



INTERNATIONAL

Power Generation

Energy Engineering • It's in our DNA

Utility to Utility • **Power Generation** • Transmission & Distribution • Strategic Advisory • Specialist Services



The mission of ESB International is to unlock value for energy utilities and developers right around the globe.

Welcome

From conventional thermal power plants to state-of-the-art modern and renewable technologies, we provide the skills, knowledge and experience required to support power generation assets through all stages of their life.

ESB International, which is wholly owned by the Electricity Supply Board (ESB) of Ireland, 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, our clients 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 Power Generation with you, and we assure you of our unstinting support throughout whatever journey you may now be embarking on.

Utilising our Power Generation Capabilities

As a result of divesting ageing plant and investing in highly efficient modern plant, Ireland now has plentiful supplies of clean energy and a healthy capacity margin to accommodate future growth. We are active in decarbonisation strategies across the supply chain, retrofitting existing plants to make them compliant with environmental standards.



Thermal

Our expertise in conventional power plant spans the complete range from coal and peat technology to open cycle and combined cycle gas turbine (CCGT) technology. This is now developing into renewable and low carbon technologies, including energy from waste and biomass.



Hydro

ESB has a proud tradition in sustainable generation – in fact, our first station in 1927 was the hydro generating station at Ardnacrusha on the river Shannon, Ireland.



FlexGen

We have built up expertise in FlexGen plant and technologies to facilitate our decarbonisation strategies. These plants facilitate fast start and response capabilities to support the network counteracting fluctuations from wind and solar power. We have used these over the years as Peaking Plants and are developing new plants to support our evolving decarbonised grid.



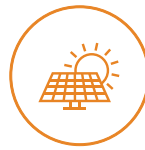
Wind

Through innovative wind based solutions, we are enabling our parent company, ESB, to deliver their decarbonisation strategy, to be carbon neutral by 2040. From its first 5MW wind farm in Crockahenny in 1998, we have developed an onshore wind asset portfolio that has the capacity to supply 1GW of clean energy. ESB has a significant pipeline of both onshore and offshore Wind development, which will increase our overall Renewables to 5GW as part of our Decarbonisation journey



Green Hydrogen

Integrating green hydrogen production & storage into the offshore wind developments is a key component of ESB's renewables and decarbonisation development.



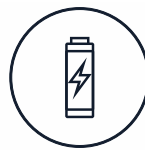
Solar

Solar has become one of the most dynamic sectors in the renewables electricity market. We are active in the solar industry and have integrated solar projects and a project pipeline of over 1 GW of Solar Energy in Ireland.




Synchronous Compensator

ESB recently commissioned a 4000MWs (megawatt seconds) Synchronous Compensator with associated Flywheel on the All Ireland Grid. This is the largest of its kind in the world and enables higher volumes of renewables on the system.



BESS

Battery Energy Storage Systems are also integral to Grids with large scale Wind & Solar generation, providing frequency support and meeting short term load fluctuations. ESB are implementing over 220 MW capacity of BESS plants.



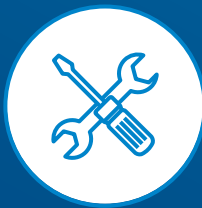
Our technical competencies span the breadth and depth of the power generation industry, from plant performance and control to piping and materials. Our goal is to ensure that we can provide a complete service offering to our clients across all our international markets.

We offer a full spectrum of services

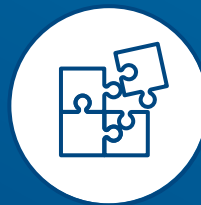
We provide a full range of services to meet our clients specific requirements in power generation.



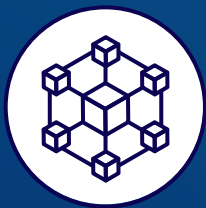
Owners
Engineer



Operations &
Maintenance



Specialist
Services



Engineering
Design



Overhaul
Management

In all cases, ESB International aim to provide a complete service to all of our clients. To achieve this, our service capabilities are closely integrated, ensuring the highest standard of services for the power generation industry.





