

POWER PLANTS CONSULTANCY SERVICE

For Investors for Existing Power Plants

Inspection &
Reporting
Scope

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Introduction

This proposal presentation is aimed to support Investors and EPC Contractors before and after project implementation.

This section aims to investigate both Lignite Fired and Bituminous fired existing Power Plants.

Providing a full complement of Engineering Services for Power Plant projects from new power plants to renovating existing facilities, offering complete support from conceptual engineering through maintenance and operations support.

Boiler and its auxiliaries, Main Feedwater and Steam cycle, cooling systems, ductwork, or flue gas systems, among others, are commonly object of design, Power Plant Engineering or consulting works related to performance, efficiency and mechanical integrity.

Why need a Consultancy Service

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| <ul style="list-style-type: none"> • Obtain sustainable energy production • Keep planned monthly and yearly production • Determine and monitor fuel quality • Obtain the best efficiency of Thermal and Electrical Power generation • Controlling the impact of harmful emissions on the environment • Improve the safety of working conditions | <ul style="list-style-type: none"> • Analyze system performance and determine the best operating conditions • Executing an operational audit of the existing enterprise and identifying weak points • Obtain efficient conditions for minimum fuel combustion • Control Maintenance and Operational costs |
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Scope of consultancy services are summarized in the following items.

1. Main Coal Feeding System

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| <ul style="list-style-type: none"> • Conveyors • Pre-Crushers | <ul style="list-style-type: none"> • Coal Bunkers |
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2. Coal Mill System

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| <ul style="list-style-type: none"> • Rotary Parts • Grinding Parts • Pulverizing System • Feeding Gas Ducts | <ul style="list-style-type: none"> • Primary and Secondary Air • Vibration Analysis • Main wheel fracture analysis |
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3. Boiler and Auxiliaries

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| <ul style="list-style-type: none"> • Burners • Soot Blowers • Boiler Economizer, Superheater and Reheater Tubes • Fly Ash Handling System • Bottom Ash Handling System | <ul style="list-style-type: none"> • Slag Removal System • Boiler Top Supporting Mechanism • Hopper Inspection • Water quality • Tube fracture analysis |
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4. Feed Water and Steam Piping System

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| <ul style="list-style-type: none">• Main Valves• Safety Valves• Drain Valves• Desuperheater• Support System• Insulation | <ul style="list-style-type: none">• Deaerator• Steam Drums• Feed Water pumps• Heat Exchangers• Piping Stress Analysis |
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5. Fresh Air System

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| <ul style="list-style-type: none">• Expansion Joints• Dampers | <ul style="list-style-type: none">• Duct Supports• Insulation |
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6. Exhaust Gas System

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| <ul style="list-style-type: none">• Expansion Joints• Dampers | <ul style="list-style-type: none">• Duct Supports• Insulation |
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7. Flue Gas Recirculation System

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| <ul style="list-style-type: none">• Expansion Joints• Dampers | <ul style="list-style-type: none">• Duct Supports• Insulation |
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8. FD and ID Fans

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| <ul style="list-style-type: none">• Flow efficiency• Consumption efficiency• Pressure drops | <ul style="list-style-type: none">• Blade condition• Fan Curves• Optimum working conditions |
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9. Rotary Air Preheater

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| <ul style="list-style-type: none">• Thermal efficiency• Plate condition• Rotary system condition• Design and working conditions | <ul style="list-style-type: none">• Radial and circumferential Sealing condition• Pressure drops |
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10. Compressor System

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| <ul style="list-style-type: none">• Mechanical efficiency• Piping condition | <ul style="list-style-type: none">• Service air condition• System air condition |
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11. Electrostatic Precipitator (ESP)

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| <ul style="list-style-type: none"> • Efficiency • Plate condition | <ul style="list-style-type: none"> • Hammer condition • Flow analysis |
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12. Fabric Filter

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| <ul style="list-style-type: none"> • Design condition • Working condition • Thermal resistance limits | <ul style="list-style-type: none"> • Maintenance intervals • Efficiency |
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13. Cooling Water System

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| <ul style="list-style-type: none"> • Condenser condition • Cooling Tower condition • Drift eliminator | <ul style="list-style-type: none"> • Efficiency monitoring • Water quality |
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14. Water Treatment System

