## PGESCo SERVICES PORTFOLIO

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Since 1993, Power Generation Engineering and Services Company “PGESCo” has manifested proven capabilities by providing innovative engineering solutions for energy projects and industrial sector in Egypt and MENA region.

With focus on delivering top quality and best services, PGESCo has engineered and managed sophisticated projects in challenging environments. From business planning up to operation and maintenance, PGESCo provides complete integrated services over the project’s life.

To ensure seamless digital exchange between organization functions, PGESCo develops and applies world advanced technology that provides the tools and environment needed to achieve its goals delivering quality projects that meet client expectations.

PGESCo provides services and support to the governmental utilities, EPC contractors, independent and private developers using State-of-the-Art design and communication technology platforms.
This Vast Experience Contributed Significantly to PGESCO’s Understanding of Power & Industrial Projects Requirements, Especially in Engineering, Procurement, Construction Management Services (EPC/EPCM) as well as Project Management and Startup Management Services.
OFFERED SERVICES
COMPLETE INTEGRATED PROJECT SERVICES
Renewed ISO 9001:2015
PGESCo was the first runner in Africa, also one of few pioneers around the world to have ISO 9001:2015 certification

OHSAS 18001: 2007
ISO 14001: 2004
ENGINEERING SERVICES

PGESCo engineering provides innovative solutions in various fields of power generation and industry including conceptual, detailed and final engineering design for civil, mechanical, electrical, control system and communication systems Services.
PGESCo executes detailed engineering plans from licensing to vendor interfacing. Our skills include structural steel design, foundations design such as large rotating equipment foundations design, architectural design, electrical engineering design, equipment management and process design, Piping Stress analysis, layout, load analysis and piping supports design. Engineering activities of conceptual, detailed or final design are covered by our highly experienced team.

- Architectural
- Civil / Structural
- Control Systems
- Electrical
- Mechanical
- Plant Design
- Engineering Quality Assurance & Quality Control
- Environmental
- Engineering Platform
PGESCo Engineering Typically Provides:

- Technical Specification Preparation for each Equipment & Detailed Design
- Pre-tender Clarifications
- Technical Evaluation of Tenders
- Pre-award Clarifications
- Review of Contractors Technical Documents and Technical Coordination
- Construction Support Services
- Startup and Acceptance Testing Support
- Plant Performance Tests
- Training Services
- Plant Data Book
- Engineering Studies
BUILDING CODE ANALYSIS:
- Buildings Occupancy Classifications
- Means of Emergency Exits
- Life Safety Requirements

FINISHING MATERIALS SPECIFICATIONS INCLUDING:
- Multi-Project Standard Specifications
- Project Technical Specifications
- Design Criteria for Architectural Works

FULL RANGE OF ARCHITECTURAL DESIGN INCLUDING:
- Power Plant / Buildings
- Auxiliary Buildings
- Ancillary Buildings and Colony

3D MODELING
Civil/Structural
- Analysis and Design of:
  - Steel Structures/Buildings.
  - Reinforced Concrete Structures and Foundation (Shallow and Deep Foundation).
- Preparation of Technical Specifications, Tender Documents, Evaluation of Bidders, and Recommendation of Civil Related Award Contracts.
- 3D Modeling of Civil-Commodities; including Steel Structures, Concrete Buildings, Rebar Detailing and Underground Circulating Water Pipping.
- Storm Drainage & Roads Design.

Geotechnical
- Onshore/offshore Soil Investigation and Geophysics.
- Geotechnical Analysis and Design.
- Seismic Hazard Assessment & Analysis.
- Topographic Survey and Underground Detection.

