

Overview

Energy Holdings International Inc. (EHII) is a developer based in USA that is focused on acquiring, developing and managing energy assets across the Middle East, Asia and the Americas. EHII is intending to prepare an offer for Saudi Electricity Company (SEC) to develop a new power plant ("the Plant") on a build, own and operate (BOO) basis. The Plant project ("the Project") will complement the IPP program that is developing in the Kingdom of Saudi Arabia and will represent another important and timely step forward in assisting SEC to successfully address the Kingdom's increasing demand for electricity.

At this stage, and pending ongoing discussions with SEC, it is anticipated that the Plant will comprise all facilities necessary for the generation of 500 MW of power in open cycle operation utilising either crude oil or heavy fuel oil (to be discussed) as a feedstock and provided to the Project on a 'pass through' basis.

Based on the above, the purpose of this Prequalification package is to initially introduce the parties and teaming arrangements that we have developed for the Project for review and with a view to gaining SEC's support for the proposed team to progress to begin to develop the Project for review by SEC at a later stage.

It is envisaged that the main parties that will successfully develop, implement and then operate the Plant in support of SEC will be as follows:

- **Energy Holdings International Inc as the lead Developer** supported by **Parsons Brinckerhoff (PB) as appointed Technical Advisor**. PB's capabilities are generally well known to SEC, and in its capacity as EHII's Technical Advisor, PB will support EHII with concept development, design, procurement, interface management and managing the construction, commissioning and testing of the Plant leading to successful commercial operation;
- Depending on the fuel feedstock, either **General Electric (GE) or Siemens as main equipment supplier** to supply and support the successful implementation of the Plant prime movers. Both of these OEMs have expressed a willingness to associate with EHII/PB for the Project but, as SEC will appreciate, the actual choice of main equipment supplier (and potentially, therefore, the overall delivery approach) will be decided based upon fuel feedstock that is made available to the Project;
- **A General Contractor** that will supply the balance of plant and successfully undertake the construction, erection, installation, commissioning and testing of the Plant to commercial operation. Based on our experience of Saudi Arabia, EHII/PB are aware of such general contractors that have worked in support of SECs projects and these include, for example Al Toukhi Company. Based on early discussions with such contractors, a willingness to associate with EHII/PB has been expressed;
- **ProEnergy Services as Plant Operator** is an Operations and Maintenance company that focuses on safety whilst maximising plant reliability, availability and performance. ProEnergy has expressed a willingness to associate with EHII/PB to provide a customer focused approach to the plant operations.

Building on the above, this document serves to reinforce for SEC the suitability of those described to develop and implement the Project. To this end, and bearing in mind the outstanding fuel feedstock issue that we are keen to discuss and resolve with SEC in the very near future, included within this Prequalification pack are basic qualification details on the Project parties together with brief details on their typical equipment and services. Where appropriate, and to demonstrate that EHII/PB has already begun the process of developing its associations to deliver the Project, also included within this pack are specific Letters of Association from those concerned.

We firmly believe that the proposed team offers SEC the opportunity to successfully develop and implement the Plant to deliver 500MW electrical power to the off-taker at a competitive tariff within the terms of a Power Purchase Agreement (PPA) that is expected to be similar in form to that which has been recently utilised in relation to, for example, the recent Riyadh Power Plant No. 11 IPP development process. We welcome your feedback on the proposed approach.

Letters of Association



GE Energy

February 07, 2010

To:

Mr. John Richardson

Parsons Brinckerhoff

Dear Sirs,

General Electric International Inc. (GE) is pleased to express its willingness in principle to use all reasonable efforts to work with Parsons Brinckerhoff for the 500MW Power Plant in Saudi Arabia. GE will need more specific information about this opportunity to evaluate and make final decision.

In the event that the contract has been awarded to Parsons Brinckerhoff, GE would consider entering into an agreement as per GE's standard Terms and Conditions with Parsons Brinckerhoff for the proposed scope of supply of Gas Turbines.

We look forward to support your power needs and working on this project.

Sulaiman Al-Rumaih

Power Generation Account Manager

GE Energy

A handwritten signature in blue ink, consisting of a large, stylized 'S' followed by a few horizontal strokes.

شركة الطوكي للصناعة والتجارة والمقاولات
Al-Toukhi Company for Industry, Trading & Contracting

L. L. C. Capital 5 000 000 Riyals ذات مسئولية محدودة رأس المال المدفوع ٥ ٠٠٠ ٠٠٠ ريال



February 7, 2010

Parsons Brinckerhoff
Legends Headquarters Building
Dubai

Attn: Mr. Rob Higgs
Business Development Manager
Power & Water, Middle East

Subject: 500MW IPP - Kingdom of Saudi Arabia - Letter of Intention

Dear Sir,

Al Toukhi Company hereby advises and confirms its genuine interest and solid intention to participate as a member in the consortium PB is assembling for developing a 500MW IPP in the Kingdom of Saudi Arabia. Al Toukhi confirms further to endeavor its best efforts to make the consortium's mission smooth and successful. Al Toukhi's role, obligations and rights pertaining to the said consortium and project, as well as the structure of such consortium, shall be as negotiated and agreed between the parties in due course.

Yours sincerely,

Mohammed Alyami



Vice President, Business Development

Qualifications of Parsons Brinckerhoff and Services

Why PB?



Delivery of the project requires a full service engineering consultant with a complementary blend of project management, design, procurement and site supervision expertise, combined with a strong understanding of the Middle East power development environment.

Parsons Brinckerhoff (PB) is just such a team. We have been working on power and water projects in the Middle East for over 40 years, many of these located in the Kingdom of Saudi Arabia (KSA). Our portfolio in the Middle East includes such major power and desalination projects as Shuweihat S1 and Al Taweelah B in Abu Dhabi and Ras Laffan C in Qatar, with reference KSA Construction Management (Owner's Engineer) projects such as the recently completed Riyadh PP8, the Faras power plant, and recently contracted Riyadh PP10 and Wadi Dawasir; as well as project management and site supervision of landmark developments in the UAE including all infrastructure works for Nakheel's Palm Jumeirah Island in Dubai and firsts like the Masdar Initiative, which is leading the world in delivering carbon-neutral, zero waste solutions for development. Alongside this, PB has a thorough understanding of the vision, processes and procedures from our history of service to projects the Kingdom.

As part of a large organisation with a growing and dedicated local presence, PB has the ability and stability, to focus on two key areas — **people and innovation**.

We believe that the most important element of any organisation is its people, and successful people deliver successful projects. Our team will comprise an array of highly accomplished, technically talented professionals from a variety of backgrounds and disciplines. We invest in their development, promoting management skills and planning, design and construction expertise through embedded systems of training, certification and mentoring, whilst encouraging constant innovation. A recent example of our focus on innovation is PB's patented 'drains cooler' technology, which was developed by engineers from within our power and water business to enhance the economy and performance of power and desalination projects and ensure effective process integration for our clients. We offer not just the portfolio of projects and ideas, but also the people who have managed these projects and who have been key to delivering on the expectations of their owners and investors.

Vision and Values

PB's vision is to be a continuing positive and highly influential force in the development and operation of infrastructure around the world. Through service to our clients and collaboration with colleagues, we will create a lasting legacy that improves the lives of people and communities.

In working towards our Vision, PB and its employees aim to live the following Values:

- We behave ethically, acting with integrity and respect;
- We work with our clients to contribute to their success;
- We care for our colleagues, encouraging their development, engagement and achievement;
- We share knowledge with our colleagues to deliver professional excellence;
- We act in a socially and environmentally responsible manner, committed to high standards of safe performance.

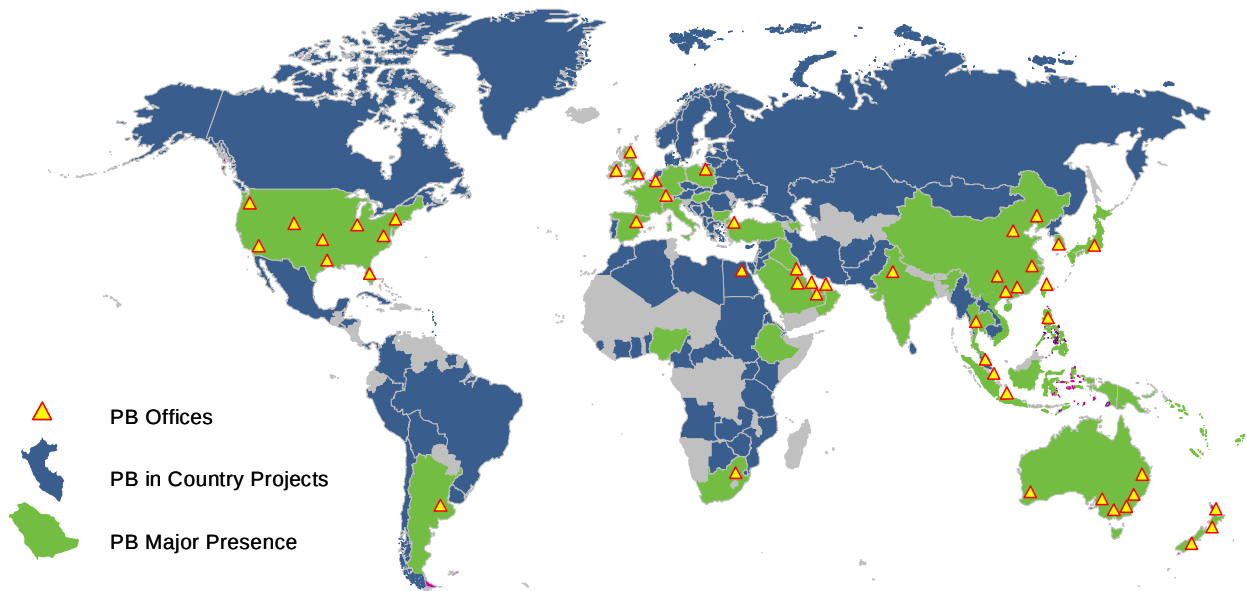
Fundamentally, PB will commit a multidisciplinary team of candidates for the project who are not only highly experienced and professionally qualified, but also proven as a fully functioning team.

Company Overview

Parsons Brinckerhoff (PB), founded in 1885, is one of the world's most well-established infrastructure consultancies and is recognised as a world leader in strategic consulting, planning, engineering, program management, construction management and operations and maintenance for all types of infrastructure. We have participated in some of the world's most notable infrastructure projects, including the Masdar carbon-neutral and zero-waste city and Ras Laffan C - Qatar's largest new-build power plant and desalination facility.

As a wholly owned subsidiary company of Balfour Beatty, PB's staff resources total over 13,000 across 150 corporate and project offices worldwide. In addition to its US-based headquarters, PB has major, regional offices located in Dubai, London, Hong Kong and Sydney - for our clients, this means responsive, local capability that complies with standards of international best practice.

In the Middle East, we serve clients across all markets - power and water, buildings and infrastructure, transportation and environment. Active in the Middle East since the 1970's, PB has roots in the region dating back as early as the 1940's.



PB worldwide office locations

Over recent years, we have focused on developing a strong local presence to better serve our clients and are now in 13 locations across the region, including Dubai, Abu Dhabi, Oman, Jordan, Kuwait, Saudi Arabia, Bahrain, Iraq and Qatar.

PB has delivered some of the world's most prestigious projects that have not only responded to the clients' vision, but have also positively impacted communities. Our vast experience in the generation and transmission of power in the Middle East, delivered by our team of leading experts will bring specific knowledge of local conditions to the 500MW Power Plant.

Serving the power industry

PB is a world-class company serving today's global power industry-developers, owners, lenders, governments, utilities and contractors.



PB's global power business combines the consultancy businesses of Merz and McLellan (acquired PB in 1995), Kennedy & Donkin (integrated into PB in 1999), Design Power (the engineering consultancy arm of Electricity Corporation of New Zealand, acquired by PB in 1998) and PB Energy Services. Our global power industry clients have access to the best power-related technical and management skills in the world.

PB's power division is a global business line providing specialist advice to the electricity and power industries.

Clients come to PB for the full range of project development services, from project planning and financial feasibility, to civil, electrical, mechanical, structural, architectural and environmental engineering, to program and construction management services. We offer the benefits of technological innovation, financial consultation and the risk assessment and management necessary for our clients to remain competitive in today's global power economy.

