechanic, shut down activities and well production services for FCP – FIRST CALGARY PETROLEUM (ENI)

- The field in the Berkine Basin has a daily production capacity of 9 million cubic metres (318 million cubic feet) of gas, 15,000 barrels of oil and condensate, and 12,000 barrels of LPG (liquefied petroleum gas)
- The field is located 1,000 kilometres (625 miles) southeast of Algiers

Main activities for CPF and oilfield facilities:

- Preventive/corrective maintenance and inspection works
- Procurement of spare parts, tools, materials and services
- Clearance and logistics management
- Subcontractors management





MELLITAH COMPLEX, LIBYA

GMS AND ASSISTANCE TO OPERATIONS

General Maintenance Services for MELLITAH OIL & GAS

The Mellitah Complex is one of the largest gas treatment plants in the world. It is located about 100 km west of Tripoli on the Mediterranean seashore.

The plant is constituted by two sections:

- Wafa Coastal Oil Plant (treats crude oil from Wafa Desert field and Sabratha Platform)
- NC41 Gas Plant (treats gas from Wafa Desert field and Sabratha Platform).

NC41 and Wafa Coastal Plant can produce about 11 BSCM/year of gas and about 120,000 BPD of oil. The crude oil is loaded into tankers via the Jetty and the SBM terminal. Gas from Sabratha Platform, after being treated to remove H₂S, and the gas from the Wafa Desert field are exported by the Greenstream Compressor Station.

Main features:

- Global service since 2004 (construction of the Complex also executed by Bonatti)
 - Maintenance engineering
 - Planning & scheduling
 - Spare parts management
 - Repairs management
 - Predictive, preventive, corrective maintenance execution
 - Assistance to operations
- Full partnering approach (client & contractor teams completely integrated)
- OEM remote assistance managed directly by Bonatti
- Plant modification & upgrades
- Plant shutdown & turnaround
- Training plan for local resources fully integrated in the scope of work

Bonatti living & operation yard:

- Capacity for more than 600 people
- Warehouse and storage yard for materials
- Workshop for pre-fabrication activities
- Equipments and tooling availability
- Offices & HSE training facilities



SABRATHA OFFSHORE PLATFORM, LIBYA MAINTENANCE MANAGEMENT ASSISTANCE CONTRACT

Maintenance management, procurement, field maintenance services and technical support for MELLITAH OIL & GAS

The platform is located 110 km offshore from the Mellitah Complex. It includes all the facilities required for preliminary separation and treatment of the gas produced from Bahr Essalam Field.

Plant capacity:

- GAS Export: 27.5 M m³/day
- FGC recovered gas: 450 KSm³/day
- Condensate Export: 4,620 m³/day

Main activities for CPF and oilfield facilities:

- Preventive/corrective maintenance and inspection works
- Procurement of spare parts, tools, materials and services
- Clearance and logistics management
- Subcontractors management

MELLITAH GAS COMPRESSOR STATION, LIBYA OPERATION & MAINTENANCE

Maintenance service and assistance to operations for GREENSTREAM

Gas from Sabratha Platform and the gas from the Wafa Desert field, after being treated to remove H₂S, are sent by the GreenStream Compressor Station to Sicily through a 600 km sub-sea pipeline.

The station delivers 30,000,000 scm of gas to Italy daily

Main features:

- Global service since 2004 (EPC of the compressor station also executed by Bonatti)
 - Maintenance engineering
 - Planning & scheduling
 - Spare parts management
 - Repairs management
 - Predictive, preventive, corrective maintenance execution
 - Assistance to operations
- Full partnering approach (client & contractor teams completely integrated)
- OEM remote assistance managed directly by Bonatti
- Plant modification & upgrades
- Plant shutdown & turnaround





WEST QURNA 2, IRAQ GENERAL MAINTENANCE SERVICES

Maintenance, repair, operation, modification and commissioning services for LUKOIL

The West Qurna 2 field is located in the Southern Iraq, near the Euphrates and the Tigris confluence, 85 km north-west from Basrah. It is one of the largest Iraqi oil fields and is believed to hold 43 billion barrels of recoverable reserves.