Hydraulic Works
- Hydrographic Survey, Hydraulic Modelling.
- Design of Circulating Water System (Onshore/Offshore).
**Automation and Control Design**
- Distributed Control System (DCS) Specification
- Control Systems Architectural Drawing
- DCS Sizing and I/O Assignment
- Logic Diagrams (Plant Protection, Function Block, and Digital Logic)
- Set Point Index
- Factory Acceptance Test (FAT)

**Instrumentation and Analysis Design**
- Instrument Selection
- Instrument Data Sheets
- Control Valve Data Sheets
- Control Valve Sizing and Selection
- Instrument Location Plans
- Instrument Installation Details (IID)
- Continuous Emissions Monitoring System (CEMS)
- Steam & Water Analysis System (SWAS)
Single-line and Phasing Diagrams
- Main Plant Electrical Distribution System (Single-Line Diagrams)
- Plant Phasing Diagrams

Plant Cabling
- Cable Design that Includes Cable Type and Size Selection Using PGESCo Proprietary Software.
- Cable Routing that Includes Cable Pathway Selection, Cable Filling and Length Calculations, and Cable Pulling Cards Using Both PGESCo Proprietary and International Software.
- Cable Termination that Includes Cable Termination cards.
- Cable MTOs and Material Tracking that Includes: Cable Quantities Estimation and MTOs, Cable Installation Follow-Up and Material Tracking.
Metering and Relaying Single and Three-Line Diagrams
- Plant Metering and Relaying Single-Line Diagrams
- Plant Protection Three-Line Diagrams

Equipment Modeling, Layout Drawings and Raceway System Design
- Equipment Layout Drawings
- Raceway System Design
Breaker Logic Diagrams Power System Studies
- Short Circuit Calculations
- Load Flow
- Motor Start Simulations

Protection Setting and Relay Coordination Study

Electrical Equipment Sizing and Specification
Sizing and Specification for the Following:
MV and LV Switchgear, Plant Power and LV Transformers, DC and UPS Equipment, Grounding System, Switchyard Equipment and Systems, Generator Circuit Breaker, and Isolated Phase Bus Duct
Mechanical discipline is responsible for the process design and equipment specifications. The discipline has its distinguished expertise in all types of systems and mechanical equipment. Through its crew of mechanical specialists, PGESCo can cover any mechanical Engineering need that may arise.

**Discipline maintains a long list of projects Design Documents, Studies and Drawings:**

- Power Plant heat & Mass Balance
- Conceptual Design
- Preliminary Design Report
- Process piping and Instrument diagrams P&IDs
- Pipe List, Valve List, Equipment List and Specialty List
- Detail systems design calculation including piping and mechanical sizing
- Equipment technical specifications
- Bidders Evaluation Report

**MECHANICAL ENGINEERING TECHNICAL SPECIALISTS**

- Fired Heat Transfer Equipment (Boiler/HRSG)
- Unfired Heat Transfer Equipment (Deaerator/Feedwater Heaters/Heat Exchanger
- Rotating Equipment (Compressors/Pumps)
- Performance Test
- Firefighting/HVAC
- Water Treatment Group
- Environment
- Heat and Mass Balance
Power Plant heat & Mass Balance Conceptual design
Intelligent Piping & Instrument Program

Through its Intelligent Modelling Platform that is Fully Integrated, PGESCo can Guarantee the Accuracy of all Delivered Lists
Pipe List, Valve List, Equipment List and Specialty List
Detail systems design calculation including piping and mechanical sizing

Right tools and long deliberating and checking process that guarantee accurate results and optimized designs
Equipment technical specifications

PGESCo specifications have been refined and optimized based on tens of projects installations and years of operations.
MECHANICAL ENGINEERING TECHNICAL SPECIALISTS

- Fired Heat Transfer Equipment (Boiler/HRSG).
- Unfired Heat Transfer Equipment.
  (Deaerator/Feedwater Heaters/Heat Exchanger).
- Rotating Equipment (Compressors/Pumps).
- Performance Test.
- Firefighting/HVAC.
- Water Treatment Group.
- Environment.
Unfired Heat Transfer Equipment (Deaerator/Feedwater Heaters/Heat Exchanger)

- Refine and Optimize Specifications for Unfired Heat Transfer Equipment
- Review Heat Exchanger Detail Design
- Review Deaerator Transient Condition Calculation
- Support Projects During Pre-Award Meeting and Other Technical Meeting
- Prepare and Issue Design Guide

Fired Heat Transfer Equipment (Boiler/HRSG)

- Continuously Refine and Optimize Boiler/HRSG Specifications Based on Actual Operation Experience and Continuous Discussions With all the Leading Suppliers.
- Prepare Studies for Technical Issue Whether During Detail Design or Upon Request for Support from PGESCo Clients.
- Work with Projects to Evaluate Proposals, Prepare and Negotiate the Technical Aspects of the Contracts
- Prepare and Maintain Design Guides
Performance Test Group

- Prepare Plant Performance Test Protocol Using ASME PTC or Other International Codes.
- Review Performance Test procedure Provided by Contractor.
- Witness units Performance Test.
- Analyze Output Data.
- Prepare and Issue Reports.