Whether serving as owner's engineer, lender's engineer, project manager or partner in an Engineering, Procurement and Construction (EPC) joint venture, PB's goal is always to help owners achieve economical, high-performance projects.

PB's technical strength is underpinned by a company-wide commitment to quality, working under a quality assurance system that is certified to ISO 9001. The ISO 9001 guidelines cover our entire operations including design, project management, procurement, accounting, administration, scientific studies and software development.

Groundbreaking power generation

Our project portfolio includes:

- coal power plants
- oil power plants
- gas-fired power plants
- hydroelectric power plants

and alternative fuels, including:

- geothermal
- wind
- municipal waste

PB has built a portfolio of experience in virtually every type of power generation, including a wide range of fuel and plant types. We have engineered hundreds of thousands of megawatts of generating capacity on over 400 sites around the globe in the past 30 years alone. Our generation skills complement our transmission and distribution activities to provide the essential links between generator plant and electricity users.

Our strength is our technical diversity. Our skill and versatility - both 'inside and outside the fence' - enable us to plan, design, and inspect power plants and bring old plants back to life; engineer transmission and distribution lines; consult with governmental agencies, environmental groups, and land owners; supervise construction and installation of equipment; design, develop and refurbish support structures, foundations, insulators and conductors; and perform testing and commissioning.

A world leader in conventional power generation technology, we are also known for groundbreaking work in cogeneration projects and leveraging of renewable energy resources.

The demand for higher fuel efficiencies is raising the popularity of Combine Cycle Gas Turbine Technology (CCGT) over Open Cycle Gas Turbines, with the latest designs achieving efficiencies of 60 percent. PB has been involved in CCGT through plant rehabilitations, extensions, and modernisations, resulting in greater cycle efficiencies and reduced operating costs. We have recently worked with leading suppliers of CCGT plants, and understand all CCGT technologies and recent advances.

With the growth in the independent power generation market, PB has taken an active role in project development activities and services. Our clients' satisfaction and successes have led to growth opportunities for PB - we have now supported the vast majority of recent independent water and power projects (IWPPs) in the fast-growing Middle East region.

On many projects we have acted as a representative for financing institutions in order to review and evaluate whether a project is technically sound in terms of design and performance, and to confirm that the facility can be built to the specifications put forward by the project developer. Compliance with environmental regulations in terms of air and water emissions is an essential part of these technical reviews. An important aspect of this work is the supervision and approval of performance tests on project completion and the certification of the results.

Innovations in power transmission and distribution

With PB, challenges give way to opportunities, demonstrated through such innovations as our now-patented 'drains cooler' technology to enhance the economy and performance of power and desalination projects; the world's largest thermal desalination process units and reverse osmosis plants, and some of the most groundbreaking hydropower schemes of the last 40 years.

Our expertise spans all aspects of power network engineering, including power systems planning and analysis, overhead lines and towers, cables, substations, and protection and control. PB has engineered more than 30,000 kilometres of transmission lines and related substations at voltages up to 500kV. We have provided detailed engineering for permanent and temporary substations for quick connection to rapidly growing power networks. Our detailed knowledge of international practices in power transmission and distribution brings the benefits of modern techniques to new construction projects and to the more efficient use of existing plants.



PB is recognised in particular for pioneering work in extra high voltage (EHV) transmission. To address a client's unique challenge in the 1960's PB introduced the concept of high-voltage interconnection between contiguous regions and the first 330kV system in Africa (including the first application of high-speed single-phase auto-reclosing on an EHV system). In the 1970's, PB successfully designed and implemented the first 500kV transmission system in South America, and went on to introduce 500kV ac transmission into Southeast Asia, when the firm's design was accepted for Indonesia in the early 1980s. These were historic moments in the firm's history, but most importantly, they resulted in vital infrastructure for our clients and the communities they serve.

Quality and inspection services



International utilities look to PB for independent third party quality assurance (QA) and inspection services, provided both off-site during the manufacturing program and during statutory site outages. Our dedicated staff continuously inspect major power plants and are therefore able to provide our clients with the benefit of knowledge obtained from in-depth exposure to manufacture of many machines - not just the individual unit being manufactured for a specific project.

These activities can be engaged from an initial vendor survey prior to contract award, through full QA auditing, inspection and test witness, expediting, and review and advice of special processes such as welding and NDE.

Environmental Services

Utilities, independent power producers, banks and government bodies worldwide rely on PB's environmental services and unparalleled depth of knowledge of environmental issues relating to infrastructure, in particular, the power generation and water sector.

Our multidisciplinary team comprises engineers, scientists and chemists, and our clients benefit from our expertise in performing environmental impact assessments, environmental audits, atmospheric dispersion, air and water pollution abatement studies, contamination studies, due diligence studies, power station chemistry and obtaining the environmental consents associated with power plants.

Through recent experience in the region, including environmental impact assessments for Taweelah B in Abu Dhabi, Aqaba Power Plant in Jordan and Az Zour North Power Plant in Kuwait, our team has brought comprehensive knowledge of environmental legislation and is able to provide detailed, local, technical solutions to environmental challenges.

Technical Approach

Introduction

The capability and experience of the main power plant, balance of plant suppliers and construction contractor is critical to the successful completion of the Project, as indeed is PB's understanding of the plant and equipment with which the Project will be implemented. PB has extensive experience with the major contractors and suppliers of the power plant required for this Project.

The importance of good communication on a day to day basis throughout the design, procurement, construction and commissioning phases is recognised. PB will establish a continuous dialogue with Manufacturers' and Contractors' personnel to ensure all issues are thoroughly reviewed and discussed.

Scope of services

The services that PB would provide to this Project would be in five parts as follows:

- Engineering Services during the Development stage
- Pre-Construction Services prior to Financial Close of the Project
- General Engineering Services: Design, procurement and approval of manufacturer's design and engineering documents, inspection and witnessing of tests at equipment manufacturers' factories
- Site supervision activities during construction, commissioning
- Services during defects liability / warranty and operations stage

Engineering Services during Development Stage

These services briefly cover:

Phase 1: Services to be provided prior to bid submission

- Plant Optimisation Study and Modelling and recommending best technical configuration solution;
- Review of Interfaces as appropriate;
- Preparation of Minimum Functional Specification's;
- Provide clarifications as sought by Contractors;
- Support EHII in suppliers Meetings;
- Technical Review of Manufacturers and Contractor's Proposals;
- Environmental Review Reports;
 - Assist with full EIA if required;
- Lenders' Preliminary Assessment Report;
- Technical Bid Preparation Support;
- Site Visits and Attendance at Meetings.

Phase-2 – Services to be provided post bid submission

- Post-bid clarifications & technical support as required;
- Technical Services for Contract Finalisation, Lenders and Insurers questions / answers.

PB Engineering Services

PB participates in EPC contracts in cooperation with construction companies that are highly experienced in power generation work.

- PB will undertake design of the balance of plant requirements and determine equipment and materials to be procured;
- PB has a track record of delivering EPC projects successfully and seeks to maximise client value through a variety of risk sharing structures. PB can undertake turnkey responsibility in cooperation with partner constructors;
- PB produces equipment specifications, qualifies vendors (as described in the Inspection and Witness section), manages and procures equipment while working alongside other team members to assure the completed plant meets all the operating requirements and obligations;
- The benefit of the EPC method employed by PB is in the combination of construction and design talent at the outset of the project. This allows the design to be tailored to specific construction methods resulting in designs adapted to the contractor's best methods, skills and standards. This method also leads to cooperative problem solving during construction to minimise disputes and keep the project on schedule.

Pre-Construction Services Prior to Financial Close Date

The technical advice and services that would typically be provided by PB prior to Financial Close of the Project may be as follows:

- Review and provide opinion on the technical aspects of the Power Purchase Agreement (PPA), equipment and construction contracts (with technical appendices) and verify consistency with the requirements of the PPA and design;
- Assist in finalisation of supply and construction contracts;
- Review of the project implementation schedule;
- Review and provide comments with respect to the Interconnection Agreements to be entered into between the Project Company and electricity utility company. If required, draft the technical appendices to the Interconnection Agreements;
- Organise, attend and provide input into supply and construction contract progress meetings;
- Assess the competency and qualifications of proposed subcontractors;
- Assist EHII in responding to requests of the Insurers and their technical advisors;
- Assist EHII in responding to requests of EHII lawyers as regards conditions of contract and other legal issues;
- Assist EHII in the application for and pursuit of governmental approvals and permits for which the Project Company is responsible;

Upon Financial Close and award of the equipment and construction contracts, meetings will be held with the equipment suppliers and contractor(s) for the purpose of establishing the Project procedures to be adopted to ensure the Contract is administered, supervised and executed in a well-organised manner. At these meetings the scope of work will be reviewed and information given to the suppliers and contractor for the format of the project programme and contents of progress reports.

General Engineering Services

Project Procedures Manual

PB will prepare a Project Procedure Manual containing all the instructions and procedures needed for proper organisation and co-ordination of activities and correspondence during the Project. Once agreed, the Project Procedure Manual will be binding on all parties involved during the period of the Contract implementation.

Project Planning, Scheduling and Monitoring

The development of a realistic and comprehensive programme for the Project is essential to its success. PB will prepare the Project Companies overall project schedule which shall integrate the design, equipment procurement, construction and commissioning schedules.

PB holds discussions with the suppliers and contractors in order to agree on the appropriate information required to fully monitor the Project. It is expected that the programming will be based upon use of Primavera software, wherein, a critical path will be determined, which will form the basis for progress monitoring. PB can identify information which is required from the Contractor on a regular basis and which will serve as principal indicators of progress towards overall completion.

The Contract programmes and Critical Path would be reviewed and audited to ensure that they accurately reflect the logic, realism, sequence and timing of Project activities. If any anomalies are identified they will be discussed with the Contractor to ensure that it presents a detailed schedule, which is acceptable to all parties. When PB is satisfied that the programme is an accurate representation of forthcoming activity, formal approval will be given to the programme.

Progress in the manufacture and delivery of equipment from manufacturers' works will be reviewed by quality surveillance engineers, to alleviate potential delays at the earliest possible stage so that pressure may be applied and escalated to the appropriate management level to obviate any possible cumulative delays.

On-site construction work progress will be reviewed against the agreed programme so that adjustments can be made if necessary and the Contractor requested to deploy additional resources to maintain the required target commercial operation date.

Design and Review

As the main power plant will be delivered on a turnkey basis, it is the supplier's responsibility to ensure that guaranteed performance, availability and construction programme are met. The PB design review team would maintain an overview of the design to ensure that good engineering practice and compliance with the Contract and relevant codes and standards are achieved by reviewing critical drawings and documentation.

Interface Management

It is anticipated that there will be a large number of interfaces to be managed. In this respect, PB understands the importance of initially identifying all interfaces and then monitoring progress of the engineering for each interface.

The main areas of interface include, but are not limited to:

- between package suppliers within the power plant;
- between power plant and HV Substation and OHL Transmission system;
- between power plant and Load Despatch Centre;
- between power plant and water supplies;
- between power plant and fuel supply pipelines and supplier.

Whilst the main power plant supplier is responsible for agreeing the interface details and undertaking the work at the tie-ins, PB shall closely review all details and expedite progress and communication/interaction between the supplier, contractor and other parties.

Inspection and Witnessing during Manufacture

PB would develop and implement an integrated plan for monitoring, inspecting, witnessing and reporting on testing activities associated with the Contract works.

It would also be proposed to undertake a Quality Assurance (QA) audit of the Contractors Project Organisation and quality control programmes. This is a technique that PB has used very successfully on previous similar assignments and serves to ensure that the main Contractors are controlling their quality assurance arrangements satisfactorily and in particular with reference to subcontractors.

PB would develop and implement procedures and documentation to manage, record and communicate the Engineers' inspection, expediting and witnessing activities.

In addition to the planned inspections, the manufacturing history of the particular equipment will be checked as evidenced by the supplier's internal inspection documentation. Of particular relevance is the examination of internal non-conformance reports and their disposition. The purpose in reviewing the internal non-conformance reports is to ensure that the Project Company has the benefit of an independent assessment of these non-conformances.

Detailed reports of the results of each inspection visit, which will also include a section on the progress status of the equipment at that supplier's works, will be forwarded to the Project Company following the visit. Separate progress and expediting visits have also been programmed into this proposal.