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| <ul style="list-style-type: none"> • Performance monitoring • Equipment Analyze • Efficiency • Input/Output Analysis • Monitoring leaks, corrosion, or other defects in piping, tubing, and structural components • Conducting supplier audits and material inspections | <ul style="list-style-type: none"> • Verify the quality and conformance of raw materials, components, and sub-assemblies • Scaling, solids formation, and inefficiencies • Effect of water chemistry on Boiler tube fracture |
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15. Dewatering System

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| <ul style="list-style-type: none"> • Performance monitoring • Efficiency Analysis • Reducing the volume of sludge | <ul style="list-style-type: none"> • Reduce conveying costs and minimize the environmental impact |
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16. Fuel Oil Tanks

- High coverage inside the critical zone
- Less blind zones
- Regular inspections and testing to ensure the safety of continuous

- operations and integrity in case of corrosion, cracks and leaks.
- Radiographic testing, ultrasonic testing, eddy current testing and magnetic particle testing alternatives

17. Flue Gas Desulfurization System (FGD)

There are various types of Flue Gas Desulphurization systems, predominantly Dry Sorbent Injection, Wet Limestone Based, Sea Water Based systems are adopted in the global market.

- Efficiency
- Net Internal consumption
- General System Analysis

- CEMS system
- Acid formation
- Erosion and Corrosion control

18. Coal Analysis

- Analytical methods to measure the particular physical and chemical properties of coal.
- LHV analysis review
- HHV analysis review

- Moisture analysis review
- Ash analysis review
- Volatile Matter analysis review
- Effect of Coal Properties on Plant efficiency

19. Plant Efficiency

- Coal Quality and Calorific Value
- Coal Mill Grindability
- Combustion Chamber
- Unburned carbon content

- Insulation
- Stack outlet temperature
- Unit consumed fuel oil

20. Chemical Cleaning

The main purpose of internal cleaning of boilers is to produce a clean metal surface on all parts of the boiler which are in contact with steam or water during operation.

The materials which may be present on the metal surface may be scale, corrosion products, oils, greases, mill scale, paint, etc.

In many instances it is necessary to use some chemical method of cleaning to remove the undesirable materials present.

The chemical method to be used should be one which will remove the undesirable material present without injury to the boiler (like metal surfaces, gaskets, joints, seals, etc.) or cause contamination of the steam after the boiler goes back in service.

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| <ul style="list-style-type: none"> • Alkaline Cleaning • Acid Cleaning • Hydrogen Embrittlement | <ul style="list-style-type: none"> • Hydrogen Gas Explosion • Corrosion |
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21. Steam Blow

Provide the removal of construction debris, weld slag, sand, oil, dust, rust and mill scale from critical systems prior to plant start-up.

The line is blown with sufficient boiler pressure to provide enough dynamic pressure will be created in the pipe to provide adequate cleaning.

During any plant start up, there's a possibility that particles left in the pipe from the overhaul or maintenance phase could cause pitting in the surface (especially in pipe bends) and travel downstream. These particles can also damage instrumentation and impede other plant operations.

22. Hydrostatic Test

Fully drainable boiler and superheater surfaces that does not include stainless steel elements can be filled and hydrotested with filtered potable water, filtered softened water, demineralized water, or treated demineralized water.

The water used to fill the components shall not be at a temperature less than 21 DegC to avoid the danger of tube brittle fracture failures.

For new drum boilers, the first stage of the hydrostatic test pressure shall not exceed 1-1/2 times the maximum allowable working (design) pressure at the highest point of the boiler.

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| <ul style="list-style-type: none"> • Brittle fracture failures during testing, • Water quality | <ul style="list-style-type: none"> • Test pressure • Test duration • Filling Drum Boilers |
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Reference Projects

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| <ul style="list-style-type: none"> • SGS-Türkiye P. Plants • ACWA Power Aqaba PP -Jordan • Inter Rao- Russia • Enerjisa / Çimsa ORC Plant • Çayırhan Power Plant • Seyitömer Power Plant | <ul style="list-style-type: none"> • Tunçbilek Power Plant • Afşin-Elbistan-A Power Plant • Yeniköy- Kemerköy Power Plant • Kırıkkale- Diesel Fired P. Plant • Entek- İzmit GE Frame 6 HRSG and Piping Design & Installation |
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- Shatura – Russia Power Plant- Piping
- Samra P.Plant – Jordan, Piping System
- Baiji / Iraq 85MW HFO Power Plant