Zoning in on our Power Generation Services



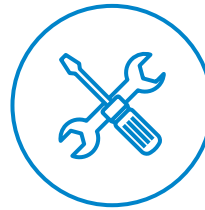
Owners Engineer

ESB International has a long and proud history of providing owners engineer services to developers of power generation projects spanning the globe.

The owners engineer role is a function that has existed in large capital investment projects for decades. ESB International has a deep wealth of knowledge and experience in providing owners engineer services to gas, coal, hydro, wind and other renewable projects.

Our capabilities span a wide range of disciplines and technology areas, including:

- Project management
- Specification development
- Contract negotiation
- Site construction & commissioning supervision

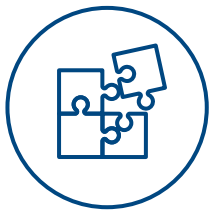


Operations & Maintenance

ESB International operations & maintenance adopts a tailored approach to the delivery of services geared for optimal performance over the lifetime of the asset.

Our operations & maintenance team is led by the needs of our customers. As a power plant investor in its own right, ESB International has a clear understanding of those needs. Working closely with developers and owners, we identify their specific objectives and then develop the necessary solutions that best suit the challenge.

ESB International's excellent track record has been built on a combination of our utility perspective and our commercially focused, performance driven approach.



Specialist Services

ESB International specialist services consists of a dedicated team of resources across multiple disciplines. We boast a specialised knowledge, acquired and developed through years of hands-on experience.

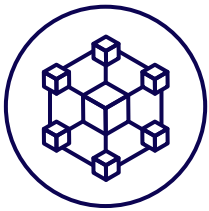
We also provide the full range of civil, structural and geotechnical services necessary for the planning, design and construction and maintenance of power stations and wind farms.

The key technology competency areas of specialist services are:

- Gas and steam turbine
- Conventional boiler
- Plant generators and electrical systems
- Plant controls and instrumentation
- Plant chemistry
- Plant material integrity
- Piping
- Process and performance
- Hazardous areas
- Civil, structural, geotechnical
- Environmental
- Safety services



Zoning in on our Power Generation Services

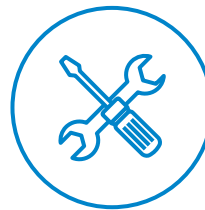


Engineering Design

ESB International offers a range of engineering design capabilities to the power generation sector. Engineering design consists of teams including mechanical and process, electrical, control and instrumentation (C&I).

Engineering design prides itself on being a method-driven engineering services team, with core capabilities in:

- Front end engineering design (FEED) and concept development
- Detailed process, mechanical, electrical and C&I design
- System and equipment specification and selection
- Site surveying, drafting and 3D modelling
- Design safety
- Tendering and procurement management
- Design construction and commissioning support



Operations & Maintenance Services

ESB and ESB International operate over 7,000 MW of power plant capacity in Ireland and worldwide.

For the past two decades, ESB International has constantly been improving and developing its approach to operating and maintaining power plants to get the best results for its clients.

We have captured this learning into a set of modular components that can be integrated into a tailored O&M package to meet each client's specific requirements.

These include:

- O&M Mobilisation
- Plant Management Systems
- Operations and Safety Management
- Maintenance Management
- Technical Services
- Finance and Administration
- Human Resources Management
- O&M Critical Business Applications