Firefighting/HVAC

- Refine and optimize Firefighting/HVAC specifications.
- Establish design basis for HVAC system.
- Detail design of plant wide Firefighting/HVAC.
- Review contractor submittals for Firefighting/HVAC.
PIPING & VALVES SPECIALITY

- Issue Piping Material Classes.
- Prepare Specifications and Material Requisitions for Piping, Valves, and other in-line Components, e.g., Expansion Joints, Traps, Strainers, etc.
- Prepare Pipe Fabrication and Installation Specifications.
- Prepare Pipe Insulation Specification.
- Material Selection for Piping and Valves.

EQUIPMENT & PIPE LAYOUT DESIGN

- Site layout Optimization.
- 3D Modeling of Mechanical Equipment and Major Plant Commodities.
- Design and Routing of Different Plant Piping Systems.
- 3D Modeling of Piping, Fittings, Valves, Special Devices etc.
- Ownership of Plant 3D Model and Exchange it with Contractors Models.
- Run Model Review and Interference Checking of PGESCo Design and Contractors Commodities.
STRESS ANALYSIS

- Perform Computer Stress Analysis of Piping Systems
  Including:
  Weight, Thermal, Wind, Seismic, Time History (Steam Hammer),
  Dynamic Loadings, and Provide Support Loads and Locations to the Pipe Support Group.
- Perform Transient Analysis.

PIPE SUPPORT DESIGN

- Prepare Specifications for Fabrication and Installation of Pipe Supports.
- Prepare Requisitions for Procurement of Pipe Supports.
- Select Feasible Support Locations for Analyzed Systems.
- Select Support Locations and Type for Non-analyzed Systems.
- Pipe Support Design.
- 3D Modeling of Pipe Supports & Hangers.
- Analyzing Engineered Pipe Supports.
QUALITY ASSURANCE

- Engineering Procedures & Instructions “EDPs, SEIs, GEIs & WPDs”.
- Codes & Standards.
- Standard Technical Specifications.
- Continuous Training and Development of Engineers.
- Audits Planning “internal & external”.
- Risk Analysis & Assessment.
- Documents and Records Numbering System.
- Lessons Learned.

QUALITY CONTROL

- Design Checklists
- Documents & Drawings Register.
- Calculation Register.
- 3D Model Review Meeting.
- Design Checkers.
- Design Review Notice “DRNs”.
- Coordination Forms.
- Standard Drawings.
- Standard Forms.
- Risk Register.
· Technical Specifications.
· Develop Project Environmental Impact Assessment.
· Coordinating and Managing Environmental Activities Between Financing Agencies such as the World Bank, African Development Bank and Client.
· Developing and Maintaining Environmental Monitoring and due Diligence Programs for Air, Surface & Groundwater, Noise, Traffic, Soil and Social Conditions.
· Writing Environmental Reports.
· Ensuring Project Compliance with Environmental Regulations.
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<th>Project Master</th>
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PROJECT CONTROLS SERVICES:

- Planning and Scheduling
- Project Cost
- Estimating
- Monitoring and Reporting

In addition, the Estimating Function Maintains a Historical Cost Database and Skilled Resources to Support the Business Development and Proposal Process
• Customer/PGESCo Expectations
• Scope of Work
• Facility Description
• Division of Responsibility Matrix (DOR)
• Implementation Methodology and Integration (Engineering, Procurement, Construction and Startup)
• Work Breakdown Structure
• Lessons Learned From Previous Similar Projects
• Execution Plan
• Integrated Cost and Schedule Control Methodology
• Integrated Detailed Schedules and Reports
PROJECT CONTROLS COST CONTROL

