

Offshore power transmission services

Complete life of asset solution



About AMEC

AMEC is a focused supplier of high-value consultancy, engineering and project management services to the world's oil & gas, minerals & metals, clean energy, environment & water markets.

With annual revenues of nearly £3 billion, AMEC designs, delivers and maintains strategic and complex assets for its customers. The company employs some 25,000 people in over 40 countries worldwide.

AMEC strives to be a successful and sustainable company, with all our employees understanding our vision, believing in and sharing our values. Our values are vital in securing and keeping trust, creating a respected, sustainable, profitable company with strong relationships – for the long-term.



Offshore transmission overview

AMEC is able to provide a complete life of asset solution from consultancy, engineering, procurement and construction management, through to operations and maintenance.

Our transmission engineers are located throughout the UK, enabling us to provide a total service in power transmission engineering. Complemented by programme and project managers, we deliver projects on time, to budget and quality standards.

Through our joint venture, Teshmont Consultants*, we are a world leader in high voltage power transmission engineering specialising in HVDC power transmission systems. We have provided services for projects which represent over 50 percent of the world's installed capacity of HVDC transmission.

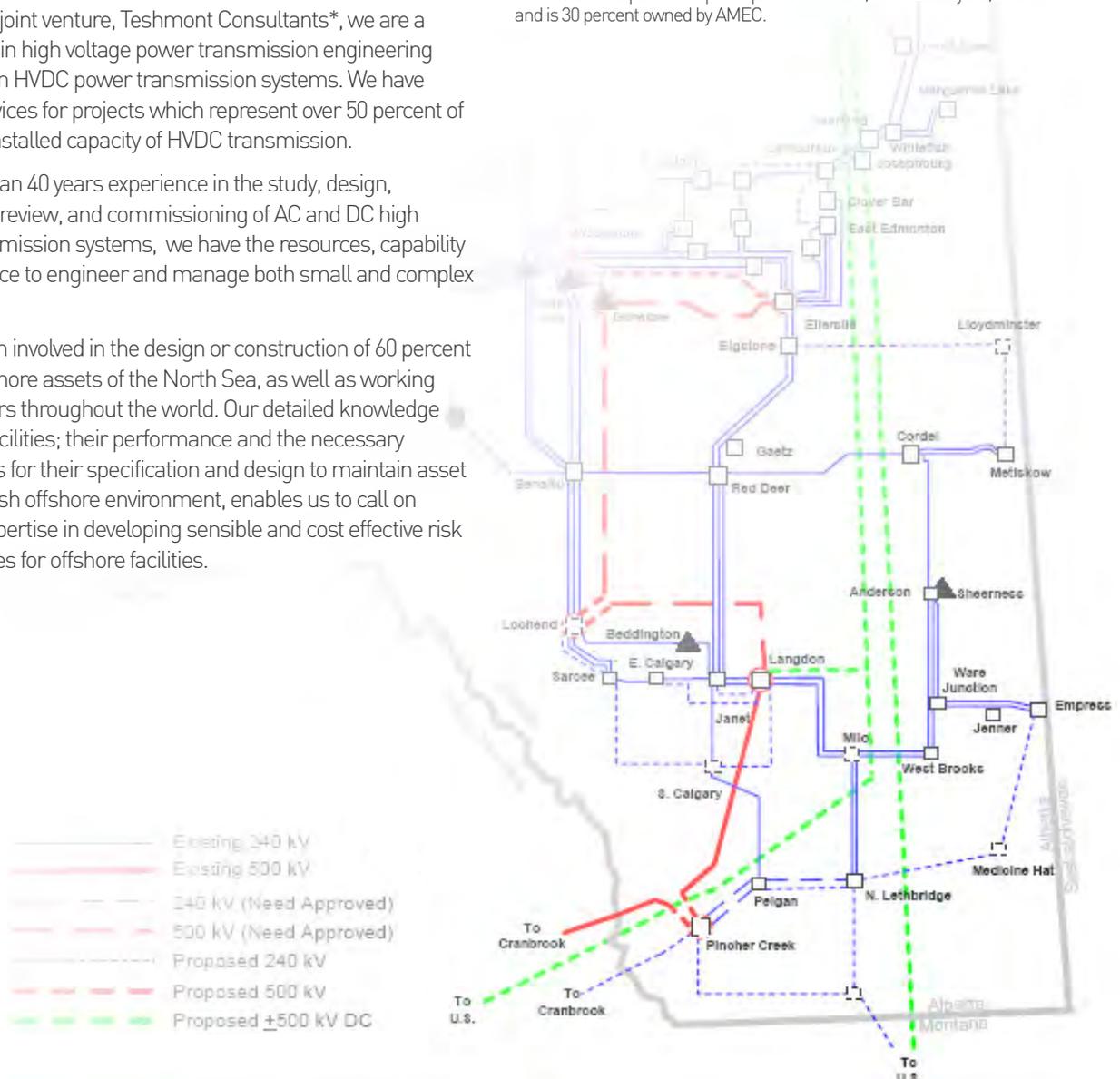
With more than 40 years experience in the study, design, construction review, and commissioning of AC and DC high voltage transmission systems, we have the resources, capability and experience to engineer and manage both small and complex projects.