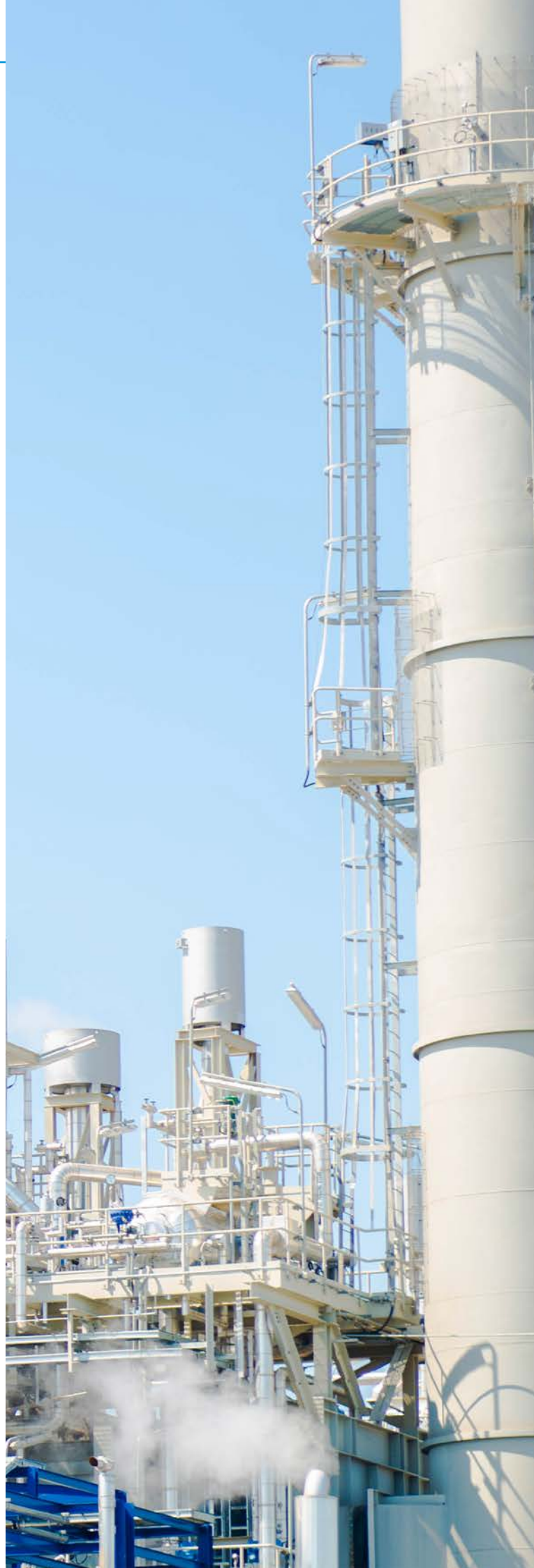
Overhaul Management

ESB International has an established capability in planning and managing the execution of overhauls on power generation assets.

Overhaul management provides the following services:

- Plant outage, planning and programming
- Commercial and contract management
- Strategic inventory planning
- Contractor supervision and coordination
- Plant inspection
- Safety management
- Post-overhaul plant commissioning support

Overhaul management draws on support from specialist services in the development and execution of inspection plans and the review of 'as found' issues.





— A case study to judge us on



Alba 2,481 MW PS5 Combined Cycle Gas Turbine Plant & Power Distribution Network, Bahrain

ESB International is responsible for the specification, tender negotiation leading to contract award, design review, project and construction management, safety and commissioning supervision of the Alba PS5 CCGT power plant project and associated Power Distribution Network.

Client Name	Aluminium Bahrain (ALBA)
Start Date – End Date	2015 - 2020

Background

Following the appointment of ESB International in September 2015, the EPC consortium of GE/GAMA was issued with Notice to Proceed in August 2016. The combined cycle gas turbine plant consists of 3 x GE 9HA01 gas turbines and achieved commercial operation in 2019. These “H” technology gas turbines were the first of their type in the Middle East and the first application in an aluminium smelter.

In a parallel procurement process, Siemens was appointed to supply and install new 220 kV and 33 kV sub-stations and associated transformers/ reactors, as well as a SCADA system for the new power distribution system.

The existing Alba Power Distribution network is also incorporated into the new SCADA system.

In February 2020, ESB International was appointed as Engineering, Construction and Management (ECM) Consultant by Alba for a CCGT 4th Block to be added to PS5, this time utilising the latest MHI J Class Gas Turbine technology. EPC Notice to Proceed was granted in May 2022. ESB International is currently supporting the delivery of the station’s 680 MW extension, which is due to be fully commissioned in 2024. This extension will increase our client’s power generation efficiency by over 4%, and greenhouse gas emissions will reduce by over 600,000 tons annually.