Main facilities involved:

- Central Processing Facilities (CPF)
- Well Pads (WP)
- Euphrates River Water Intake (WI)
- Gas Turbine Power Plant (GTPP)
- Pipelines (in- and outside of contract territory)
- Accommodation Camp (AC)

Main activities:

- Mechanical maintenance
- Electrical maintenance
- Instrument maintenance
- Services for pipeline systems
- Management of change (MOC)
- Workshop & overhaul services
- OEM vendor services
- GTPP operations
- Field power distribution system operation



BADRA FIELD, IRAQ OPERATION & MAINTENANCE

General Maintenance Service for CPF, oilfield facilities and gas turbine power plant for GAZPROMNEFT BADRA

The oil field is located 160 km southeast of Baghdad. The plant contains 3 oil trains and 2 gas trains that process the production from 22 offsite wells. The plant is fully self-sufficient, with power supply, water wells, RO units, air and nitrogen packages and fire station. Main plant components are backed up by redundant equipment to minimise downtime.

Main activities for CPF and oilfield facilities:

- Preventive/corrective maintenance and inspection works
- Procurement of spare parts, tools, materials and services
- Clearance and logistics management
- Subcontractors management

Power plant, main features:

- 5 Gas Turbines with total base load of 125MW
- The generated power supplies energy to Badra Oil Field, Badra Base Camp and Badra city
- The fuel gas used for power generation comes from the gas plant process itself
- The plant is equipped with Intake Air Cooling System (TIC), in order to maintain turbine base load of 25 MW during hot season
- The skid uses a refrigeration package with 3 screw compressors (800 KW each)

Main activities for power plant:

- General maintenance
- Combustion Inspections
- Hot gas path inspection
- Major overhaul
- Detailed inspections using borescope and vibration monitoring devices
- Technical support services for turbine troubleshooting
- Manpower for plant operation activities



PRODUCTION AREA MUNTENIA, ROMANIA GENERAL SURFACE SERVICES

Operation & maintenance, material management, facilities operation and firefighting services for OMV PETROM

In a geographic area of 50,000 km² Bonatti maintains a large network of hydrocarbon storage and transportation infrastructure.

Main assets:

- 8 oil treatment centers
- 2 gas treatment centers
- 3,400 km of pipelines
- 7 compression stations
- 11 tank farms and associated gathering lines
- 8 workshops with more than 40 tool machines
- 5 water and steam injection plants
- 700 km electric power lines
- 2,579 wells
- 1,000 people involved
- Establishment of a maintenance and engineering hub

Main activities:

- Preventive and corrective maintenance
- Repairs
- General overhauling
- defect detection
- Installation, replacement and dismantling works
- Inspection of all surface equipment
- 24/7 operation, management and monitoring of the facilities (with operator license obtained from the Romanian Government)
- Firefighting services