We have been involved in the design or construction of 60 percent of all the offshore assets of the North Sea, as well as working for many years throughout the world. Our detailed knowledge of offshore facilities; their performance and the necessary requirements for their specification and design to maintain asset life in the harsh offshore environment, enables us to call on unrivalled expertise in developing sensible and cost effective risk based services for offshore facilities.

With more than 3,000 scientists, geologists, engineers, biologists, environmental planners and other specialists, we also offer an impressive depth and breadth of environmental capabilities. Our specialists deliver consulting services to public and private sector clients globally, often in long-term relationships.

Our environmental offshore expertise is focused in consulting, surveying, engineering and marine studies, geotechnical, environmental, materials and equipment, offshore structures, project and programme management, and assurance services.

*Teshmont is a partnership comprised of AMEC, Manitoba Hydro, and Stantec and is 30 percent owned by AMEC.



Capability

System studies and planning

AMEC provides world class expertise in system studies and planning. We have undertaken long range strategic planning and system design studies for some of the world's largest power development projects, such as:

- South China Power Studies project
- North China Power Transmission project
- India Power System planning study
- Itaipu Transmission System in Brazil
- Western Electric Power Grid in Canada
- Isle of Lewis windfarm, Scotland
- Polish Power Grid Expansion and Rehabilitation



Project examples	Rating	Voltage
Atlantic Wind Connection Project	6000 MW	320 kV dc
Nelson River Bipole 3	2000 MW	+/-500 kV dc
AESO	1000 MW	+/-500 kV
Bakun-Sabah AC Interconnection	1200 MW	500 kV ac

HVDC and AC power system development

We can deliver expert support covering all aspects of offshore AC and HVDC power transmission. AMEC has a successful track record in system analysis, specification, design, procurement, installation, commissioning, asset assessment, management and decommissioning.

We have UK based engineers and can mobilise global resources from our offices worldwide to ensure the appropriate skills and expertise are employed to support our clients.



System engineering

AMEC has a range of experts who can provide world class offshore network design consultancy. This includes the appraisal of the electrical system and potential grid code compliance reviews, through to sub-system and component specification to ensure an efficient, coordinated, robust and cost effective solution.

Power system design

AMEC engineers provide Electrical Power Transmission guidance to clients regarding new connections and development of existing grids to facilitate increased and more efficient power transfer. Through our knowledge of AC and DC systems together with the issues arising from wind farm connections to grid systems, we can provide system studies on local, regional or national scales to help clients determine the most economically advantageous system solutions.

Following detailed system studies we can then develop the specification of the appropriate sub-system, delivering a practical solution that can be implemented.