In the event that the PB inspecting Engineer finds a non-conformance during the course of the inspection the Project Company will be informed immediately.

Site Supervision Services

PB carries out the Site supervision of the Contractors by establishing an appropriate Site team as the example depicted in PB's organisation chart for the Site team included in this document. PB's site presence would usually commence with the Senior Civil Engineer, and thereafter, the Site Manager, Construction Manager and discipline Senior Engineers and Inspectors to suit the build up of construction activities. Whilst the Project Manager retains overall responsibility for the Project, responsibility for all site activities would transfer to PB's Site Manager upon arrival in accordance with the manning schedule developed to suit the projects needs.

Support to PB's Site team on any specialist issues would be provided by PB's Home Office staff and, in general, PB would act for EHII on Site related matters and provide necessary liaison between EHII and the Contractor.

PB would conduct regular site meetings with the Contractor to cover all key organisation, staffing, health and safety, environmental, quality assurance, design and construction control issues, and construction, materials sampling, commissioning and testing procedures. Other meetings would be called as may be necessary.

PB would in addition, develop and maintain a punch list of open items and assist in expediting their completion and close-out by the Contractor. Upon mechanical completion and during the testing and commissioning phases PB would arrange with the Contractor the production of a defects list. Prior to completion of the sections of the Plant, PB would expedite clearance of the defects so at the time when handover is achieved the number of defects is reduced to a minimum.

Testing and Commissioning

Witness, monitor and approve safe and controlled pre-commissioning, commissioning, plant start-up tests in coordination with EHII. Coordinate any plant outages with EHII and the Operator. PB would provide EHII with recommendations regarding Mechanical Completion, Substantial Completion, Take Over and Final Completion as per the terms of the Contract.

Monitoring of Performance and Acceptance Tests

Prior to the Plant tests commencing PB would review and comment upon the Contractor's programme and procedures. PB will monitor the testing, attend and witness the Performance, Reliability and Plant Dependable Capacity Tests and Acceptance Tests in order that it may be determined that the plant is safe, ready and complete for such tests, and that the tests are carried out with such diligence that an accurate test may result. PB will examine the results to determine that the Plant has been satisfactorily completed, has met its contractual performance guarantees, and may be taken over by the Owner. PB would review and approve the Test reports prepared by the Contractor(s).

Operating and Maintenance Manuals and As Built Drawings

The commissioning, operating and maintenance instructions will be required from the Contractor(s) at least four months in advance of completion of the first section of the Works. Thereafter a continuous process of review and revision will commence to ensure that these critical documents fully reflect the Plant and are provided in a concise, accurate and logical manner.

The O&M manuals will be provided by the Contractor(s) in electronic form and supported by drawings, photographs and if required video films.

The necessity for a certain amount of duplication of information between sections of the manuals will be recognised to avoid excessive cross-referencing to facilitate access to information by the various groups and disciplines of personnel involved.

Early in the Project the exercise of identifying the drawings to be provided in the As Built format will commence. Throughout the construction phase of the work a recording system will be implemented to record any site modifications and these records will be used to ensure that the final As Built Drawings accurately reflect the As Built Status of the Plant. PB would supervise the preparation, check and certify “as-built” drawings submitted by the Contractor(s) for the purpose of establishing project records.

Take Over Certificates

Once the Tests of Completion and all other specified requirements relating to take over of the plant are met by the Contractor(s), PB would assist the Owner to prepare Take Over Certificates (TOC) for the defined sections of the Plant.

Attached to these TOC will be lists of any outstanding works and defects identified during the final inspections held at the time the plant is offered for take over.

Maintenance and Warranty Period

The Works taken-over by the Project Company (Owner / EHII), although commercially in operation, would require completion of all the outstanding works or defects. In addition, during this period, it is important that the performance of the equipment is reliable and meets the guarantee requirements.

PB's Warranty Engineer (or manager) would continue at site as per the agreed manning schedule and generally perform the following services in coordination with the Operation team:

- providing engineering advice as necessary;
- maintaining records of the defects recorded at Take Over and expediting clearance of these defects by participating with EHII in certifying clearance of these defects;
- recording, investigating and expediting the rectification of any defects arising during the Warranty Period;
- providing data / records for EHII in resolution of any disputes that may arise between Owner and the Contractor during this period;
- check that the Contractor maintains on site adequate stocks of spare parts and consumables as specified in the Contract documents;
- issuing in conjunction with Owner and Final Certificates to the Contractor.

Other Related Services

Quality Management

PB in the Middle East maintains an integrated management system fully certified under ISO 9001, ISO 14001 and OHSAS 18001 standards.

PB implements project procedures that reflect state of the art systems to deliver world class projects.

PB has developed a comprehensive corporate quality management system which is certified through Det Norske Veritas, (DNV), an accredited third-party management systems registrar to ISO 9001:2000, to ensure that deliverables meet your requirements, we can implement rigorous quality management processes throughout all project phases. These processes define the quality assurance reviews and quality control techniques required to assess the level of deliverable and process quality within the project.

PB was the first project management company to achieve this difficult certification.

The project manager is issued a quality manual, which mandates policies and procedures to be incorporated into the project. ISO requires a company to maintain an internal quality assurance program, which is audited at least twice a year. This gives our clients the added assurance that PB will deliver the highest quality services expected from a leader in the industry. The impact of this certification can be seen in our work every day.

In conjunction with the existing construction supervisor or engineer we will establish and implement Quality Assurance and Quality Control procedures in accordance with the requirements of the Owners quality policy. This will be in the form of a quality manual.

PB will endeavour to ensure that the construction supervision consultant or engineer implements a computerised inspection and test management system.

PB will monitor the activities of the construction supervision consultant or engineer to ensure that project Safety procedures are followed.

PB will carry out observations of quality and issue NCRs for areas that non conformance is found and recommend solutions for correcting faults found to the Owner.

Health, Safety and Environmental (HSE) Management

PB is fully committed to the health and safety of all project participants, to the security of the persons engaged on the project and of the works themselves and to the safe management and improvement of the environment in which the project is carried out.

It is PB policy to conduct all operations with the highest regard for the safety and security of those working or visiting the project site.

With this in mind all parties who work on the project during the construction phase are required to commit adequate resources, being manpower, knowledge, time and money to actively manage risk and hazards, to prevent accidents and ill health.

There is a clear responsibility on senior managers to take an active role in driving good practice throughout the organisation and to demonstrate through their actions and words the importance of proactive environmental health, safety and security management.

PB will endeavour to ensure that the HSSE plans required of all consultants and contractors are in conformance with the Project Companies HSSE policy, Kingdom of Saudi Arabia Metrology and Environmental Protection Agency and other contractual requirements.

PB recognises that the Project would need to comply with the emission levels contained in the World Bank / IFC's new Environmental, Health and Safety Guidelines for Thermal Power Plants (draft dated March 2008).

PB would review methods statements, risk assessments and work plans, safety reporting and related data (monthly required reports) and implement processes for regular scheduled inspections and audits of contractors and subcontractors.

PB would endeavour to ensure that emergency and incident response plans are in place and first aid facilities are readily available.

PB will focus particular attention on compliance against the following:

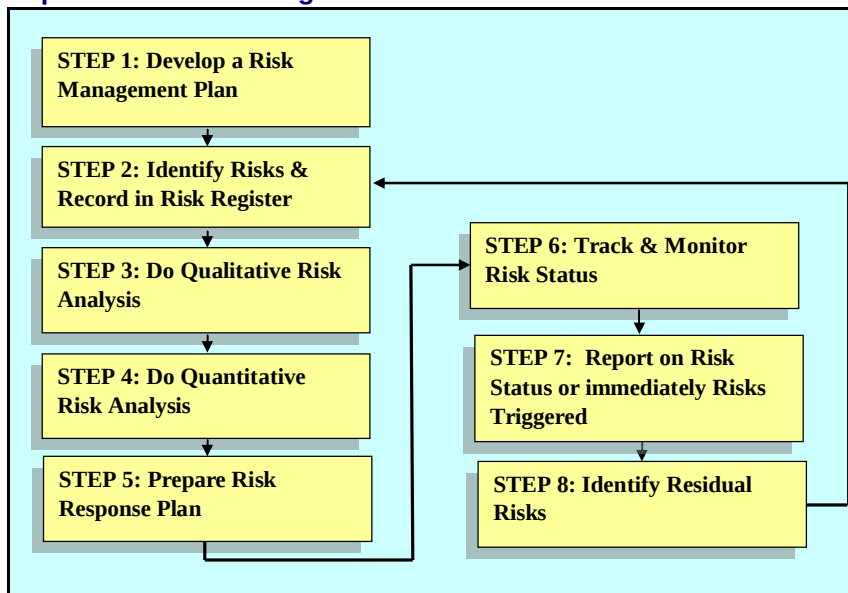
- success in meeting monthly environmental, health safety and security objectives;
- compliance with the induction process requirements;
- environmental, health, safety and security incident performance rates;
- reporting of accidents/incidents and their investigation;
- timely submission of weekly/monthly reports;
- attendance at safety meetings by senior staff;
- number of environmental, health, safety and security tours, inspections and audits undertaken;
- positive safety incentive schemes;
- development and adherence to training programme;
- training achievements;
- improvement and accident/incident reduction schemes.

Risk Management

PB can formulate and implement a systematic risk management process by introducing and embedding consistent processes and tools in a practical and sustainable way to manage risks such that the threats to the success of the projects are minimised and the opportunities are maximised.

The Risk management process to be followed is as illustrated in the accompanying diagram.

Key Steps in the Risk Management Process



The primary objective is to identify the risks associated with the project and determine if they may be avoided, reduced, spread, transferred or prevented and thus:

- avoid unnecessary cost increases through delays, lack of coordination, sequencing of work, late changes, retro fitting solutions or other unexpected problems;
- improve overall control and management of the project;
- improve programme delivery through early identification of risks and pro-active management of these; and
- actively seek opportunities for project schedule or cost improvement.

PB will thus also ensure that risk is owned at the appropriate level within the programme, commensurate with achieving the delivery schedule at optimal cost.

Following the drafting of a Risk and Opportunity Management Plan (RMP), which will be completed during the Handover Period, PB will conduct a formal risk identification exercise. It is proposed that the first of the risk workshops required to complete this exercise be held before the end of the Handover Period to identify all risks and opportunities currently facing the project. The output from this exercise will be a detailed Risk Register that will become an auditable record of all risks identified as well as the qualification, quantification, prioritisation, response planning and monitoring actions.

Qualitative analysis of the risk data identified will be carried out through a combination of independent assessments, obtaining expert opinions and through risk work shops, to build up an overall assessment of the probability of occurrence, possible scale of impact and to determine priorities for addressing the risks identified.

In conjunction with the qualitative risk analysis a quantitative risk analysis will be carried out to achieve a number of objectives, including but not limited to:

- measuring the probability of risks occurring so as to help determine the combined effect and overall impact of the identified risks on the project objectives;
- assessing reasonable contingencies for cost and schedule;
- scenario analysis to assist in the identification of solutions for improving performance and working procedures as well as optimising resource requirements and allocation; and
- sensitivity analysis to identify those risks that are likely to have the greatest impact on the project objectives.

The results from the analyses of the risks will be used to develop a Risk Response Plan and to determine the required mitigation actions, management strategies, allocation of responsibilities and determination of the action schedule in order to enhance opportunities and reduce threats to the project objectives.

Regular monitoring and control of the status of the risks, opportunities and effectiveness of the mitigation action plans will be embedded into the project's culture and procedures.

The Risk Monitoring and Control process incorporates the following activities, which will be executed throughout the life of the project:

- identifying and planning for new risks and analysing them as they arise;
- checking that project assumptions are still valid;
- keeping track of the already identified risks to ensure that they haven't changed;
- re-analysing existing risks as well as the risk trends;
- re-estimating and rescheduling the project as necessary;
- monitoring trigger conditions and "Early Warning Notice" systems;
- monitoring residual risks and updating actions as necessary;
- reviewing the execution of risk responses and evaluating their effectiveness;
- updating the historical database;
- monitoring contingency reserves and adjusting where necessary.

Tools and techniques used to monitor and control the risk management process include Risk Reassessments, Risk Audits, Variance and Trend Analysis, Technical Performance Measurement and Reserve Analysis.

