

# OPERATION & MAINTENANCE



INTERNATIONAL

THE MISSION OF ESB  
INTERNATIONAL IS TO  
UNLOCK VALUE FOR ENERGY  
UTILITIES AND DEVELOPERS  
RIGHT AROUND THE GLOBE.



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# WELCOME

ESB International adopts a tailored approach to the delivery of services, geared for optimal performance over the lifetime of the asset. We customise our range of solutions to the needs of our customer to include initial project support, mobilisation, technology and knowledge transfer.

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ESB International, which is wholly owned by Electricity Supply Board (ESB), is a leading engineering consultancy firm to the global utility sector. We are headquartered in Dublin, Ireland, with a central hub in the Kingdom of Bahrain and have operations in Europe, the Middle East, Africa and South East Asia. We have a fully-integrated structure with a team of 7,500+ experts.

We work in partnership with asset owners to deliver large-scale, capital intensive projects, using a proprietary project delivery methodology to minimise project risk and maximise investor returns.

In all our markets, we are faced with strategic challenges that affect millions of people – and our solutions help to transform economies, societies, and the lives of individuals and communities.

Our success is built solidly on our experience in delivering electricity to our own country, resulting in a social and economic revolution over many decades.

ESB has brought electricity to Ireland's major towns and cities; a Rural Electrification Scheme brought the transformative power of electricity to even the most remote corners of the country.

We have drawn on this experience in over 120 countries around the world, offering not just technical expertise, but also the leadership and personal commitment to succeed in some of the most demanding economies and geographical regions around the globe.

We would be delighted to share our expertise in Operation & Maintenance with you, and we assure you of our unstinting support throughout whatever journey you may now be embarking on.



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A CASE STUDY TO JUDGE US ON

## PHILIPPINES OPERATIONS & MAINTENANCE ADVISORY FOR ENERGY DEVELOPMENT CORPORATION

ESB International entered into an agreement with the Philippines geothermal power producer, Energy Development Corporation (EDC), to provide Operations and Maintenance (O&M) Advisory, comprising an initial assessment period, advisory period, and a transition/close out phase.



Start Date – End Date  
**October 2018 - ongoing**

Client Name  
**Energy Development Corporation a subsidiary of First-Gen,  
a First Philippine Holdings Company**

## BACKGROUND

EDC is the largest vertically integrated geothermal company globally and operates 1,170 MW of geothermal generation in the Philippines, across 11 facilities in four widely dispersed geographic locations.

High level personal contacts between ESB and the client's parent company, First-Gen, facilitated the introduction of ESB International as a provider of O&M advisory services. This was aided by the presence in Manila of an ESB International asset embedded with another Philippines power company with whom ESB International then had a Joint Venture agreement.

## THE SERVICES WE PROVIDED

- > O&M review at client facilities, report on findings.
- > A series of attainable best-practice "quick-wins", seven client priorities, and a number of other improvement opportunities identified and agreed.
- > Major fleet-wide and business-wide initiatives.
- > Implementation of new MAXIMO enterprise asset management system.
- > Implementation of NiSoft Eclipse software safety document management system.
- > Introduction of ESB International's Safety Rules.
- > Development of Competency Management system.
- > Implementation of an Alarm Management System to ISA 18.2.
- > Development of an ISO 15001-ready Asset Management System.
- > ATEX explosive atmospheres reviews and production of Explosion Protection Documents.
- > COSHH audit, implementation of recommendations arising.
- > Safety Management audit, implementation of recommendations arising.
- > Various initiatives to attain industry best practice in a wide range of both operations and maintenance fields.
- > Advice and assistance in development of company and facility engineering standards and procedures.





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## A CASE STUDY TO JUDGE US ON

# AXPO ITALIA / ASPI REVIEW OF LONG TERM SERVICE AGREEMENT (LTSA)

ESB International contracted with AXPO Italia to supervise over two phases of this project. Phase one included the initial review and assessment of the existing LTSA including site survey.

Phase two consisted of developing the specification and RFQ for a new LTSA. This included a review of bids from vendors and assistance with final negotiation and an in depth review of Operations and Maintenance organisation and assessment of re-structuring, as required.