SHUTDOWN & TURNAROUND ACTIVITIES

**Extensive experience
in managing crucial events.**

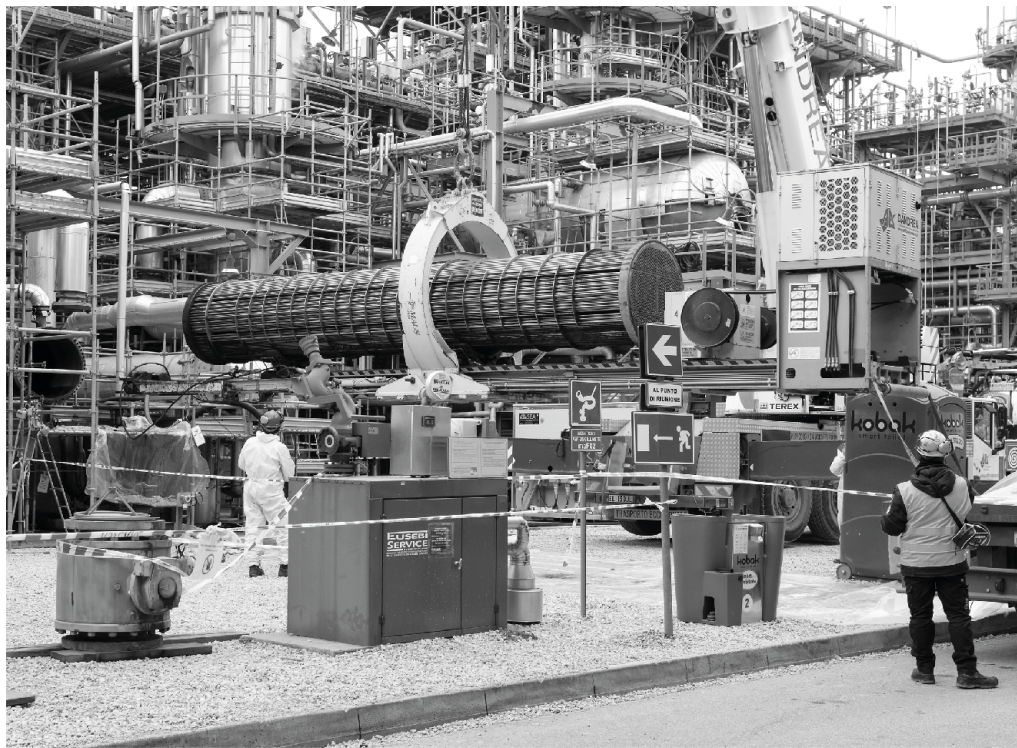
Shutdowns and turnarounds are a complex activity that combines high technical/engineering difficulties with the demanding schedules that are necessary to guarantee plant production continuity as far as possible.

Bonatti, as recognized best-in-class provider for such services, fully understand Customers' needs to minimize production loss, by adopting all necessary HSEQ criteria.

We can provide the following full services:

- Data collection
- Planning
- Engineering & procurement
- Execution
- Technical reporting





EL MERK, ALGERIA TRIENNIAL PLANT SHUTDOWN

Planning and execution of the turnkey shutdown of the central production facilities (CPF) for GROUPEMENT BERKINE

The field is located in Block 208, 90 km south of the Sonatrach/Anadarko-operated Hassi Berkine South facility and more than 1,000 km from the Algerian coast.

Main data:

- Total personnel at peak: 905
- Working time: 24/7
- Total manhours: 700,000
- Construction of the temporary living camp: 5 months

Execution timing:

- Pre-Shutdown 26 days
- Shutdown 30 days

CPF – main process and utility systems involved:

- Inlet slug catchers and separators for oil and condensate
- 2 oil/condensate trains
- 1 oil/condensate re-run system
- 1 NGL train
- 1 LPG re-run system
- Gas injection compression
- Water treatment packages
- Utility systems

CENTRO OLIO VAL D'AGRI, ITALY MAJOR SHUTDOWN ACTIVITIES

Engineering, planning, spare parts procurement, construction, and maintenance activities for ENI

COVA Plant is located in Southern Italy (Basilicata Region), and occupies an area of approx. 180,000 sqm. It is the largest onshore treatment plant in Western Europe: crude oil is stored in tanks and then transferred via pipeline to Taranto Refinery, while natural gas is pumped into the Italian distribution network. Water is sent to authorized treatment plants after removal of any hydrocarbon residuals.

The scheduled maintenance includes preliminary activities and full shutdown.

Specialized technicians: 600

Duration: 75 days

Execution: 24/7





MELLITAH, LIBYA 2018 SHUTDOWN AND UPGRADE PROJECT

Typical maintenance shutdown activities plus 3 WP relevant to improvement projects for MELLITAH OIL & GAS

The field is located in Block 208, 90 km south of the Sonatrach/Anadarko-operated Hassi Berkine South facility and more than 1,000 km from the Algerian coast.

Main data:

- Total personnel at peak: 430
- Working time: 24/7
- Total manhours: 90,000
- Execution timing: 19 days

Main activities:

- 16 vessel internal inspections
- 17 leakage points eliminations
- 40 root valves replacement
- 1 Cooling Tower Basin internal cleaning
- 3 PSV calibration
- 4 tube bundles replacement on Lean Amine Trim Coolers
- 11 electrical and instrumentation corrective activities
- 2 UPS upgrading with CEG Assistance
- 30 PM activities

WPs:

1. Replacement of HP Absorber
2. Unit 51/52/53-330 replacement of 12 valves and trim replacement of 10 control valves

EL MERK, ALGERIA 2021 TURNKEY PLANT SHUTDOWN

Planning and execution of the turnkey shutdown of the central production facilities (CPF) for GROUPEMENT BERKINE

The field is located in Block 208, 90 km south of the Sonatrach/Anadarko-operated Hassi Berkine South facility and more than 1,000 km from the Algerian coast.