- Detailed Tracking, Monitoring and Updating for Project Actual Cost
- Scope Changes Cost Forecast and Analysis
- Cost Evaluation & Analysis for Changes
- Cost analysis & Evaluation
- Trends Analysis
- Change Notices
- Claims Evaluation
- Invoices Tracking
- Finance Agency Support
- Cash-flow Curves
- Project Cost Summary Report
- Actual Cost Monitoring
- High Level Management Cost Report
- Graphical Display for Project Budget vs. Cost
- Financial Reporting for Various Financing Agencies as per the Funding Requirements
- Tracking Invoices Status for Various Contractors
Detailed analysis for the weekly activities as well as providing 3 weeks look ahead forecast for the project.

Log all projects chronological events.

Reporting the engineering, procurement and construction progress & performance.

Includes critical items which will have a potential impact to the project.

Monthly report to client summarizing all the project programs thru the month.

High level management report.
- Primavera
- Microsoft Office
- Milestones Professional
- Acumen Fuse
- Richardson Cost Estimate
- ROI (Financial model)
JOB SITE MANAGEMENT SERVICES

PGESCO Believes in Safety First, Then We Race to the end. From Site Tests to Contractor Interface, Our Team is on Schedule Rising up to your Highest Expectations Every Step of the Way.
The Integrated Project Jobsite Team can Perform the Hereinafter Tasks During the Job site activities Execution.

CONSTRUCTION MANAGEMENT

- Receive Contractor at Site via the kick off Meeting and Supervise Contractor Mobilization.
- Review Contractor Resources Adequacy with Workload in Accordance with Schedule.
- Review and Approve all Contractors Key Personnel Qualification.
- Supervise all Material Delivery, Receiving, Storage and Handling in Accordance with Drawings and Specifications.
- Review and Interpret Contractors’ Drawings and Specifications.
- Carry Out a Schedule-Monitoring Program.
- Supervise the Construction Work.
- Review Heavy Equipment Handling/Lifting Plans and Supervise their Execution.
- Coordinate the Interfaces Among the Contractors and Resolve any Issues Concerning the use of Space (Coordinate and Sequence the Accessibility by the Various Contractors to the Different Work Area).
- Conduct Periodic Coordination Meetings with the Contractors.
- Supervise and Attend all Construction Testing Activities and Approve its Results.
- Conduct Systems Walk Down.
- Follow up System Punch List Closure and Turn Over to Startup and Commissioning.
- Determine Construction Progress and Recommend Progress Payments.
- Review Field Modifications and Provide their Disposition.
- Review Test Procedures and Coordinate Engineering Comments on Field Construction, Field Surveys, Tests, Laboratory Services and Startup Management Activities.
· Develop/Review Startup Schedules and Prepare an Integrated Startup Master Schedule.
· Coordinate Contractors’ Startup and Testing Activities.
· Finalize Startup Scoping Drawings in Details after Design Completion.
· Develop/Review Startup and Testing Procedures.
· Manage and Authorize Work Permits.
· Supervise Suppliers/Contractors’ Startup and Testing Activities.
· Establish and Control Work Permit Processes.
· Review O&M Instructions Submitted by the Contractors.
· Verify the Performance and Acceptance Testing of Equipment in Accordance With Previously Established Procedures and in Full Compliance With Design Specifications.
· Prepare Turnover Schedule and Packages.
· Assist Owner Operating Staff in Becoming Familiar With Operating the Plant, the Performance and Testing Procedures Relating to Performance Testing of Major Mechanical and Electrical Equipment and Overall Station Performance Tests.
Review ES&H Plans for all Contractors During the Tender Evaluation.


Ensure Contractors Understand their ES&H Obligations by Participation on Pre-tendering, Procurements, Contract Evaluation & Pre-mobilization.

Develop the ES&H Requirements on Execution Plan.

Review and Approve Contractors ES&H Staff & Qualifications.


Coordinate Site ES&H Construction, Startup & Commissioning Activities.

Conduct ES&H Site Inspection and Issue of Corrective Actions / Nonconformance Reports.

Coordinate Site Emergency and Evacuation Plan & Drills.