Start Date – End Date  
**January 2020 - ongoing**

Client Name  
**Axpo Italy**

Duration of Assignment  
**2 years to date**

## BACKGROUND

In late 2019, ESB International travelled to Genoa, Italy for a one-day workshop with AXPO Italia to assess and understand their requirements. This meeting arose due to strong client relationship with AXPO Italia having completed work with them 10 years earlier.

Following the one-day workshop, AXPO Italia confirmed they wished to retain the consultancy services of ESB International for review and assessment of power plant LTSA services.

The project entailed engagement between ESB International and G&T Contractor Services on the latest approach and market assessment of LTSA contractual matters, to offer advice and assistance to the client.

## THE SERVICES WE PROVIDED

- > High level review of Operations & Maintenance organisation.
- > Initial review and assessment of existing contract (GTF).
- > Site visits to client power plants to validate documentary evidence provided
- > Assessment and comparison of new LTSA options.
- > Full RFQ – including identification of suitable vendors, review of proposals and presentation of new contract to preferred vendor.
- > Delivery of initial assessment and options report.
- > Conference calls with Client to clarify options (travel curtailed due to Covid 19 restrictions)
- > Modification of existing contract to reflect required new criteria.  
Project still ongoing, but will involve the following:
  - > Advice and negotiation assistance to Client, to finalise new contract.
  - > In depth review and assessment of O&M organisation to reflect change requirements arising from new LTSA contract commitments.
  - > Assessment and mentoring of organisational changes through initial implementation stages.
  - > Delivery of overall final report.



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## A CASE STUDY TO JUDGE US ON

# DELIMARA 4 OPERATION & MAINTENANCE AGREEMENT

ESB International contracted with AXPO Italia to supervise over two phases of this project. Phase one included the initial review and assessment of the existing LTSA including site survey.

Phase two consisted of developing the specification and RFQ for a new LTSA. This included a review of bids from vendors and assistance with final negotiation and an in depth review of Operations and Maintenance organisation and assessment of re-structuring, as required.



Start Date – End Date

**2018 - ongoing**

Client Name

**ElectroGas Malta (EGM)**

Duration of Assignment

**4 years to date**

## BACKGROUND

ESB International entered into an O&M contract with Electrogas Malta (EGM) to operate and maintain 215 MW Delimara 4 plant over a 6.5 year term, including one year Mobilisation and half year operation in Open Cycle.

The power plant is a 215 MW, 3:3:1 configuration, with 3 x 50 MW Siemens SGT-800 GTs and 1 x 50 MW Siemens ST. EPC Contractor for the power plant is Siemens, which holds also the LTSA for the power plant.

It is a bundled project, starting from the Fuel Supply Unit (a floating vessel), Regasification Plant and the Power plant. Plant is fuelled by LNG. ESB International is only involved in the O&M of the power island.

## THE SERVICES WE PROVIDED

- > Selection and recruitment of the power plant staff;
- > Prepare operation and maintenance instructions and maintenance schedules;
- > Prepare standing instructions and procedures to a standard to ensure that Delimara 4 is operated and maintained in a safe and efficient way;
- > Prepare and implement safety control and permit to work systems which shall comply with the standards of Good Industry Practice.
- > Establish work management, technical record, stores management, personnel, financial, environmental, safety and general administration systems in accordance with Good Industry Practice;
- > Prepare plant environmental management programme which adequately meet the Owner's requirements and demonstrate competence and care for the environment.  
For the Operation phase, ESB International is:
- > Responsible for the operation and maintenance of Delimara 4,
- > Responsible for performing the Planned Maintenance, Unplanned Maintenance and Routine Maintenance of Delimara 4;
- > Manage the LTSA with the LTSA Contractor on behalf of the Owner;

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## CASE STUDIES TO JUDGE US ON



# CONSULTANCY SERVICE FOR RENEWAL OF LONG TERM SERVICES AGREEMENT (LTSA)

ESB International have been contracted by Sohar Aluminium for consultancy services in the renewal of their current LTSA maintenance.

The service will consider maintenance requirements for Sohar Aluminium Gas and Steam Turbines and associated generators, in their existing power plant, incorporating potential Life Time Extension arrangements and possible machinery hardware upgrades.



Start Date – End Date

**March 2018 - ongoing**

Client Name

**Sohar Aluminium**

Duration of Assignment

**4 years to date**

## BACKGROUND

Through ESB International branch presence in Oman, we became aware of the requirement from Sohar International for assistance in renewal of their LTSA.