Main data:

- Total personnel at peak: 982
- Working time: 12 – 7/7
- Total manhours: 800,000
- Construction of the temporary living camp included in the scope of work

First mobilization was on October 2019, with PMT & QAQC team. Due to Covid-19 global pandemic, planning & preparation phase was delayed and execution phase postponed to 2021.



PRODUCTION SERVICES

Increasing clients' production rates and optimizing costs.

Our Well Production Service unit is offering more than 15 years experience in providing rental solutions to on-shore operators demanding fast-track increase of production.

The main services are:

- Multiphase pumping
- Water injection
- Salt dilution and chemical injection
- Gas storage and boosting

The "BOO – Build-Own-Operate" model we propose allows customer to shift from capital expenditure towards operational costs, adding gross production and ensuring a positive cash-flow. Moreover, such approach, fully "skin in the game", facilitates the creation of an actual partnership, contributing to further production enhancement.

By a perfect combination of EPC-skills and O&M-expertise, Bonatti WPS provides fast, reliable, safe and zero-environmental-impact solutions to meet client expectations along the various phases of the service: from conceptual design and selection of the most suitable application, through fast mobilization and start-up on site, up to a 24/7 assistance for a top performance and for an immediate response in case of any problem during the operations.

Our fleet is composed by:

- *more than 50 multiphase pumping systems*
- *more than 30 water/chemical injection skids*



WATCH
THE VIDEO



MULTIPHASE PUMPING SYSTEMS

This technology allows to boost a multiphase fluid by using a single skid system instead than more complex plant (water/oil separator and gas compressor solution), including a "no-flare" embedded application.

In 2021 our fleet averagely produced for our clients:

- **150,000 BBL/d** of oil
- **280 MMscf/d** of gas

Main advantages:

- Help the production of wells or manifolds
- Fast mobilization time
- Pumps work up to 100% GOR

Main features:

- High design flexibility
- All equipment are skid mounted

Typical applications:

- Remote and marginal wells production boosting
- Boosting station in presence of multiphase fluid
- Alternative application Vs. ESP, in presence of multiphase fluid



WATCH
THE VIDEO

*low temperature
application*

TECHNOLOGIES

Fully packaged solutions,
with three standardized "sizes".

*high temperature
application*



Small Size:
based on Progressive Cavity Pumps technology



Main technical features:
Pump flow: from 11,000 to 29,000 EBPD*
Pump differential pressure: up to 60 bar
Gas Volume Fraction (GVF): up to 97%
Pump Installed Power: up to 180 kW
Remotely monitored



Medium Size:
based on Twin Screw Pumps technology



Main technical features:
Pump flow: up to 100,000 EBPD*
Pump differential pressure: up to 60 bar
Gas Volume Fraction (GVF): up to 100%
Pump Installed Power: 750 kW
Remotely monitored



Big Size:
based on Twin Screw Pumps technology



Main technical features:
Pump flow: up to 420,000 EBPD*
Pump differential pressure: up to 65 bar
Gas Volume Fraction (GVF): up to 100%
Pump Installed Power: up to 2,500 kW
Remotely monitored

*Note: The "E" in front of the flow unit stands for "Equivalent" or in some cases called "Actual" flow, i.e. flow at suction pressure and temperature (when gas portion is compressed to "Suction" as opposed to "Standard").





WELL PRODUCTION SERVICES, MAIN FEATURES

- The most updated technology that fits with Client production needs
- Ultra-fast mobilization / start up: from 10 days, depending upon in-Country equipment availability and production needs
- A dedicated project management team: from early design to site installation
- Full control of the whole supply chain
- Modularized solutions (production enhancement)
- Dedicated construction team
- Dedicated commissioning team: minimum start up
- A local team 24/7 ready to solve any trouble
- Full control of operations: 24/7 monitoring system based on satellite transmission



www.bonatti.it