The services we provided:

- Project development activities
- Management of project planning
- Specification preparation, tender evaluation and EPC contract award
- Management of site preparation
- Detailed engineering design review
- Project construction & commissioning supervision
- Complete engineering support during all phases of the project
- Site management, safety management and quality surveillance
- Power Systems Study for integration of the 4th Unit into power distribution network
- Project closeout and warranty services



— A case study to judge us on



Delimara 4 Operation & Maintenance Agreement

Delimara 4 is the first and only independently owned power station in Malta and is an LNG-to-Power project designed to reduce dependence on diesel for power generation on the island. The plant's owner, Electrogas Malta, is an equal parts consortium comprising a local holding company, Siemens and SOCAR Trading. ESB International's role was to bring decades of experience to the project and complete the operation and maintenance of the plant on behalf of the owner and, in the process, embed the processes and procedures developed through experience in a wide variety of international projects.

Client Name	ElectroGas Malta (EGM)
Start Date – End Date	March 2016 – August 2022
Duration of Assignment	6.5 years

Background

In 2016 ESB International entered an Operations and Maintenance (O&M) contract with Electrogas Malta (EGM) to operate and maintain the 215 MW Delimara 4 plant over a 6.5-year term. This comprised of one-year of mobilisation and a half-year operation in open cycle followed by five years of combined cycle operation. The power plant is a 215 MW, 3:3:1 configuration, with 3 x 50 MW Siemens SGT-800 GTs, 3 x HRSG and 1 x 67 MW Siemens SST900.

What we achieved

On time take-over from EPC Contractor

ISO accreditation within 2 years of take-over

Operators' availability figures > 99% over operating period

The OEM and EPC contractor for the power plant is Siemens, which also holds the LTSA for the power plant. It is a bundled project, starting from the Fuel Supply Unit (a floating storage vessel), providing storage and supply of LNG for the project. Regasification is completed onshore with the re-gasified LNG and then fed to the power plant. ESB International was contracted for the O&M of the power plant, with other experienced operators managing the remainder of the project.

What services we provide

- Selection, recruitment and training of the power plant staff.
- Mobilisation of Plant Stores & Maintenance facilities
- Developed and implemented maintenance strategy and maintenance schedules.
- Implemented Business Management System including technical standards & guidelines, O&M procedures and standing instructions ensuring safe and efficient operation
- Implemented best industry practice safety control and permit to work systems.
- Implemented Business Critical Systems for Enterprise Asset Management & Safety Document Management System
- Established work management, technical records, stores management, personnel, financial, environmental, safety and general administration systems in accordance with Good Industry Practice.
- Implemented environmental management programme meeting the owner's requirements and regulatory compliance.
- For the Operation phase, ESB International was responsible for:
 - Operation and maintenance of Delimara 4
 - Performing the Routine, Planned and Unplanned Maintenance of Delimara 4
 - Managing the LTSA with the LTSA Contractor on behalf of the Owner
 - Achieving and maintaining ISO9001 (Quality), ISO14001 (Environmental), ISO45001 (Safety) certification
 - Preparing ISO55000 (Asset Management) ready for certification.



— 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 Services. Following an initial assessment period, we delivered a targeted program of key process improvements and updating of strategic business applications to meet the client's needs across the utility.

Client Name

Energy Development Corporation

Start Date – End Date

October 2018 - Ongoing

Background

Energy Development Corporation (EDC) is the largest vertically integrated geothermal company in the Philippines and operates 1,200 MW of geothermal generation across 11 facilities in four widely dispersed geographic locations. In 2018, ESB International was contracted by EDC to provide Operations & Maintenance (O&M) Advisory Services to support their journey as the company moved through a phase of reinvestment and reorganisation.

ESB International conducted an initial assessment and review to identify gaps and priorities. The client agreed to a targeted program to deliver key O&M process Re-engineering and updating of strategic business applications across the utility.

What services we provide

Safety Management

- ESB International's Safety Rules and Safety Document Management System inc. Competency Management.

