

Pollution control technologies

Helping to reduce your environmental footprint



Mott MacDonald is a global multidisciplinary consultancy with a strong engineering base. With annual revenue of £1 billion, we combine the skills of over 14,000 staff with a presence in 140 countries.

Policies worldwide have taken a new direction to reduce pollutant emissions and tackle climate change. To support these pollutant emissions reduction strategies for both the power industry and other energy intensive processes, we have developed a full technical, commercial and environmental capability in pollution control technologies (PCTs).

PCTs encompass the following areas:

- Nitrogen oxides control technologies
- Sulphur oxides control technologies
- Particulate abatement systems
- Carbon capture and storage
- Ash utilisation

Environmental legislation is the major driver behind the installation of such technologies on power plants worldwide. Increasingly stringent legislation will bring these systems to the forefront of pollutant reduction solutions in the longer term.

What we offer

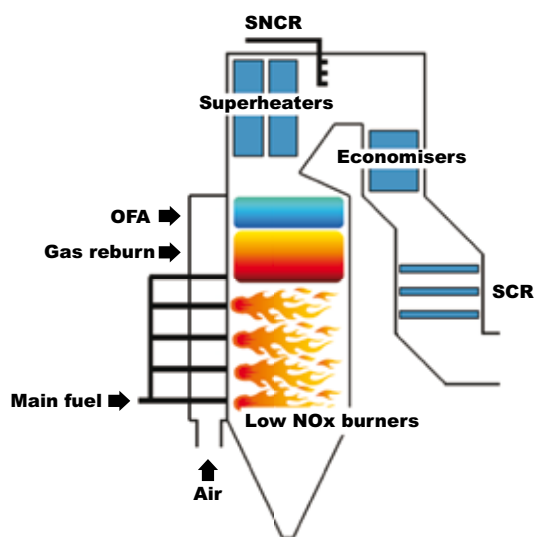
We offer a wide range of services on conventional plants (coal, oil and gas) as well as on plants operating on biomass, waste and biofuels. In addition to our in-depth knowledge of the pollution control processes, we bring experience of the other key engineering disciplines associated with installation for both retrofit and new-build options in the form of process, structural, civil, mechanical, electrical, control and instrumentation engineering assistance. We also provide a wide range of non-technical services including the economics related to both capital and operational expenditure.

Carbon capture and storage technology is seen as a key element in addressing climate change.

Mott MacDonald adds significant experience and capability across multiple industry sectors, including power, oil, gas and process.

We offer a broad range of services, both technical and non-technical, including:

- Technical: advisory, feasibility studies, design reviews, conceptual engineering, front end engineering design (FEED), detailed design, overall project management, project integration, owner's engineer (OE) and engineering procurement construction management (EPCM).
- Non-technical: legislation, policies, market studies, financial modelling, carbon management and permitting.



We have in-depth knowledge of NOx reduction technologies.



Reducing SOx emissions helps to avoid acidification of soils and water.

We are a world leader in providing services to owners, developers and project financiers, all of whom require independent assurance during implementation of their investment. Our multidisciplinary teams combine engineers, environmentalists, financial analysts, economists, safety experts, project managers and management consultants. We operate worldwide from centres of excellence in Europe, the Gulf region, Asia and the USA, and we are supported by local capabilities in many other countries.

Our resources, combined with a full understanding of the key issues associated with PCT installation, leads to effective project execution, from definition and design through to construction monitoring and commissioning.

Mott MacDonald has a reputation for quality, experience, expertise and international reach. As described hereafter, our extensive project and client list lends weight to our reputation.

Nitrogen oxides control technologies

Nitrogen oxides (NOx) emission reduction can be grouped into either primary or secondary methods. Primary methods are related to the combustion process and reducing the formation of NOx whilst secondary methods are post-combustion processes and convert the already formed NOx back to elemental nitrogen. A number of NOx reduction technologies are available, including low-NOx burners and Selective Catalytic Reduction (SCR) and Selective Non-Catalytic Reduction (SNCR).

Our track record

- Project management support on the development work for an SCR retrofit feasibility project for 3 × 600MW coal-fired units, UK. We performed a multidiscipline technical review of the feasibility reports provided by three contractors and prepared a functional specification detailing the requirements for the SCR system.
- Structural assessment and redesign of part of a coal-fired boiler structure to incorporate new boosted over-fire air (BOFA) system for a major client in the UK.
- Options appraisal study for a 500MW power and water plant in the UAE. We examined methods to reduce the gas turbine NOx emissions for all four units, including low-NOx burners, water injection and SCR units, and their implication on cost and air quality.
- Retrofit of dry low-NOx combustors to four existing gas turbines operating in combined cycle mode in the UAE. Our role included full project management, design verification and construction monitoring.

Sulphur oxides control technologies

Flue gas desulphurisation (FGD) technologies are post-combustion technologies used to control the emissions of sulphurous compounds from flue gases into the atmosphere. They convert the already formed sulphur oxides (SOx) back to elemental sulphur. FGD is commonly used in facilities including coal and oil fired power plants, refineries, metallurgical and cement plants. Energy from waste and biomass plants also use SOx reduction methods such as sorbent injection.