Following a competitive tender process, ESB International were awarded a contract for provision of consultancy services.

The project entailed engagement between ESB International and ESB major Contract Services on the latest approach and market assessment of LTSA contractual matters, to offer advice and assistance to the Client.

## THE SERVICES WE PROVIDED

- > Initial review and assessment of existing LTSA contract
  - > Assessment and comparison of new LTSA options.
  - > Extensive conference calls with Client to clarify options (travel curtailed due to Covid 19 restrictions)
  - > Delivery of initial assessment and options report.
  - > Delivery of full suite of extensive contract documents to reflect required new criteria
  - > Provision of Instructions to Tenderers (ITT)
  - > Identification of potential new suitable vendors list
  - > Development of PQQ (pre-qualification questionnaire)
- Project still ongoing, but will involve the following:
- > Evaluation of Tenders received
  - > Advice and negotiation assistance to Client to finalise new contract.
  - > Delivery of overall final report





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# FURTHER OPERATION & MAINTENANCE EXPERIENCE

ESB International has extensive O&M experience  
both in Ireland and abroad



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## **CARRINGTON POWER 860 MW COMBINED CYCLE GAS TURBINE (CCGT)**

### **UNITED KINGDOM**

Carrington Power, near Manchester, is ESB's latest CCGT development in the United Kingdom and is one of the most efficient power stations in the UK. ESB International was responsible for the planning, designing, engineering, construction and commissioning of the Carrington CCGT power plant project. The day to day operations and maintenance team are responsible for all management activities in the power plant.

## **AGHADA 435 MW CCGT**

### **IRELAND**

During design and construction, ESB International provided the engineering services for development, construction and supervision (Owner's Engineer). The plant is operated by ESB with an Operation and Maintenance team of 37 staff.

## **YENI ELEKTRIK 865 MW CCGT**

### **TURKEY**

Unit International and ESB International established a 50/50 partnership with Unit International and ESB International, called UNES, for the Yeni Elektrik project. UNES and ESB International provided O&M services for Yeni Elektrik's 865 MW CCGT in Gebze, Kocaeli with 38 O&M personnel between 2013 - 2019.

## **VOLTA RIVER AUTHORITY (VRA) 755 MW CCGT GHANA**

ESB International provided O&M support and advisory services to VRA for management of generation assets, capacity development and O&M support at the Takoradi and Tema Plants. The project was delivered over a three year period from 2014 - 2017 through a core ESB International team based in Ghana, who were supported, as appropriate, by specialist support services provided from ESB International headquarters in Dublin. The contract scope was based on co-created methodology developed by ESB International / VRA in an effort to progress VRA to international best practice.

## **ROUSCH 412 MW CCGT PUNJAB**

### **PAKISTAN**

ESB International operated and maintained the Rousch plant for over 20 years, up to 2017. Rousch is a 412 MW combined cycle plant using Siemens F-class technology. Initially, the plant, which uses Siemens V94.2 gas turbines, was fuelled by residual crude oil transported to the plant from oil refineries in the south. A gas-fuel conversion project was undertaken to convert the plant to burn natural gas. The plant is owned by a consortium of companies of which Descon Engineering is the majority shareholder.

ESB International further supported the plant through a Technical Services Agreement (TSA) in 2018 whereby experienced management and technical specialists assist during the transition to a new plant management team.

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## **DELIMARA 4 215 MW CCGT**

### **MALTA**

ESB International entered into an O&M contract with Electrogas Malta (EGM) to operate and maintain 215 MW Delimara 4 plant over a 6.5 year term in 2016 including one year Mobilisation and half year operation in Open Cycle. The power plant is a 215 MW, 3:3:1 configuration, with 3 x 50 MW Siemens SGT-800 GTs and 1 x 50 MW Siemens ST.

## **MONEYPPOINT ESB 915 MW COAL**

### **IRELAND**

Three units of 305 MW each were put into service at Moneypoint in the west of Ireland in October 1985, July 1986 and April 1987. ESB International provided complete design and construction management services on a multi-contract basis.

ESB has operated the power plant, coal yard, ash handling and deep water jetty since construction, primarily as a base-load plant.