Cables

AMEC's team have been providing guidance on cable design, testing, repair and asset monitoring and continue to support clients in the UK and throughout the rest of the world. Our experts have contributed to international publications through Cigré and other organisations. This involvement ensures that current knowledge and guidance can be provided to our clients.

We have been involved in the planning, consenting, routing and installation of cables and cable repairs both onshore and offshore over many years.

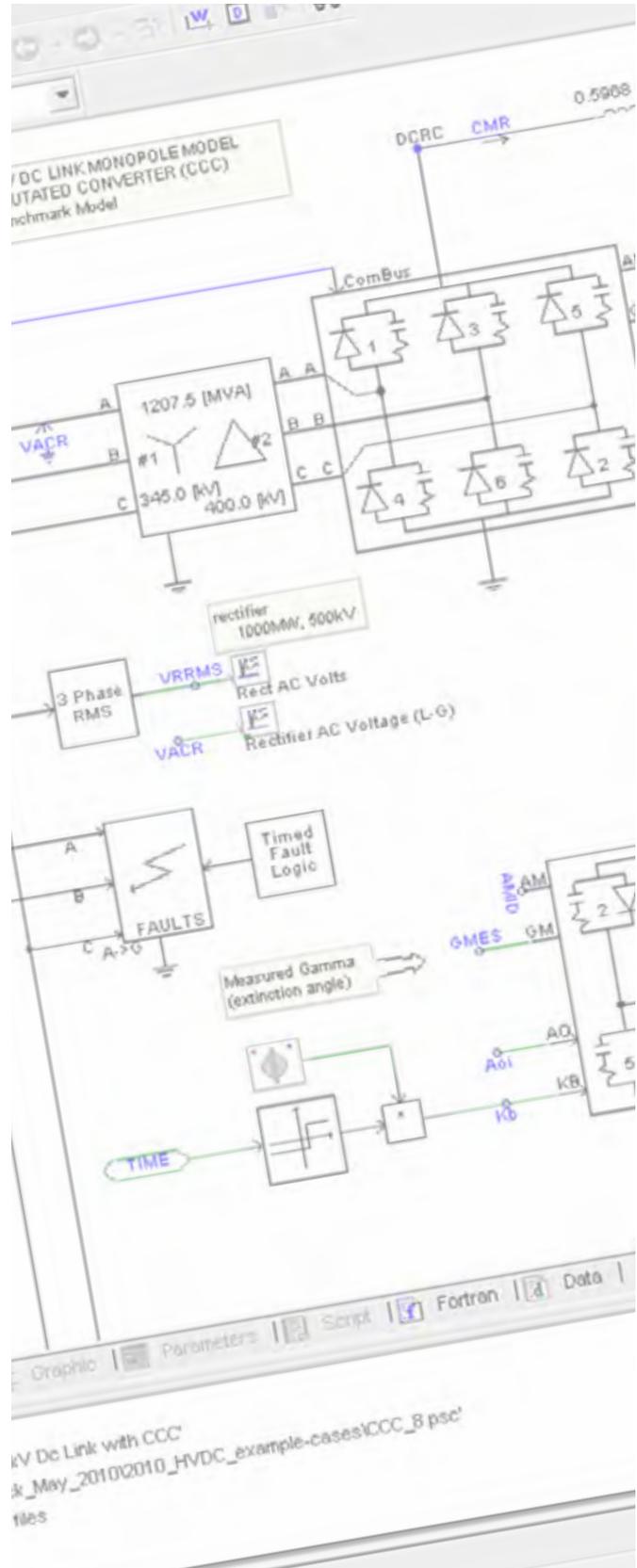
Substations

Our substation engineers deliver solutions in North America, South America, Europe and the Middle East, working in a consultancy capacity and also in support of manufacture, testing, detailed design, commissioning and ongoing maintenance of substation assets.

Our engineers can provide support on plant design, layout, protection and control systems, communication and security systems, ancillary services and supplies along with support structures and buildings.