Investigate Incidents & Near Misses and Issue of Lesson Learned.

Review All Environmental Measurements and Ensure Compliance With Laws and Regulations.

Review Licenses and Certifications and Conduct Inspection of Equipment’s before Allowing Site Operation.

Coordinate, Lead Site ES&H Meetings and Site Walkthroughs.

Conduct Several ES&H Training for PGESCo/ Client’s Employees.

PGESCo is Certified for ISO 14001 & OHSAS 18001.
- **PUNCH LIST PROGRAM**
  Program Controls all Punch List Items (ownership Open & Close) for every Contractor Included with severity Category Leveling.

- **IO LIST PROGRAM**
  Program Controls all Loop and Functional Checks for every Contractor.

- **DAILY REPORT PROGRAM**
  Program Manages all Daily Reports Issued by the Construction Engineers that Shows Daily Activities Attached with Site Photos.

- **BIM PROGRAM**
  BIM (Building Information Management) Program Manages the Steel Structure Work Process Starting from Engineering, Purchasing, Fabrication, Delivery, Handling and Erection.

- **LESSON LEARNED PROGRAM**
  Program Captures Lessons Learned for Running Jobs to be Utilized in Future Jobs Enhancement and Improvements.
1. Receipt of all Project Documentation.
2. Control and Classify According to Assigned Document Numbering System as Per PGESeCo Standard Numbering System or Client Specific System.
3. Logging and add all Project Documentation to the Project Data Base (ProjectWise).
4. Log Out for the Project Documents & Issue Transmittals.
5. Distribute all Project Document Types Distributed as the Project Distribution Matrix.
PRIME CONTRACTS & PROCUREMENT

PGESCO Uses Multi-Package and Turnkey Contracting Systems Depending on The Client Requirements and Costs Optimization opportunities. Also Uses Competitive Tenders, Setting All Technical Terms and Commercial Conditions to Evaluate Bids.

SCOPE
Prime Contracts (Formation and administration of contracts between PGESCO and Clients).
Project Procurement.
Contract/Purchase Order Administration.

PRIME CONTRACTS MAIN TASKS
Contractual Risk Identification & Assessment
Preparation of Different Types of Agreements such as:
- Non-Disclosure Agreements.
- Memoranda of Understanding.
- Joint Venture Agreements.
Review Terms and Conditions Provided by Clients and Identification of Required Changes.
Prime Contract Administration (Invoices/Changes/Amendments, etc.)
• Development of Contracting Plan Depending on Client needs.
• Pre-qualification of Tenderers and Evaluation of their Capabilities Based on Previous Experience, Financial Standing, Technical Capabilities and Safety Records etc.
• Development, Review and Issuance of Tender Documents in Accordance with Owner and Financing Requirements and Procedures.
• Coordinate Tendering Period Activities such as Conducting Pre-tender Meetings, Issuance of Addenda, etc.
• Evaluation of Tenders Received and Issuance of Recommendations of Award to Owner.
• Conducting Pre-award Negotiations with Successful Tenderer/Conforming Contracts.
Typical Range: 17-22 Contract and Purchase Order Packages
(Client is Electricity Utility)

**Contract Packages – Supply & Installation Scope**

- Combustion Turbine Generator.
- Civil Works.
- Environmental Monitoring.
- Switchyard.
- Heat Recovery Steam Generator/Boiler.
- Steam Turbine Generator.
- Yard Tanks.
- Wrap-Up Insurance.
- Water And Waste Water Treatment.
- Mech. Equip./Pipe Install.
- Intake And Discharge Off-Shore.
- Site Services.