Key Experience of Team

Owner's Engineer Team

As one will appreciate, the Middle East power and water market is very busy at the present time with various large projects running in parallel. This market situation is putting pressure on resources for all of those involved in the market, from developers to lenders to contractors and advisors. PB is no different to any other participant at the present time and, hence, it should be noted that PB's team members, as detailed below represent "typical" personnel only; inclusion of the names provided by PB herein does not necessarily signify that they will be available to support the project.

As a consequence, the profiles included within this proposal for the Middle East team members should be considered indicative i.e. they are intended to purely highlight the capabilities of those that PB would intend to provide for the respective positions.

Typical Organisation charts of the PB Project team follow the staff biometric data.

Management Team; Key staff biometric data

Dr John Richardson – Project Director (Abu Dhabi-based)

John Richardson is based in PB's Abu Dhabi office and, as a Company Director, he is responsible for leading PB's Power & Water market sector interests within the Middle East region. As a certified PB Project Manager and consultant, John has, for example, full responsibility for marketing, business development, recruitment, resourcing, projects specifications and tendering, contract negotiations, project technical management, budget control and management and project finance. John has knowledge of general power plant design and has been responsible for the development and assessment of a number of power plant arrangements. John also has experience in the design and testing of low NOx systems aimed at developing and improving combustion system performance and providing solutions to abate atmospheric pollutant emissions.

Project Manager: John Martin

John Martin has over four decades of experience in the design, construction, and commissioning of large power stations. He is experienced in both power (and water) plant design and project management. Throughout his career he has been responsible for the management of large power plant projects both on a "turnkey" and "multi-contract" basis from inception through completion. John brings to this project not only an unrivalled level of technical skill, but also a long history of work on some of the region's most important power projects - dating from Jebel Ali 'E' Station and Aweer GT Power Station "H", to more recent projects such as Fujairah F2 Independent Water and Power Project and Mesaieed A Independent Power Project - proving his ability overcome specific, local challenges to deliver successful power projects.

Construction Manager: Fred Fawcett

Fred Fawcett has more than three decades of experience providing construction management/site engineering services for the development of power stations throughout the Middle East and UK. Fred has successfully supervised the construction of a number of Open Cycle Gas Turbines and Combine Cycle Power Plants, and brings proven experience from recent projects including Az Zour South OCGT in Kuwait, and the Ballylumford and Seabank CC Plant in the UK. His assignments have encompassed boiler units, turbines, waste heat boilers, water treatment plants and associated pipework. Fred is currently working in Qatar on a Power and Desalination project.

Senior Electrical Engineer: Dave McKee

David McKee has 26 years broad experience from worldwide industrial, mining and power station projects. His key areas of expertise include high, medium and low voltage installations and commissioning; project engineering and contract management, including subcontractor supervision; and engineering design team management.

David brings practical experience of the full project life cycle; from tender preparation and electrical estimating, plant conceptualisation layout and design, to documentation, drawings, schematics and cable engineering preparation and handover, to contract close-out, workshop and manufacturing supervision, workshop testing (FAT), draughting supervision and instrumentation and PLCs

Senior Mechanical Engineer: Collin Beresford

After a fully comprehensive apprenticeship in theory and practice in the disciplines of engineering and enhancing aircraft propulsion systems, in the Royal Air force, Collin has developed a career of nearly 40 years. Professionally qualified and has established himself into a diversely qualified and experienced mechanical engineer with the specific skills of an engineering specialist in construction validation and commissioning in the mechanical, energy, environmental and instrumentation fields on power station and oil and gas projects.

Senior Mechanical Engineer: Richard Hill

Richard Hill is a chartered engineer with many years of experience related to major power and water projects in the Middle East and UK. Considered one of PB's leading desalination experts, he brings critical experience from his employment as senior and lead mechanical engineer for the construction, commissioning and start up phases of the conversion of OCGTs to combined cycle in Qatar.

Richard also brings essential expertise in water and waste water treatment schemes, and the installation of heat recovery steam generators. His skill set ranges from the development of feasibility studies, preparation of detailed design, design coordination, planning, and procurement, to expediting and management of site installation and commissioning activities.

Senior Civil Engineer: Chris Hodgson

Chris Hodgson has been employed continuously in the construction industry since 1970 and has considerable international experience - he has contributed to projects in the Middle East for more than 20 years. His main expertise lies in project management of multi-discipline teams on power, desalination and industrial facilities. His project experience ranges from new-build to repair and refurbishment of existing buildings and facilities. He is knowledgeable in project management, detailed design, design audit and site supervision.

Chris' Middle East experience includes appointments as resident civil engineer for the Az-Zour South Gas Turbine Project in Kuwait, resident civil engineer for the Al-Hidd Phase III Desalination Plant in Bahrain, and, more recently, construction manager infrastructure for the Bawadi Project in Dubai, project manager for four 132/11kV substations and project manager on the Ras Abu Fontas A1 Desalination Project in Qatar.

Senior I&C Engineer: Edward Frank Rimmer

Edward Rimmer is a successful, degree qualified and highly motivated Senior Instrument & Control Engineer with over 34 years extensive experience, (over 24 years overseas) in the Oil/Gas, LNG/NGL, Refinery, Chemical/Petro Chemical, Water Treatment and Power Generation projects worldwide.

Edward has gained experience in all project phases from initial engineering/design group supervision, instrument specification/purchase, production of all I&C related documentation/drawings, participation in factory & site acceptance tests through to site construction, commissioning and start up.

Senior GIS Engineer: Ian Robson

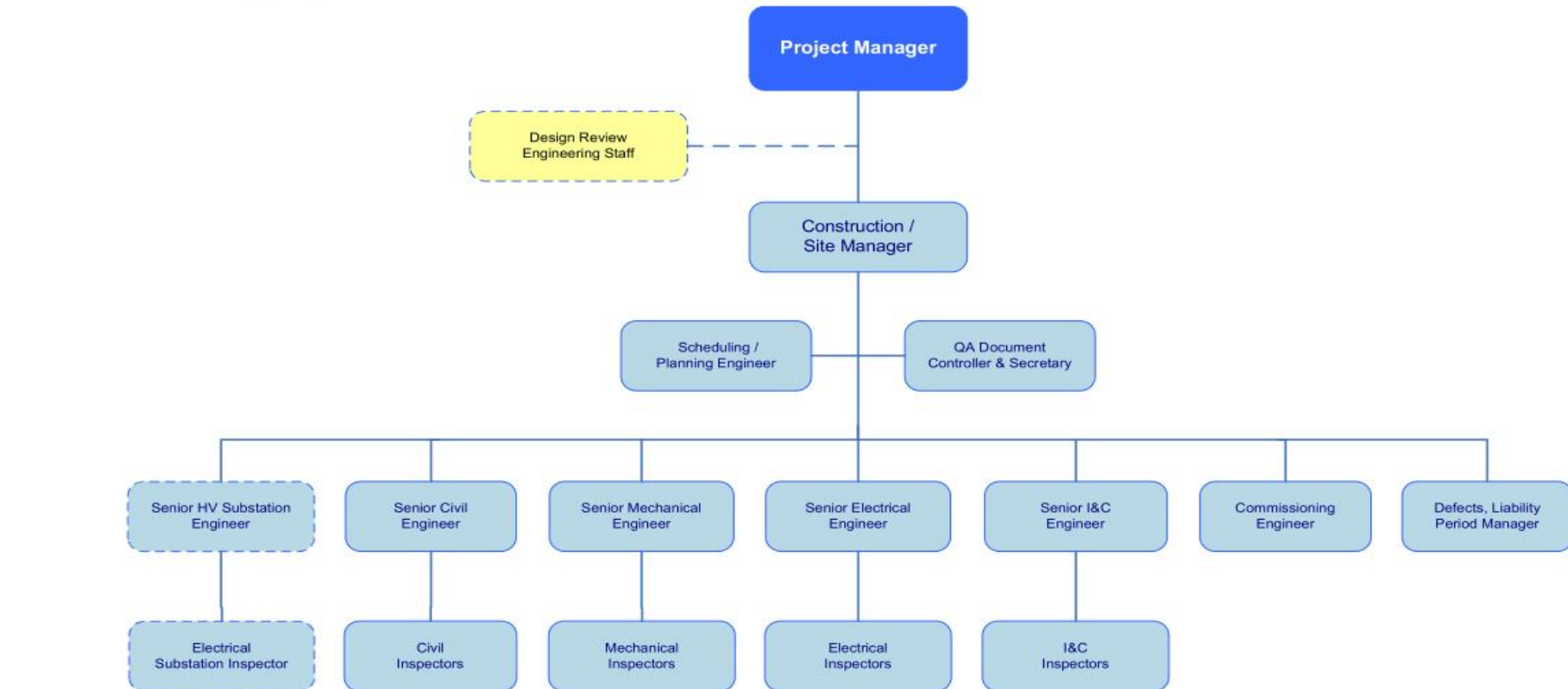
Ian Robson is a Substation Engineer specialising in the design and specification of high voltage substations and project management of substation projects. He has been involved in a project involving several substations in Qatar of 220 kV, 132 kV, 66 kV, and 11 kV and has been responsible for a 66/11 kV substation and 11 kV distribution substations project for a large medical facility in Qatar. During the installation and commissioning period of this project he also acted as site engineer where he was responsible for supervising the installation and commissioning of the works.

Prior to joining the company he specialised in the design of high voltage circuit breakers. He participated as part of a team developing new products and supporting manufacture of existing product range in the Circuit Breaker Design Department of a switchgear manufacturer. He has detailed knowledge and experience of Interrupter design including constructing and analysing electrostatic field plots of new Interrupter designs. He has supervised the build and setting of circuit breakers ready for short circuit testing, including testing of dew point of SF6 gas using Burlec Cell equipment as well as strip and modification of hydraulic mechanism to achieve optimum trip and closing speeds for testing. He has been involved in the preparation of detail and assembly drawings of Extra High Voltage Circuit Breakers using CAD and 3D Modelling Package.

Design Coordinator: Ramachandran Venkatesh

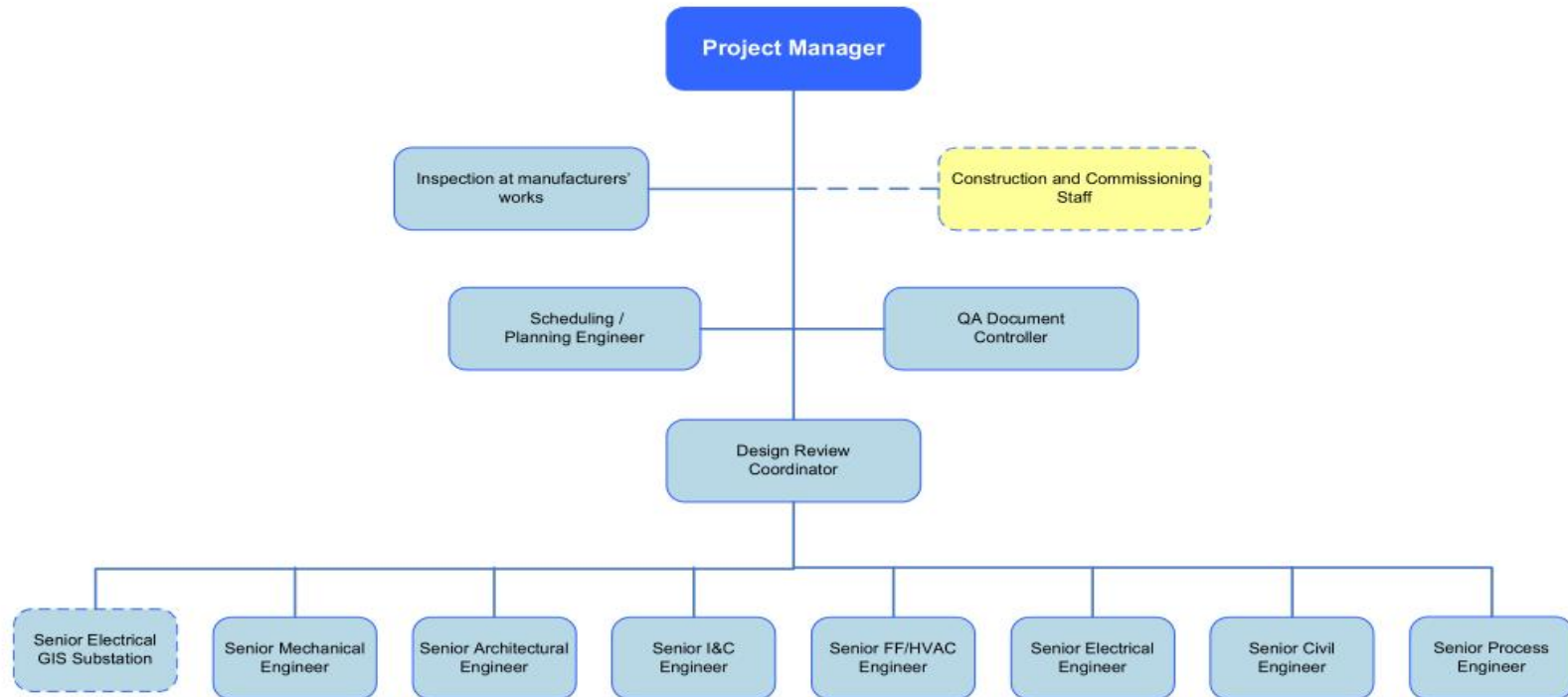
Venkatesh is a senior mechanical engineer with 18 years experience. He has considerable, specialist experience in the detailed engineering and project management of large power (CCGT and other) Plants. He brings a wealth of experience from numerous projects in the UAE and wider Middle East, with recent projects including Ras Laffan C IWPP in Qatar and Fujairah F2 IWPP in the UAE. His specific areas of expertise include design review, feasibility and due diligence studies, plant life assessment studies, witnessing of performance tests, and production of tender documentation. He also has a proven leadership record in site management and managing design review teams.