Operation and maintenance

Our current contracts include supporting our clients around the world with the management and maintenance of their assets. We apply the lessons learnt at an early stage in scheme development and specification, understanding the asset lifetime risks and potential impacts to the design.



Renewable offshore development

We provide complete power transmission system capability including equipment, cable, structures, and associated engineering and environmental services.

Our experience includes the Beatrice Talisman Downwind Project comprising: design and procurement of topside and subsea LV and HV cables, and switchgear; design of metering, protection, and control circuits including fibre optics; procurement of subsea cable installation; PMC for all offshore operations.

OFTO – Offshore Transmission Operator

AMEC have been providing technical due-diligence support as part of the OFTO transitional regime in the UK. Our involvement includes advice on all assets of the system design; onshore and offshore cable design; onshore and offshore substation design; IS and IT advice; guidance on risk based Operation and Maintenance and Environmental compliance.

We have used AMEC global skills and resources in the delivery of this work to ensure a first class service to our clients.

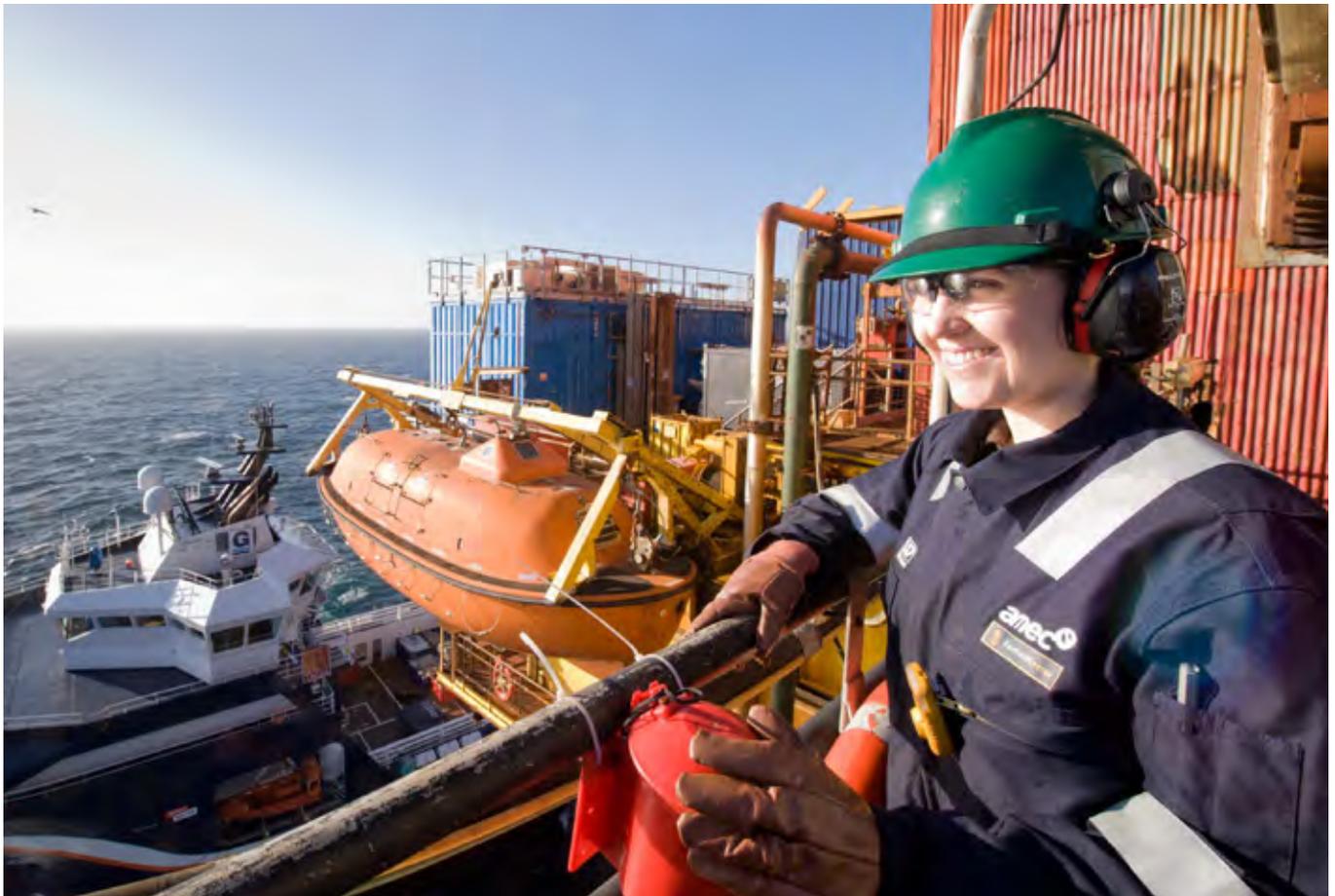


Offshore structures

AMEC's detailed knowledge of offshore facilities; their performance and the necessary requirements for their specification and design to maintain asset life in the harsh offshore environment ensures that we can call on unrivalled expertise in offshore infrastructure.

Services include design, procurement, installation, commissioning and ongoing maintenance.

In addition to having the expertise to assess the technical suitability of the installations to withstand the harsh environment of the North Sea we also undertake the role of Owners Engineer and duty holder for customers including Shell and BP.



Environmental studies

We provide environmental expertise for offshore projects.

We were involved in the design process of the Lynn Offshore Wind Farm and performed the due-diligence role for the subsequent sale to Centrica in 2003. The work included site design, environmental studies, and consent application.

We were engaged to carry out the environmental impact assessment for Race Bank and Docking Shoal Wind Farms on behalf of Centrica. The work carried out for this included: geophysical surveys to understand the characteristics of the seabed; marine biological surveys, aerial and boat-based bird and marine mammal surveys; commercial and natural fish resource surveys, marine traffic surveys, Intertidal bird and invertebrate surveys, archaeological surveys of the seabed to the shoreline; visual assessments of the landscape and seascape and support at public exhibitions.