Process Safety

- Supporting Implementation of Alarm Management to ISA 18.2.
- Standardised Operator Shift Logs
- ATEX reviews and Explosion Protection Documents.
- COSHH audit.
- Standardised drawings, equipment registers, and plant labelling

O&M Process Re-engineering

- Lifetime Asset Management Process Implementation.
- Work Management Systems, (WMS), and process training.

What we achieved

Digital Transformation Projects delivered on time, on budget and in scope

Best practice Safe Systems of Works and the Safety Rules embedded

Re-engineered multiple O&M processes to best industry standards

- WMS KPIs Development including KPI Dashboard & Reporting.
- Supporting engineering standards and procedures development.
- ISO 55001-ready Asset Management System.
- O&M methodology for new power plant takeover

Utility-wide Digital Transformation

- System selection to best match legacy systems and new processes
- IT infrastructure upgrades, data migration, system integration and rollout.
- Software systems included IBM Maximo, Nisoft e3, SAP PO, SAP, Coupa and Honeywell Forge Alarm Management Software

Health, Safety and Environment

Health

The health and safety of all people associated with our business activities is a key focus for ESB International. This is reflected in the company safety policy signed off by the Chief Executive of ESB Group and his Executive Director Team. All senior managers have safety related targets in their respective objectives.

Safety

Visible leadership is a key part of ESB International's approach to safety. As a wholly owned subsidiary of ESB, ESB International implements the corporate safety policy in full and strives to deliver every project to the highest level safely. A safety steering group in ESB International reviews all projects in detail and implements appropriate actions where required.

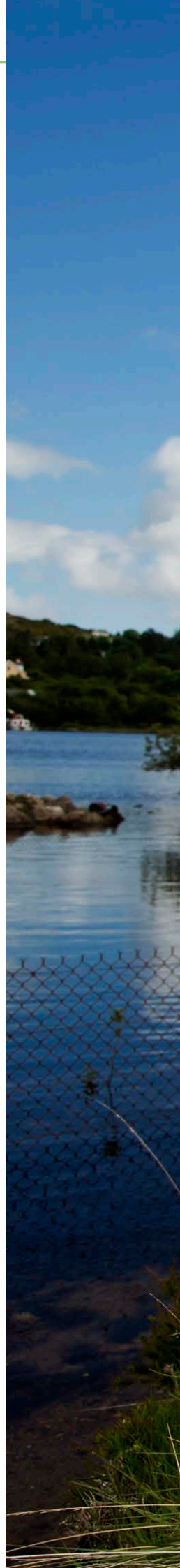
At power plant level, ESB International provides and maintains safe and healthy working conditions, equipment and systems of work for its personnel and other persons visiting or carrying out work on its behalf at site. This is achieved by the use of comprehensive rules, procedures and codes of safe practice relating to particular activities.

Environment

We strive to achieve excellence in all our endeavours and recognise that our business activities interact with and may impact the environment.

Our objectives are to adhere to the principles set out in the ESB Group Environment Policy in our operational businesses and to deliver best practice solutions to customers while minimising our effects on the environment.

Managing and continually improving Health, Safety & Environment is a key focus of our business and an integral part of our approach.





We should be talking to each other

To discuss your Power Generation needs, please get in touch with ESB International at the contact points below.

ESB INTERNATIONAL

One Dublin Airport Central
Dublin Airport
Cloghran
County Dublin
Ireland
K67 XF72

Tel +353 (0) 1 703 8000
Fax +353 (0) 1 703 8088

ESB INTERNATIONAL

Bahrain Office
Office 1002
Building 655
Road 3614
Block 436
Seef District
Kingdom of Bahrain

Tel: +973 1770 8118
Fax: +973 1770 0115

ESB INTERNATIONAL

Abu Dhabi Office
Office 25/25
20th Floor
Al Wahda Commercial Tower
Airport Road
Abu Dhabi

Tel: +971 2815 7999
Fax: +971 2815 7888

ESB INTERNATIONAL

Oman Office
Office 206, 2nd Floor
Holiday Inn
Al Mazoon Street
South Al Mawaleh
Muscat
P.O. Box, P.C. 118
Sultanate of Oman

Tel: +968 2428 7961

Email marketing@esbi.ie
Web www.esbinternational.ie