Construction and Commissioning Staff
(Typical)



Design Review Engineering Staff
(Typical)

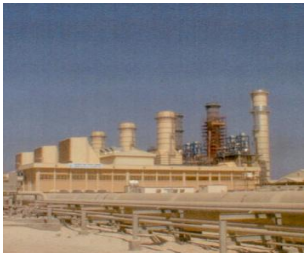
EHII 500MW Power Plant



PB Relevant Experience

Project Description	Scope of Consultancy Services provided	Date of Project Commencement /completion	Project Value (UAE Dhs.)
Shuqaiq Phase II IWPP, Saudi Arabia The Shuqaiq Phase II IWPP will comprise of power generation and desalination facilities with a net power capacity of 850 MW and 212,000 m ³ per day of water to meet the expanding needs of the cities of Abha, Al Birk and Jizan by 2011.	PB provided technical adviser services during pre-bid and post-bid submission activities to one of the developer consortia for this project. The proposed plant will consist of three power blocks and four desalination units each crude-oil fired boiler will be directly coupled to one condensing extraction steam turbine. Water production is based on MSF technology.	2008	n/a
 Ghazlan II Power Station, Saudi Arabia The 2400MW Ghazlan II Power Station, located 80km north of Dammam on the Gulf Coast of Saudi Arabia, is one of the largest power plants in the Middle East. In 1996, due to increasing demand for energy associated with industrial expansion plans in the region, the Saudi Electric Company's Eastern Region Branch sought to construct a major extension of the gas-and-oil-fired plant to supplement its generation capacity.	PB performed overall consultancy services, including design audit and supervisory services for the construction of the 4 x 600MW conventional steam turbine generator power plant which included a fuel tank farm with four storage tanks. A turnkey contract approach was adopted for the supply of the plant. Additional works featured a breakwater, cooling water intake and discharge channel, four turbine generator blocks, steel framed ancillary buildings, a 380kV GIS substation, a gas reduction station, and a desalination plant with a capacity of 4,000 cubic metres per day. Commercial operation of the first 600MW unit was successfully synchronised by September 2001, exporting much-needed power to the grid. The remaining three units were ready for use the following year.		

Rabigh Power Station Extension, Saudi Arabia	PB provided engineering services in association with Saudconsult for the civil, electrical and mechanical design works for an extension to Rabigh Oil-fired Power Station on behalf of Saudi Consolidated Electricity Company in the Western Region. PB was responsible for providing engineering services, including site supervision for the electrical and mechanical plant and equipment and the civil engineering works for the conversion of crude-oil open cycle gas turbine plant to combined cycle.		
Shuweihat S1, Abu Dhabi, UAE Shuweihat S1 was the third independent water and power plant (IWPP) to be promoted by the Abu Dhabi Water and Electricity Authority (ADWEA) to address the ongoing needs for additional power and water capacity in the Emirate. The Shuweihat S1 IWPP is a 'greenfield' construction of 1,500MW and 100MIGD of power and water capacity in the Western region of Abu Dhabi. In addition to the main dual-fuelled plant itself, the project encompassed electrical special facilities (a 400kV electrical substation) and shared facilities. 	In late 2000, PB was appointed developer's engineer by an International Power/CMS Energy consortium to provide technical support during the developer bidding process launched by ADWEA. Having successfully assisted the developer consortium to secure the rights to implement the project, PB was subsequently appointed by SCIPCO, the project company, to provide full owner's engineer services through to plant commercial operation in 2004. This major IWPP project for Abu Dhabi was completed in just 34 months and its performance exceeded expectations.	2000 – 2004	\$1.5 billion
Al Taweelah B IWPP, Abu Dhabi, UAE The project was the fifth IWPP developed in Abu Dhabi under the Government of Abu Dhabi's program for the privatisation of the water and power sector. It involved the acquisition and expansion of the existing B plant with a power and desalination capacity of approximately 928MW and 92MIGD	PB was appointed as Developer's Engineer for the IWPP led consortium, in its bid to acquire the existing 1070MW plus 100MIGD Taweelah B plant. PB provided technical due diligence of the existing plant to assess the potential to meet the performance and availability requirements. This included assessments relating to performance,	2005-2007	\$1.8 Billion

	respectively, by approximately 1000MW and 65MIGD. The combined plant provides capacity of approximately 2000MW of power and up to 160MIGD of desalination, and is one of the largest power and water desalination plants in the Middle East region.	plant condition, integrity and reliability. PB then assessed the performance of the new plant and reviewed the interfaces with the Abu Dhabi grid system. PB also produced functional specifications for the new works and assisted the Consortium in the preparation of its bid and post-bid clarifications. PB is now providing full Owner's Engineer Services for the project which is being built by Siemens and Fisia Italimpianti.		
	Al Taweelah A2 IWPP, Abu Dhabi, UAE Al Taweelah A2 was the first IWPP project in this area of the Middle East. This 710MW and 50MIGD combined cycle gas turbine power and desalination plant was constructed by a consortium of Siemens AG and Korean Heavy Industries and Construction Co Ltd for developer CMS.	PB was technical advisor to the lenders, Barclays Capital. PB provided evaluation and technical advice up to financial close; independent evaluation of plant capital operating and maintenance costs; due diligence review of related agreements for provision of power and water, EPC and operation and maintenance contracts; technical advice throughout the construction and guarantee periods; and appraisal of performance test procedures, test witnessing and evaluation of test results. PB is currently Lenders' Technical Adviser to ANZ and Société Générale for the refinancing of the project.	1998 – 2001	\$1 billion
	Umm Al Nar Privatisation and Expansion Project, Abu Dhabi, UAE ADWEA was seeking to select a developer partner for the Umm Al Nar IWPP. The selected developer/consortium would own 40 percent of a special purpose vehicle to be incorporated under UAE law to purchase, develop, build, own, operate and maintain the Umm Al Nar IWPP.	PB provided technical support to the TotalFinaElf consortium in its bid to ADWEA to act as developer on this project. These services gave PB a valuable insight of both the Umm Al Nar site challenges and an understanding of the requirements of ADWEA. PB is now providing technical advisory services to the lenders for this project.	2002 – 2003	\$1 billion

Fujairah F2 IWPP, Fujairah, UAE This 2000MW power and 130MIGD desalination plant is the largest new build IWPP in the UAE to date. Included within the 130MIGD of desalination is 30MIGD of RO desalination.	PB initially provided Developer's Engineer services to assist the bidding consortium secure the developing rights. PB's initial services included a review of RFP, support during bid preparation, plant modelling, thermal cycle modelling, assistance with contractor negotiations, production of minimum functional specification for power and desalination plant, technical review of EPC proposal for power and desalination plant and technical assistance during clarifications. PB is now providing full Owner's Engineer services to the project including design review and site supervision through to completion.	2007-2010	\$2.2
Fujairah IWPP Lenders' Engineer Services, Fujairah, UAE Services for the expansion of the existing 750MW and 100MIGD capacity to 1000MW and 100MIGD. This project, which uses RO desalination for approximately 40% of its product water, was ADWEA's sixth IWPP.	In early 2006, and upon the appointment of SembCorp for the project, PB was appointed by Barclays Capital and Societe Generale to provide technical advisory services in relation to the project financing. PB's services to the lenders included pre-financial close review and technical advice, technical appraisal; assessment of EPC Contract; review of capital costs; review of EPC Contract; permits; financial modelling and performance assessment report (with particular emphasis on availability and the reverse osmosis plant). PB continues to support the lenders.	2006	n/a
 Ras Laffan C IWPP, Owner's Engineer, Qatar Ras Laffan C is being developed on a fast-track basis to help meet the demand for electricity in Qatar, which is increasing at a rate of approximately 17 percent annually. The project will be able to produce 2730MW beginning in 2011 and will provide 63MIGD of desalinated water. It will be located in	PB is serving as Owner's Engineer for the Ras Laffan C Independent Water and Power Plant (IWPP) project in Qatar—the country's largest new-build power and desalination facility to date. PB is assisting with project management, design review, supervision and coordination through the engineering, construction, inspection, testing and commissioning phases of the project. PB's scope of work also includes development of related	2008-2011	\$3 billion

	Ras Laffan Industrial City, 80km northeast of Doha.	facilities to interconnect the plant with the existing fuel supply network, water supply network, and electrical network.		
	Ras Laffan IWPP, Qatar The Ras Laffan Power & Desalination Plant consists of a natural gas fired power station, a thermal desalination plant and associated gas pipeline. The plant is located within Ras Laffan Industrial City. This 750MW and 40MIGD independent power and water project is being built on a build own operate transfer (BOOT) basis.	PB acted as Developer's Engineer. PB was selected by AES Oasis to support the technical development of the project during the competitive bidding for this project and, on the basis of PB's contribution; AES Oasis bid was successful in being awarded the \$750m project.	2003-5	\$0.75
	Ras Abu Fontas A1 IWP, Qatar The project comprises conversion of three existing OCGTs to combined cycle by installing three HRSGs supplying steam to three new MSF desalination units (FISIA ITALIMPIANTI) each producing 15MIGD of desalinated water to a new water treatment facility to supply water to the State-owned off-taker Kahramaa.	In October 2007 PB was appointed as Owner's Engineer by Qatar Electricity and Water Co. (QEWCo) to provide detailed design review, approval and supervision at site services for the Ras Abu Fontas A1 Plant. The RAF A1 Plant is additional MSF Desalination Plant being added to the existing RAF A Station increasing the capacity of the site by 45MIGD. PB is providing project management and engineering services, factory inspections, construction and commissioning services and warranty period services.	2007 – 2010	1.6 Billion
	Ras Abu Fontas, Qatar The Ministry of Electricity and Water enlisted PB as Owner's Engineer for the extension to this large power and water station, which consisted of the installation of 2 x 5 MGD Ansaldo (formerly Franco Tosi) MSF distillation units.	PB provided full Owner's Engineering Services to the Ministry of Electricity and Water. PB provided full engineering services from preliminary study, including design concept, specification preparation, tenderer prequalification, tender evaluation through to design approved, site supervision and commissioning and testing of the plant.	2002-2004	\$0.7 billion
				n/a