**Purchase Orders – Supply only**

- Pumps And Drives.
- Feed Water Heater.
- Critical Piping And Valve.
- Power Transformers.
- Distributed Control System.
- Desalination Plant.
- Medium And Low Voltage Switchgears.
List of Material Requisitions

- Overhead Bridge Cranes and Gantry Crane CTG.
- Overhead Bridge Cranes and Gantry Crane STG.
- Water and Wastewater Treatment Package.
- Hoists, lifting Devices and Monorails.
- HVAC For GIS (Switch GEAR and Control Room).
- HVAC For CTG.
- HVAC For STG Buildings and Control Building.
- HVAC for Balance of Plant.
- All field Erected Tanks.
- Non Metallic Tank.
- Fire Water Pumps, Drives and Controllers.
- Sump and Vertical Pumps.
- Fire Protection Systems and Equipment (GIS, GIS Control, Central Control Building and Gas Station).
- Fire Protection Systems and Equipment (BOP).
- Compressed Air Plant Package.
- Service Water Pumps.
- Water pumps.
- Emergency Shower and Eye/ Face Wash Stations.
- Conical and Wye Strainers.
- Valves.
- Nitrogen Bottle Gas Distribution System.
- Hydrogen Bottle Gas Distribution System.
- Carbon Dioxide or Argon Bottle Gas Distribution System.
- Hydro-Pneumatic Tank
- Sanitary Sewage Lift Station Equipment/Pumps.
- Elevators.
- A/G Supports / Pipe Rack.
- GIS and GIS Control Buildings: Telecommunication system.
- CTG and Central Control Buildings: Telecommunication system.
- Others Buildings: Telecommunication System.
- GIS, GIS Control, CTG and Central Control Buildings: Lighting Panels.
- Others Buildings: Lighting Panels.
- UPS & DC System.
- Distribution Transformers and LV Switchgear (Load Center).
- Cathodic Protection System (Tanks).
- Cathodic Protection System (U/G Piping).
- Flow Elements.
- Temperature Elements.
- Pressure Gauges.
- Level and P/DP Transmitters.
- General Service Control Valves.
- Tubing & Racks.
- Tanks Accessories.
. Issuance of Contractual Correspondence.
. Claims Management and Settlement.
. Review/Processing of Invoices.
. Follow-up and Monitoring of Submittals, Documentation, Guarantees, Insurance Coverage, Back Charges.
. Administration of Supplier Quality Program/Plan and Manufacturing Inspection.
. Support of Owner During Arbitration Procedures.
. Processing and Negotiation of Insurance Claims.
. Assessment of Contractual Liquidated Damages for Performance and/or Delays.
. Issuance of Completion Certificates.
. Contract Closeout Activities.
. Local and International Expediting.
# Expediting Services

- Material Tracking Systems
- Integration with other Project schedules and Deliverable

<table>
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<th>Item Description</th>
<th>Vendor/Country</th>
<th>Planning Order</th>
<th>Procurement</th>
<th>Receiving at Workshop</th>
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<td>Planned</td>
<td>Forecast</td>
<td>Variance Forecast</td>
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<td>Equipment/Material Furnished by Supplier:</td>
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<td>Vertical can-type condensate pumps complete with electric motor drives and accessories:</td>
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<td>Motor driven HP/LP feedwater pumps complete with electric motor drives, accessories and individual automatic recirculation system:</td>
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Extensive Experience in Interface with Multiple Financing Agencies in:
- Preparation of Bid Documents in Accordance with Guidelines
- Coordination of Bidding Process
- Coordination of Reviews and Approvals of Tender Documents, Contract Documents, Amendments, etc.
QUALITY MANAGEMENT

1. Training and awareness sessions for integrated management system
2. Integration of multiple management systems
3. Certification of OHSAS 18001 (OH&S), Occupational Health and Safety Management System
4. Second party audits on contactors and suppliers & conduct internal audit for certified client who haven’t its own team
5. Certification of ISO 14001 (EMS), Environmental Management System establish
6. Certification of ISO 9001 (QMS), Quality Management System
Support partner organizations to establish, develop and maintain an effective QMS

Sustained development and improvement (continual improvement)

Assure, enforce and check the implementation of the IMS in accordance with ISO 19011 (auditing)

Acquire and maintain certification from the most renown organization (LRQA)

Develop, implement and maintain an effective IMS in accordance with ISO standards (system & procedures)
QUALITY MANAGEMENT VISION & VALUES

- Make it personal; deliver requirements first time
- Understand customer expectations; communicate to project team
- Move talent pool members with mainstream EPCM skills into quality
- Continuous training to Embed as value & instigate personal ownership
- Leverage technology to allow early, effective response
- Promote and early warnings/alarms without shooting messenger