ESB International managed an environmental refit project to reduce NO<sub>x</sub> and SO<sub>x</sub> particulate matter over the period 2005 - 2010. A major refurbishment of the DCS Control System was also undertaken at this stage.

## **EDC O&M ADVISORY SERVICES GEOTHERMAL POWER PLANTS**

### **PHILIPPINES**

ESB International is advising EDC in the establishment of world class O&M practices, systems and procedures across their fleet of geothermal assets.

This includes development and implementation of an asset management system, internationally recognised power plant safety rules and a new enterprise asset management system, in this 3 year contract, 2018 - 2021.

## **PORT DICKSON 440 MW OCGT**

### **MALAYSIA**

ESB International had an eight year contract to operate and maintain the 440 MW plant at Port Dickson, the first generation of Independent Power Plant (IPP) in Malaysia. The plant consists of four GE frame 9E gas turbines in simple cycle. ESB International committed to the localisation of all the plant staff in as short a time as possible, through a process of continual technology transfer.

## **CIKARANG 204 MW OCGT / CCGT**

### **INDONESIA**

PTCL was the first independent power producer in Indonesia. The primary fuel is gas with distillate as a backup fuel. In 1995 PTCL decided to convert to a combined cycle operation and add 6 HRBs and a steam turbine to uprate the output to 310 MW. ESB International managed the power plant and the utility distribution system and provided commissioning services of the add-on combined cycle, additional combustion turbines and provided site specific Operations and Maintenance manuals.

## **POOLBEG 470 MW CCGT**

### **IRELAND**

The ESB owned and operated power plant is located in Dublin and was commissioned in 2001. ESB International provided the engineering services for full life cycle from the project initiation, development, construction supervision (Owner's Engineer) to Operation and Maintenance. The Operation and Maintenance team consists of 37 staff.

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## **AMOREBIETA 755 MW CCGT**

### **SPAIN**

Amorebieta was the first internationally owned power plant (jointly owned by ESB International and Osaka Gas of Japan) to be developed in Spain, with a capacity to supply 30% of the Basque Region's energy requirements. Prior to its sale in 2013 ESB International were responsible for managing the Operations and Maintenance of this 755 MW plant, which uses GE 9FA technology.

## **COOLKEERAGH 400 MW CCGT**

### **NORTHERN IRELAND**

ESB owns, operates and maintains the Combined Cycle Gas Turbine plant at Coolkeeragh, the first in the Northern Ireland competitive market. The 400 MW plant uses GE 9FA technology.

## **CORBY 350 MW CCGT**

### **UNITED KINGDOM**

Corby power plant was one of the first independent power plants (IPPs) to be constructed in the deregulated UK market and is one of the strongest performing two-shift plants in the UK. The plant uses GE 9E gas turbines, and is 100% owned by ESB.

## **DUBLIN BAY POWER, 420 MW CCGT**

### **IRELAND**

This plant is owned, operated and maintained by ESB and is one of the first IPPs to be constructed in the deregulated Irish market. The plant uses a single-shaft Alstom GT26 gas turbine in combined cycle.

## **MANJUNG 2100 MW COAL-FIRED PLANT**

### **MALAYSIA**

ESB International provided O&M services for this coal-fired power plant (comprising of 3 x 700 MW units using Alstom technology) during its first 28 months of operation, and provided technical services for a further two years. The plant is owned by a subsidiary of TNB, the Malaysian National Utility.

## **O&M AUDITS**

### **MALAYSIA**

ESB International completed O&M audits of various power plants in Malaysia since 2011.

These audits covered operation and maintenance practices and procedures, plant performance, management systems and staffing capabilities.

## **KULIM 220 MW CCGT, KULIM HIGH TECHNOLOGY PARK**

### **MALAYSIA**

ESB International provided full O&M services and project management for the CCGT power plant and distribution system for Kulim Technology Park development for 15 years up to 2014. In addition to operating and maintaining the CCGT power plant and distribution system, ESB International were responsible for all activities associated with managing the utility including customer billing. From 2014 to 2017 ESB International provided technical support and O&M advisory services to the customer O&M team. The power plant uses GE 6B gas turbines. It is owned by Northern Utility Resources, a Malaysian company.

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# WE SHOULD BE TALKING TO EACH OTHER

To discuss your Power Generation needs, please get in touch with  
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