Barka II WPP, Oman Construction of a new build 500-700MW and 26.4MIGD IWPP, including the acquisition of Rusail existing generating plant (668MW). The project includes 100% reverse osmosis (RO) for seawater desalination	In late 2005, PB was appointed by the consortium led by Suez Energy International (SEI) to provide Development Engineering Services for). PB's services included a review of RFP, due diligence support, support during Bid preparation, plant modelling, thermal cycle modelling, assistance with contractor negotiations, production of minimum functional specification for power and desalination plant, technical review of EPC proposal for power and desalination plant and technical assistance during clarifications.	2005 - 6	
Sur IWPP, Developer's Engineer Services, Oman The Sur desalination plant in Oman is the first independent water project to reach financial close in the Middle East and is a further milestone for the Omani government's drive to the liberalisation and privatisation of its utility industries.	In 2005, PB was appointed by a consortium led by Marubeni to provide Developer's Engineer services for this 20MIGD IWPP, the first in the Middle East. Based on 100% RO desalination, PB's services to the project included review of RFP, support during bid preparation, plant modelling, assistance with contractor negotiations, production of minimum functional specification, and technical review of EPC proposal.	2005 - 6	n/a
Sabiya CCGT Power Station, Kuwait In the state of Kuwait, demand continues to grow for water and electricity at a rapid rate. The Ministry of Electricity and Water (MEW) plans to supplement the current installed capacity with a number of new projects to meet the expected growth in demand up to the year 2014. Sabiya will have a capacity of 2000MW in CCGT configuration.	As Owner's Engineer, PB's responsibilities include support to MEW during the final stages of the tendering process, adjudications of the tenders and recommendation of the most suitable offer and design review.	2006 – Present	36 million
Al Hidd IWPP, Bahrain PB was initially appointed by the consortium led by International Power to provide development engineering services associated with the acquisition of the	PB provided advice to the consortium throughout the bidding process including due diligence of the existing assets, plant optimisation and plant configuration and supporting the new build procurement process. Following the successful	2006 – 2008	\$1 billion

existing assets of 910 MW and 930 MIGD together with the installation of a further 60 MIGD of desalination plant based on MED Technology.	appointment of the Consortium, PB has been appointed as Owner's Engineer providing technical services including design review, quality inspection services, construction supervision and performance testing.		
Al Ezzel IPP, Bahrain Al Ezzel IPP was the first major power project in Bahrain. The station is located in the Hidd Industrial Area. The state-of-the-art combined cycle power plant is fired with natural gas.	PB provided Technical Advisory Services to a developer consortium during the bid development phase of the project. PB provided pre-bid and post-bid submission activities for the build, own, operate and transfer of an independent power project on a proposed site adjacent to the existing Al Hidd power and water plant.	2004	\$1.5 Billion
Rabigh Power Station Extension, Saudi Arabia	PB assisted in conducting desktop assessments and pilot-scale studies for the purpose of evaluating water quality and pre-treatment conditions for seawater reverse osmosis (SWRO) using seawaters under the influence of fresh water runoff (SWUI) under an existing contract for the Bureau of Reclamation (USBR) contract (Financial Assistance Agreement No 04-FC-81-1059). PB Water assisted in mobilization, demobilization, operations, review of performance of the pilot plant in the interpretation of the data and report preparation. PB provided engineering services in association with Saudconsult for the civil, electrical and mechanical design works for an extension to Rabigh Oil-fired Power Station on behalf of Saudi Consolidated Electricity Company in the Western Region. PB was responsible for providing engineering services, including site supervision for the electrical and mechanical plant and equipment and the civil engineering works for the conversion of crude-oil open cycle gas turbine plant to combined cycle.		



Kogan Creek Power Project, Australia

The plant will, when it enters commercial operation, be the largest single generating unit on the Australian National Electricity Market and one of the most environmentally friendly coal-fired power stations complying with Queensland clean energy policy.

PB later served as the Owner's Engineer for the Tampa Bay Water Authority in the procurement process for a developer for either design build operate (DBO) or design build own operate transfer (DBOOT) services for the 9-21MIGD seawater desalination facility. PB is acting as Owner's Engineer for the Consortium CS Energy. The station will utilise air-cooled condensers and will use 90% less water than conventional power plants using fresh water for cooling, reducing the risk of reduced output during times of drought.

2004 – 2007



400kV Interconnection to Abu Dhabi Island, Abu Dhabi, UAE

The project objective is to improve the availability of electrical power supplies on Abu Dhabi Island by increasing the number of 400kV interconnections from the Abu Dhabi 400kV Grid to the Island and reinforcing the transmission system on the Island. The scope of the project covers substations, overhead lines and underground circuits. **Aqaba Oil/Gas-Fired Power Station, Jordan**

The Jordan Electricity Authority awarded PB the consultancy services for the design and construction of Units No's 3, 4 and 5 of Aqaba Power Station.

PB was awarded a contract by ADWEA for the provision of technical and project management assistance for the 400kV Interconnection to Abu Dhabi Island.

The scope of works included: a new 400/132/11kV substation E19; conversion of the existing 220/132/11kV substation E48 to 400/132/11kV; 400kV double circuit overhead lines; modifications of existing 220kV double circuit overhead transmission line; and 400kV underground circuits.

The scope of the contract covered complete engineering consultancy services both pre and post Financial Close. The civil aspect of the project covered earth works, concrete works, architectural works, structural steel works, buildings and building services, electrical and intercommunication services, parts of fire protection system, chimney (one for units 3 and 4, separate stack for unit 5, 125m high), service and potable water system, waste water treatment system, plumbing and drainage system, sewage treatment system extension to the existing CW

2002 – Present

\$2 billion

	intake pump basin for unit 5.		
Amman North and Qatrana Substations, Jordan Consultancy services for system upgrade to accommodate the new Sama Power Station and system interconnection (400/132kV substations). Ghazlan II Gas and Oil Fired Power Station, Saudi Arabia This 2400MW plant comprises four 600MW steam turbine generators, each unit with a conventional steam generator and steam turbine generator to be fired on gas or liquid fuels.	PB is currently providing consultancy services to The National Electric Power Co to develop a system upgrade to accommodate the new Sama Power Station and system interconnection. Close liaison with the client was achieved during the early stages of the project by developing the Specifications in the client's office in Amman. Design reviews and contract administration will also be carried out in Amman to maintain the close involvement of the client. PB undertook detailed design verification of major civil structures and supervision of civil engineering and building works for this 2400 MW. Additional facilities include 380kV substation, residential compound, Coast Guard camp, warehouse workshops, central administrative area, fuel lines, hypochlorite facilities, sewage treatment plant, intake and outfall structures and desalination plant.		
Shoaiba Power Plant Project, Saudi Arabia Shoaiba is located on Saudi Arabia's Red Sea coast about 150km south of Jeddah. The facilities and plant involved in Stage 1, Phase 1, Lot 1 are 3 x 367.5MW steam power plant units with boilers fires with crude oil or heavy fuel oil, with a circulating water system intake and discharge.	The scope of services provided include project management, design review, construction management and supervision of testing and commissioning of the Shoaiba Power Plant Stage 1, Phase 1, and Phase 2 which comprises 5 x 367.5MW Thermal Power Plant Units and associated 380kV and 110kV GIS substations and 380 kV transmission line. This comprises the construction of this complete thermal power plant starting with a "greenfield site" on the desert terrain of the Red Sea coast of Saudi Arabia at Shoaiba 150km south of Jeddah.		



Sabine 120 MW Cogeneration EPC Project

Orange, Texas, USA

For the Sabine Cogeneration Project, PB was responsible for complete engineering and design of this turnkey, design/build 120 MW cogeneration plant, located adjacent to the Bayer Corporation Rubber Plant in Orange, Texas.

The cogeneration plant is comprised of two GE Frame 6, DLN combustion turbine generators, two heat recovery steam generators - each equipped for supplemental duct firing, and one non-condensing steam turbine generator. The primary fuel is natural gas.

This highly efficient plant has been designed with an HRSG stack temperature of 185 degrees Fahrenheit. Special provisions in the design have been included to handle the condensate which forms in the stack. Automatic by-pass control of the preheater and HP economizer provides optimum efficiency under varying loads. The water treatment system is designed to handle high organic levels which sometimes occur in the supply water. Carbon filtration and brine treatment of the cation resin are being proposed as mitigation measures.

Poor soil conditions and limited space for equipment created challenges for the design team. PB performed several maintenance access studies to ensure that all the equipment can be removed and maintained with readily available equipment. High ground water and unstable soil required the design of wastewater lift stations to keep the waste sumps and oil water separator as close to grade as possible. This approach avoided the costs associated with sheet piles and groundwater pumps. The project scope included:

- Complete engineering and design services for 120MW combined cycle project
- 2 – GE Frame 6 gas turbines
- Packed bed demineralizers
- ABB back pressure steam turbine
- Duct fired to 1600 F
- SCR – NOx limit 5ppm

PB incorporated its single pedestal pipe support system into the design. This system, which was first used on Carson Ice-Gen, allows the pipe contractor to do most of the welding at grade. Sixty foot lengths of pipe can be lifted on to the rack at one time, since there are no vertical obstructions, typical of conventional pipe rack designs.

The facility is intended to provide in excess of 90 percent of the Bayer plant's total electrical and steam requirements. Excess power will be sold to the grid.

The project was performed on a 14 month fast-track schedule.



T.J. Labbé 100 MW Electric Generating Station

Lafayette, Louisiana, USA

Lafayette Utilities Service (LUS) has developed a greenfield simple cycle gas turbine facility located north of the City of Lafayette, Louisiana. The new facility utilizes two NextGen GE LM6000 combustion turbines generators fired on natural gas and fitted with inlet air heating and chilling. The project includes:

- 2 x LM6000 Simple Cycle Sprint GT with inlet air heating & chilling (NextGen Design)
- Full EPC Services to commercial operation specifications for major equipment & EPC contracts, & on-site construction management services
- Reverse osmosis/mixed bed demineralized water system
- Chiller / cooling tower system
- Natural gas compressors
- Black start capability
- AGC control

LUS selected the joint venture of TIC/PB to provide EPC for this project. PB provided complete engineering and design services for the project including civil, structural, mechanical, electrical, and control system engineering and design. PB Power prepared system operating procedures and provided balance of plant operator training as well as providing specifications and procurement services for over 30 equipment purchase orders.

Major equipment for the T.J. Labbé facility includes two 50 MW GE LM6000 (NextGen) Enhanced SPRINT combustion turbine generators with inlet air chilling, and heating, chiller/cooling tower, CEM, RO/mixed bed water treatment plant, 3-50 percent Fuel Gas Compressors, Generator Step-up Transformers and balance of plant equipment as necessary to support operation of the CTGs.

Key design features of the new plant include:

- Dispatchable net output from 10 MW to 100 MW on AGC control
- Single button start
- Black start capability

The units are expected to operate 2,800 hrs/year as a peaking plant. The facility is designed to cold start to synchronous idle in less than ten minutes. Black start capabilities are included in the start-up design.



BlueScope Steelworks Cogeneration Project

Port Kembla, NSW, Australia

PB is engaged by BlueScope to provide detailed design, engineering and project management as part of a wholly integrated EPC team. The project aims to replace time-expired utility assets and to implement a cogeneration option that secures operating capability, security and flexibility to ensure the longevity of the steel-making process at Port Kembla.

It will capture waste gases from the steel-making process and minimize flaring to provide significant long term environmental benefits which will reduce greenhouse gases by 800,000t pa. The complexity of integrating a new cogeneration facility on an embedded brown-field site within an operational process and without disruption represents a significant challenge. The principal components of the project include:

- Capture, storage & transportation of process gases
- Three 366t/h 104bar 520oC multi-fuel boilers
- One 240MW condensing steam turbine
- 4x85t/h demineralised WTP and 4x520t/h condensate polishing plant
- BoP and associated systems with N-2 steam redundancy
- HV electrical upgrades and new 132kV connection
- CW outfall to harbour

The plant will be designed to cater to continually varying fuel availability and steam demand, dealing with load swings of 50-85 percent continuously.

As part of the owner's integrated project team, PB is leading in all aspects of design, engineering and planning, including:

- Concept feasibility & detailed thermodynamic modelling (P&IDs, HDBs & HAZOP);
- Detailed design and engineering, including 3D CAD drafting to prepare BOQs and material take-off schedules
- Preparation and control of project documentation associated with technical specification and vendor procurement
- Engineering & commercial advice in respect of contract strategy & execution;
- Layout optimisation and process integration
- Logistics, constructability & operability studies
- Project and construction management

Preparation of ESIA for Amman East IPP 370MW CCGT

Amman, Jordan

Client

AES Oasis and Mitsui & Co

Services Provided

- Environmental Social Impact Assessment (ESIA)
- Stakeholder Consultation
- Environmental Surveys
- Support to the client during the planning application process

Benefits

- Cost effective projects through integration of key environmental issues
- Compliance with appropriate planning policies and relevant environmental legislation

Challenges

- Fast integration with the design team and client
- Tight timescale



Background

The developer is AES Oasis an Independent Power Producer (IPP) and part of the AES Electric group.