This work required the utilisation of AMEC's specialists in survey works for on shore and off shore impacts assessments. AMEC's specialists are experienced in undertaking large EIAs and delivery of environmental consents.



Partnerships and Alliances

AMEC has been at the forefront of relationship contracting for nearly 40 years and in this time has gained leading edge experience in partnering, alliances, joint ventures and importantly incorporating collaborative principles.

Services are delivered in a collaborative contract model with project partnerships crossing differing market segments, customers, the supply chain and competitors.

We also undertake projects in traditional contract forms where required by customers.

We have collaborative working experience including:

- National Grid, Babcock and Mott McDonald within the Energy Alliance on the £500 Million Overhead Line Refurbishment contract for National Grid Electricity Transmission
- Novartis Grimsby in delivering £50 million of projects

- National Grid, US utility contractor Michels Corporation and US electrical engineering firm Vanderweil Engineers within the North East Power Alliance (NEPA), design and build substations and transmission lines on National Grid's network primarily in upstate New York
- Scottish Power on a £170 million Flue Gas Desulphurisation (FGD) project
- National Grid on the M1 Alliance replacing and maintaining the gas distribution system
- INEOS as TAR (turnaround) partner for Grangemouth

A significant proportion of our projects are undertaken in live and operational facilities where our service offering includes, engineering, construction, shutdowns, maintenance and with associated authorisations and permitting.





For the long term ...

We pride ourselves on building long term, sustainable, mutually beneficial business relationships. In these relationships success is built upon a platform of HSE excellence, openness, honesty, delivery capability, people, a culture of continuous improvement and importantly the ability to adapt to clients business drivers.

The following is an extract from our portfolio of long term relationships

- National Grid - over 50 years
- Shell - over 50 years
- BP - over 30 years
- Scottish Power - over 40 years

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