Our track record

- Lender's technical advisor for an 815MW coal-fired supercritical power plant in Indonesia. We reviewed the proposed concept design of the seawater FGD system.



PCTs can be retrofitted to existing power plants and other energy intensive processes to comply with environmental legislation.



Our understanding of the full CCS chain enables our clients to lock up as much CO₂ as possible.

- Owner's engineer for the construction of a 700MW coal-fired supercritical power plant located in West Virginia, USA, including SCR and FGD systems. For the FGD, we developed the minimum design criteria and assisted the client in selecting the final system.
- Design review and construction supervision services for the installation of a seawater FGD system at a large coal-fired subcritical power plant in the UK. We also conducted the tender design of civil, structural and building services, including foundations and structures.
- Air quality assessment for 2 × 100MW oil-fired power plant in Sudan fitted with a wet limestone FGD. The assessment included a source apportionment study for SO₂ in order to identify the contribution from the different phases of the power plant using a proprietary dispersion modelling software.

Particulate abatement systems

The combustion of fuels results in the formation of particulate matter. This matter is often of the order of micrometres in size and can be carried away in the flue gas stream into the atmosphere. These particulates have been linked to health hazards including heart disease and lung cancer and due to the health and environmental factors, the control of particulate emissions has been at the forefront of emission controls since the 1960s.

Our track record

- Owner's engineer for the complete design, construction and commissioning of a 220MW coal-fired cogeneration plant in Poland. We provided engineering support for all related coal delivery and ash disposal infrastructure which included electrostatic precipitators (ESP).
- Owner's engineer for the construction of a large biomass plant in Scotland, which uses a bag filter for particulate abatement. We provided complete project management services from design through to construction supervision and commissioning of the plant.
- Longevity assessment of a coal-fired power station in the UK in relation to flue gas emissions and European environmental directives. We examined options for particulate abatement systems, recommended a strategy and performed extensive design work for the ESP retrofit.
- Development of the specification documentation for the introduction of particulate collection equipment (including the consideration of ESP, mechanical cyclone separator and bag filter) and other ancillary components for heavy fuel oil-fired power plants in Saudi Arabia.

Carbon capture and storage

Carbon capture and storage (CCS) technology is increasingly seen as a key element of the global portfolio of advanced energy technologies needed to address climate change.

Mott MacDonald provides comprehensive advisory services for power plants and processes with CO₂ capture and capture-ready plant. This complements our long standing expertise in coal, oil and gas-fired power and heat production, oil and gas pipelines, gas storage and enhanced oil/gas recovery.

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We understand the technical, environmental and commercial profile of power generation with CO₂ capture, including the upstream and downstream supply chains. Our capabilities span the whole spectrum of facilities and process engineering relevant to a CCS project, both onshore and offshore. We have the ability to draw on the Group's wealth of multidisciplinary expertise to cover the whole CCS chain from source to sink. Our expertise includes in-depth knowledge of the design, engineering, operations and construction of pipelines, pumping and compressor systems, as well as the geological storage.

Our track record

- Owner's engineer assisting ScottishPower's CCS team in the preparation of their submission to the UK government as part of the UK CCS Demonstration Competition. Our work includes conceptual design, plant integration, performance and cost analysis for a 300+ MW post-combustion carbon capture scheme.
- High level pre-feasibility studies on conceptual carbon capture readiness for a number of power plants in the UK to meet the requirements of the Department of Energy and Climate Change's Guidance on Carbon Capture Readiness as part of Section 36 of the Electricity Act 1989.
- Feasibility study for developing ultra mega power plants (9 × 4,000MW) in India as carbon capture-ready, on behalf of the British government. Our services covered the conceptual design, techno-economic modelling, investment appraisal, comparison of options and costs, evaluation of risks and sensitivities. Subsequent work included conceptual CCS retrofit design for two ultra mega power plants, combined with development of plant specific carbon 'capture-ready' design measures and associated guidance for implementation of such measures for the plant owner's design team.
- Comparative study assessing the impact of carbon capture technologies on the cement industry for the International Energy Agency Greenhouse Gas Research and Development Programme. Our work covered thermal and process modelling of oxy-combustion and post-combustion processes, techno-economic modelling of plant performance, comparison and analysis of options and costs.
- Pre-feasibility study for the application of CCS to a combined cycle gas turbine plant in Kazakhstan. The study explored both pre-combustion and post-combustion capture of CO₂ for the plant. Geological sequestration of CO₂ in the offshore oilfield and other onshore formations was also explored.

Ash utilisation

Thermal power plants firing solid fuels generate significant volumes of ash over their operating life. As facilities for long-term storage of ash are often limited, sustainable options for disposal of ash need to be considered. Subject to local market conditions, ash products can be sold to third parties, in particular to suppliers of both cementitious and non-cementitious products.

Mott MacDonald has developed a full advisory capability in a number of ash processing techniques and has expertise to assess their applicability for a specific plant. We are also able to conduct comprehensive market studies in order to determine the likely market size and value of the various ash products.

We recently conducted techno-economic feasibility studies into the installation of ash processing plants at two coal-fired power stations in the UK in order to increase sales of the ash and reduce quantities stored.

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