Project Description

PB undertook the preparation of an Environmental and Social Impact Assessment (ESIA) for the Amman East 370MW Combined Cycle Gas Turbine (CCGT) plant to be located 14km to the east of the city of Amman. The plant, proposed by AES Oasis and Mitsui & Co was the first independent power producing plant in the Kingdom of Jordan.

The ESIA was undertaken to World Bank standards taking full consideration of all relevant World Bank and International Finance Corporation (IFC) guidance notes and safeguards. It was prepared within 2 months to meet the tight timeframe required as part of the overall project programme.

Following submission of the ESIA for the project, PB continued to provide assistance in the preparation of various environmental support documents on behalf of the project. These included the preparation of a Social Monitoring Plan, Archaeological Recovery Plan and construction and operational Environmental Management Plans for the project.

PB also assisted in the undertaking of an ESIA and Resettlement Policy Framework (RPF) document for the transmission line connecting the project to the Jordanian National Grid.

OIL-FIRED POWER STATION, ENVIRONMENTAL IMPACT ASSESSMENT

Aqaba, Jordan

Client

Jordan Electricity Authority

Services Provided

- Environmental Impact Assessment (EIA)
- Environmental Surveys
- Support to the client during the planning application process

Benefits

- Cost effective project through integration of key environmental issues
- Compliance with appropriate planning policies and relevant environmental legislation

Challenges

- One of the first EIA produced in Jordan for a power project

Background

The Jordan Electricity Authority awarded PB the consultancy services for the design and construction of two Units 3 and 4 of Aqaba power station. The units are an extension to the existing Aqaba power station which is equipped with 2 130MW oil-fired units.

Project Description

As part of the scope of works PB undertook the preparation of an Environmental Impact Assessment (EIA) covering all aspects of air and water pollution, noise, traffic, land and water use, socio-economics and visual aspects. The EIA included an air quality monitoring programme to establish pollution levels in the area. Initial monitoring of sulphur dioxide showed unexpected low levels considering the proximity of the existing Aqaba power station. The monitoring programme was therefore extended to include ammonia which was being emitted by a local fertiliser factory. The programme was set up to establish the interaction between the sulphur dioxide and ammonia emissions. Recommendations for mitigation measures and for future monitoring were also included.

As an appendix to the EIA Report the potential impacts of a proposed overhead line between the power station and the terminal station of a new sub-sea cable connection with Egypt were considered.

The construction and operation impacts of the line were assessed and included safety, electric and magnetic fields, noise and television and radio interference issues.



AZ-ZOUR SOUTH GAS TURBINES AND AZ-ZOUR NORTH OIL FIRED THERMAL PLANT

Kuwait

Client

Ministry of Electricity and Water

Date of Services

2001-ongoing

Project Summary

In the state of Kuwait demand is growing for water and electricity at a rate of approximately 6% per annum. The installed generating capacity is currently 10 GW of power and 300 MIGPD desalination. The Ministry of Electricity and Water (MEW) plans to supplement this with approximately 3.5 GW of additional power and 150 MIGD of desalination capacity.

PB were appointed as Owner's Engineer to oversee specification and installation of two major power projects.

The first, 1000 MW of open cycle gas turbine capacity to be installed on a fast track basis in 2 phases (400 MW by March 2004 and 600 MW in December 2004). The plant will operate in peak lopping mode until additional conventional thermal capacity is brought into commercial operation in 2008. The dual fuel gas turbines of approximate ISO rating of 150 MW will operate on gas oil, refinery tail gas and imported gas from Qatar as and when it becomes available. The selected site is Azzour South approximately 100 km to the south of Kuwait city.

The second project which forms the basis of the MEW's medium term plan to meet the increasing power and water demand is the 2500 MW oil and gas fired steam turbine power plant and 150 MIGD desalination plant to be located at Az-zour North. This £2bn project is a major undertaking for both MEW and PB.

Kuwait is aiming to attract additional foreign investment and as part of this effort has started a programme to privatise state owned businesses (outside the oil sector) including healthcare, electricity and communications assets.

PB is providing advice to MEW on the available procurement options for the Az-zour North project. Both private finance (as Build Operate Transfer) and Government funded (as Turnkey Design Build) options are under consideration. PB has been mandated to prepare Tender Documentation for both options. Should this process fail at any stage MEW will revert to procurement via a state funded single Turnkey Contract.

As part of a broader design contract, PB supervised the preparation of an EIA for a proposed 2500 MW oil-fired power station, including atmospheric dispersion modelling of plant and comparison of emissions with WB Guidelines to determine the need for installation of flue gas desulphurisation.



Calcining Plant and Jetty Facility

Bahrain

Client

Aluminum Bahrain BSC (ALBA)

Services Provided

- Environmental Impact Assessment (EIA)
- Stakeholder Consultation
- Environmental Surveys

Benefits

- Compliance with Environmental Affairs Directorate in accordance with Bahrain EIA Guidelines
- Enable ALBA to exercise control over calcined coke quality and thus ensure higher aluminium quality and lower anode usage
- Produce potable drinking water to supplement water supplies in Bahrain

Challenges

- Ensure the continued operation of the refinery in competition with other refineries within the Gulf area and worldwide
- Utilise the excess heat to produce steam to use in turn in thermal desalination plants

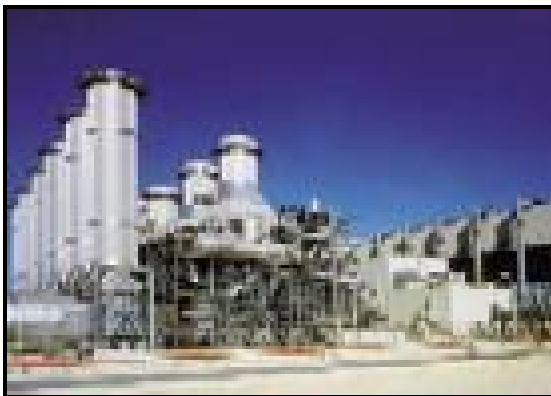
Background

ALBA proposes to construct a calcining plant and jetty facility off the east coast of Bahrain. This will be achieved by importing excess green coke and manufacturing excess calcined coke. This will enable ALBA to produce high quality aluminium which they will export for use in the Gulf area and worldwide.

Project Description

An Environmental Statement (ES) was prepared for a proposed calcining plant and jetty facility upgrade including a sea water desalination plant and associated facilities at the existing alumina unloading jetty off the east coast of Bahrain. Air quality, water quality and traffic were the significant issues and therefore were assessed in detailed within the ES.

The ES was submitted to the Environmental Affairs Directorate in accordance with Bahrain EIA guidelines. The project was conducted in association with Gredeco-Ansari Consultants, (Bahrain).



Preparation of Environmental Reports for Fujeij Wind Farm

Shawbak, Jordan

Client

The Ministry of Energy and Mineral Resources

Various other documents were provided including construction and operational Environmental Management Plans and a Resettlement Policy Framework (RPF) document.

Services Provided

- Environmental Assessment
- Stakeholder Consultation
- Environmental Surveys
- Resettlement Policy Framework
- Environmental Management Plans

The project included not only identification of environmental issues affecting the proposed wind farm but also the establishment of environmental criteria that should be considered during the development of any future wind projects in Jordan. Recommendations were also made on legislative policy reinforcement and any requirements for the relevant legislators.

Benefits

- Compliance with appropriate planning policies and relevant environmental legislation

Challenges

- Establishment of a new market in Jordan including identification of regulatory reinforcements
- Tight timescale

Background

The client, the Ministry of Energy and Mineral Resources, with the support of the World Bank, are looking to develop the wind energy market in Jordan.



Project Description

PB undertook the preparation of a high level Environmental Assessment for the Fujeij Wind farm to be located to the north of the small town of Shawbak. The project represents the first major wind farm development in Jordan.

The EA was undertaken to World Bank standards and relevant World Bank and International Finance Corporation (IFC) guidance notes and safeguards. It was prepared within 1 month to meet the tight timeframe required as part of the overall project programme.

Site Selection for Oman Coal Fired Power Plant

Various sites, Sultanate of Oman

Client
Oman Oil

The project culminated in a report that identified a preferred site for a coal fired power station.

Services Provided

- Recommendations on site selection
- Recommendations on technology
- Summary of environmental issues and relevant legislation and guidance

Benefits

- Significant experience regarding the environmental and technical issues associated with power generating plant

Challenges

- The lack of any previous examples of coal fired generating plant operating in the Middle East region\



Background

PB was commissioned to examine the potential for the development of a coal fired power station in the Sultanate of Oman.

Project Description

PB undertook a thorough examination of various sites for a coal fired power station in Oman including consideration of environmental and technical issues associated with coal fired plants.

The assessment also included the requirements for new port facilities, ash disposal sites and the issues associated with connecting the plant to the Omani electricity grid network.

Reference was made to the existing laws and regulations of Oman and the need for reinforcement of environmental legislation was recommended due to the lack of such plant in the country.

Preparation of Environmental Report for Rabigh VI

Rabigh, Kingdom of Saudi Arabia

Client

Saudi Electricity Company (SEC)

Consideration was also given to the potential impact of the proposed development on marine ecology, onsite ecology and the solid wastes from the construction and operation of the plant.

Services Provided

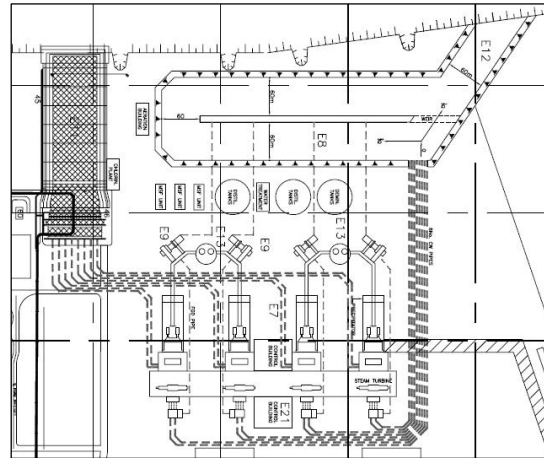
- Environmental Assessment
- Environmental Surveys
- Air dispersion modelling

Benefits

- Cost effective project through integration of key environmental issues with the plant design
- Compliance with appropriate planning policies and relevant environmental legislation

Challenges

- Consideration of the significant cumulative effects arising from the existing Rabigh generating units
- Abatement of SO₂ associated with high sulphur fuel
- Tight timescale



Background

The project represents the sixth stage of the Rabigh Power Station which already consists of a number of CCGT, OCGT and conventional thermal units.

Project Description

PB undertook the preparation of a high level Environmental Assessment for Phase VI of the Rabigh Power Station, for four 600MW units being developed by SEC to meet the power demand in the Kingdom of Saudi Arabia.

The Environmental Report included detailed dispersion modelling using the AERMOD second generation dispersion model to identify the most appropriate stack height for the four proposed 600MW units. The modelling considered the effects of sea water flue gas desulphurisation process that not only removed sulphur dioxide from the flue gas but also lowered the flue gas temperature reducing buoyancy of the plume.

SADAF 200 MW Cogeneration Plant

Al-Jubail, Saudi Arabia

Client

CMS Energy

Services Provided

- Environmental Impact Assessment (EIA)
- Support to the client during the planning application process

Benefits

- Energy security, distribution and infrastructure
- Environmental impact minimisation
- Compliance with appropriate planning policies and relevant environmental legislation

Challenges

- Site survey and management to prevent contamination by caustic agents

Background

CMS Generation (CMS) and A H Al-Zamil & Bros. Co. as partners in the Al-Jubail Power Company, propose to construct and operate a cogeneration plant on land within the Sadaf Petrochemical Complex in the Al-Jubail Industrial City on the East Coast of Saudi Arabia.

Project Description

Preparation of Environmental Impact Review of the first Independent Power Producer (IPP) gas fired project in Saudi Arabia for submission to the Royal Commission. The proposed plant will provide approximately 220MW of electrical power via two gas turbines.

The significant issues considered in this assessment were air quality impacts, noise impacts and development of extensive Best Available Technology Not Entailing Excessive Cost (BATNEEC) for abatement of nitrogen oxides from the proposed development. Air quality modelling was undertaken using Industrial Source Complex (ISC) and the results compared with Royal Commission requirements.

PB provided support to the client including discussions with the Royal Commission during the application process.



SAUDI ARAMCO COGENERATION PROJECTS EIAs

Eastern Province, Kingdom of Saudi Arabia

Client

Tihama Power Generation Company

Services Provided

- Environmental Impact Assessments (EIAs)
- Stakeholder Consultation
- Environmental Surveys

Benefits

- Cost effective projects through integration of key environmental issues
- Compliance with appropriate planning policies and relevant environmental legislation



Background

PB was employed by Tihama Power Generation Company to provide four ES's for four power plants namely: Uthmaniyah Gas Plant, Shedgum Gas Plant, Ju'aymah Gas Plant and Ras Tanura Refinery. These processing facilities will utilise the steam output of the cogeneration projects.

Project Description

Preparation of Environmental Impact Assessment for four gas fired cogeneration plants in Saudi Arabia. The power capacities for each of the plants are:

- Ras Tanura – 149MW
- Ju'aymah – 308MW
- Uthmaniyah – 308MW
- Shedgum – 308MW

Each plant comprises two gas turbine units with associated Heat Recovery Steam Generators (HRSGs). The plant will take gas and water from the adjacent Saudi Aramco site and will provide heat and power for use in the process.

The significant issues considered in the ES were air quality impacts, noise impacts and determination of mitigation measures. Stack emissions were modelled in order to select suitable stack heights and to determine expected ground-level concentrations of oxides of nitrogen (NOx) and nitrogen dioxide (NO2) for comparison with Royal Commission requirements. The ES also assessed issues such as ecology, cultural heritage, socio economics, water use and visual impact.

Core Venture 3 EIA

Saudi Arabia

Client

Consortium comprising Shell, Conoco, Total/Fina/Elf

Services Provided

- Preparation of an Environmental Statement (ES) including extensive dispersion modeling and consultation with a number of interested parties
- The ES will be produced to comply with World Bank and Saudi Arabia's Meteorology and Environmental Protection Administration (MEPA) guidelines.

Benefits

- Provision of water and power in the Kingdom of Saudi Arabia
- Cost effective projects through integration of key environmental issues
- Compliance with appropriate planning policies and relevant environmental legislation



Background

The Core Venture 3 (CV3) consortium proposes to construct and operate a Combined Cycle Gas Turbine Power and desalination plant at Jubail, Eastern Province. The consortium consists of Shell, Conoco and TotalFinaElf.

The proposed plant will be located on part of the site previously earmarked for the expansion of the SWCC Jubail Desalination plant, which commenced operation in the early 1980s.

Project Description

The plant is one of the first Independent Water and Power Projects (IWPP) in the Kingdom.

The main plant would comprise six gas turbines, each with associated Heat Recovery Steam Generators (HRSG).

The hot exhaust gases are then used in the HRSG to generate steam, which in turn is used in the multi stage flash (MSF) desalination units.

The plant would be capable of generating approximately 1100MWe and 75MIGD at 45degree centigrade.

SHOAIBA PHASE 3 INDEPENDENT WATER AND POWER PLANT PROJECT, DEVELOPMENT ENGINEERING AND ENVIRONMENTAL SERVICES

Kingdom of Saudi Arabia

Client

International Power, Mitsui & Co., Saudi Oger, Xenel Industries and Sumitomo Corporation ("the Partners")

Services Provided

- Environmental Compliance
- Production of Summary Report including environmental consent matters

Background

Water and Electricity Company (WEC) of Saudi Arabia had invited proposals from developers for the development, construction and operation of the Shoaiba Phase 3 700–900 MW and 175-195 MIGD Independent Water and Power Plant (IWPP) in Saudi Arabia.

Project Summary

The project involves the design, financing, engineering, construction, commissioning, testing, ownership, operation and maintenance of a new crude oil-fired power and desalination plant, based on conventional steam cycle technology and including flue gas desulphurisation, together with certain associated facilities, to be developed on a Build Own Operate (BOO) basis.

The IWPP is to be developed as a Greenfield project located 110km south of Jeddah on the western (Red Sea) coast, adjacent to the Shoaiba Phase I (300 MW and 50 MIGD) and Shoaiba Phase 2 (550 MW and 100 MIGD) developments.

PB was appointed to provide development engineering services to the Partners, to assist them in evaluating the project and to prepare a comprehensive proposal for submission to WEC.

The environmental assessment scope included addressing specific environmental requirements of Lenders and the compilation of a Summary Report. The Report provided assurance to Lenders that all environmental consent matters were recognised and measures implemented to ensure compliance with the relevant environmental regulations.

Shuweihat S1 Independent Water and Power Project, EIA

Abu Dhabi, UAE

Client

Shuweihat CMS International Power Company (SCIPCO)

Services Provided

- Input into Environmental Impact Assessment (2001)
- Assisted client with Application for Environmental Consent (2004)
- Support to the client during the planning application process

Background

The project was the third independent power and water development in Abu Dhabi and will comprise 1500MW of combined cycle plant and 100mgd of multi stage flash desalination plant.

The plant was built on a new Greenfield (desert) site approximately 250km west of Abu Dhabi. Other plant provided included two substations (220kV and 400kV) and a large potable water pumping station. The site will eventually be developed in two further phases to provide total power and water capacity of 5000 MW and 300 mgd.

Project Description

PB was appointed to provide technical support to CMS Energy and International Power (the Developer) during bid preparation and subsequent contract negotiation period up to award of the project.

PB provided extensive input to Jacobs Gibb, who were appointed by SCIPCO to produce an Environmental Statement to support the application for consent in 2001. Inputs included air dispersions modelling, noise levels for plant and the development of mitigation measures particularly for landscaping.

In 2004, PB assisted SCIPCO in their application for environmental consent to operate the plant. This was required to comply with new legislation and entailed submitting an application to the Environment Agency Abu Dhabi (EAD).



Taweelah New B extension Independent Water and Power Plant

Abu Dhabi, UAE

Client

Marubeni (now Taweelah Asia Power Company –TAPCO)/BTU/Powertek/JGC

Services Provided

- Environmental Impact Assessment (EIA)
- Environmental Permitting
- Technical Due Diligence
- Public Consultation
- Air and Noise Modelling
- Contaminated Land
- Marine Ecology Studies

Benefits

- All environmental permits secured
- Environmental requirements of potential funders met
- Corporate governance issues addressed
- “Good neighbour” principles established
- PB obtained ERWDA registration

Challenges

- Tight timescales overcome
- Both World Bank and national standards to be met
- Effective stakeholder management and public consultation

Background

The Abu Dhabi Water and Electricity Authority (ADWEA) in a Joint Venture with the Marubeni/BTU/Powertek/JGC consortium, proposed to develop the power and desalination facilities at Taweelah B, Abu Dhabi, UAE. The facilities are currently operated by the Al Taweelah Power Company - ATPC, and will be upgraded by consolidating the Initial B plant and Initial B Extension (together the “Existing B plant”) with a New B Extension at an adjacent site within the existing boundary fence. The project will both improve the existing plant efficiency (and reduce its levels of air pollution) and increase the capacity of the facility from 928 MWE net of power and 92 million imperial gallons per day (MIGD) of potable water to nominally 2000 MWE of power and 160 MIGD of potable water.

Project Description

Parsons Brinckerhoff has been awarded numerous contracts by the Marubeni/BTU/Powertek/JGC led consortium, to undertake the EIA and Environmental Management Plans (EMP) for the extension of the plant B power and potable water generation plant. The project will involve an extension of the existing plant of approximately 300 m, and will include three gas turbine generators, three supplementary fired heat recovery steam generators (HRSGs), one steam turbine generator and four multi-stage flash distillers.

EIAs are reported in the form of Environmental Statements which presents the findings of the EIA study undertaken and outlines residual environmental impacts associated with the construction, commissioning, operation and eventual decommissioning of the proposed project. The EIA focuses on the key issues associated with the proposed facility, and takes into account the requirements of the draft Guidelines for EIA Report published by the Environmental Research & Wildlife Development Agency (ERWDA), and appropriate World Bank/IFC and EU Guidelines, as well as internationally accepted good practice in EIA.

During the researching of the EIA, the views of the public, government officials and NGOs were solicited and a dedicated socio-economic study was undertaken within a Public Consultation and Disclosure Plan.



Qualifications of Al Toukhi – An Example of a General Contractor

Power Generation

- +2500 MW Turnkey projects
- 9 Units relocation
- 33 Units new installation (Frame 5, 6, 7)
- Simple Cycle Gas Turbines
- Diesel Generators Set
- 12 projects, 2410 MW, 33 Units, 4600 MSR

Completed and on Going Projects	Start	Completed	Value MSR
Arar Power Plant Extension (2x18) MW Gas Turbines 30 MVA , 36MW	Jun 1994	Nov 1996	88
Tabarjal Power Plant Extension (2x27)MW Gas Turbines 2x40 MVA, 54MW	May 1999	Jun 2001	145
Air Cooling System, Riyadh PP- 8 10 Units	Jul 2003	Feb 2004	165
Jazan P.P. Extension, 390MW (6X7EA) Gas Turbine Units	Mar 2004	Sep 2007	654
Arar P.P. Expansion , 135MW (2X7EA) Gas Turbine Unites	May 2004	Nov 2006	253
Rafha P.P. Expansion , 60MW (2X6B) Gas Turbine Units	May 2004	Nov 2006	195
Tihama P.P. Extension , 132MW (2X7EA) Gas Turbine Units	Jan 2005	Aug 2007	233
Jazan P.P Extension, 330MW (5X7EA) Gas Turbine Units	Jan 2007	Oct 2009	722
Tihama P.P. Extension, 135MW (2X7EA) Gas Turbine units	Mar 2007	Apr 2009	483
Riyadh P.P.8 Extension-III, 500MW (4X7FA) Gas Turbine units	May 2007	Apr 2009	461
Faras P.P. Extension, 500MW (4X7FA) Gas Turbine units	Jul 2007	Aug 2009	585
Wadi Al-Dawaser P.P. Extension, 120 MW (2X7EA) Gas Trubine Units	Jun 2008		620

Power Transmission and Distribution

- Outdoor and indoor (380/132/22/13.8) KV
- SCADA and communication systems for substations with complete LDC
- (380/132/33/13.8) KV overhead transmission lines and underground power cables
- +37 years of EPC capabilities

Completed and On Going Projects	Start	Completed	Value MSR
EPC of New 132/13.8kV Substation No. 8102 in Riyadh	May 2002	May 2004	31
EPC of New 132/13.8kV Substation No. 8021 in Riyadh	Jun 2002	May 2004	32
EPC of New 132kV Substation No. 8050 Riyadh	Oct 2002	Feb 2005	47
EPC of 132/33kV New Muhayil North Substation at Asir area	Mar 2004	Feb 2006	33
EPC of 110/13.8kV Al-Taniem S/S	Mar 2005	Mar 2007	42
EPC of 110/13.8kV Al-Shoqia S/S	Apr 2005	Mar 2007	51
EPC of 380/110/33/13.8kv Khulais Substaion at Jeddah	May 2005	Jan 2006	89
EPC of 132/13.8kV Doumat Al-Jandal S/S	Mar 2006	Dec 2007	30
EPC of 132/13.8kv S/S. 8828 in Buraidah- Qassem Area	Jul 2006	May 2008	47
EPC of New 380kv Al-Dhahiyah BSP in Dammam	May 2006		280
EPC of New 132/13.8kV S/S.8121 at Al-Warood Area	Nov 2007		65
EPC of New 132/13.8kV S/S.8128 at Al-Azizia Area	Nov 2007		65
EPC of New 132/13.8kV S/S.8144 at Al-Nasim East Area	Nov 2007		72
Replacement of (22) Nos. 230kV BOCBs at Shedgum Al-Hassa Area	Mar 2008		110
EPC of New 380/110/13.8kV Madina East BSP Substation	Jun 2008		645
EPC of New 132/13.8kV S/S.8144 at Al-Rabiia Area	Nov 2008		75



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- Outage Support
- Remote Operations
- Asset Management
- Project Mobilization Support
- ISO 9001: 2000 Certified