High performance and cost-effective emissions compliance

Snapshot

Client
Ratcliffe coal-fired plant

Challenge
To support extended operating life, the plant needed to retain its ability to operate at baseload while complying with environmental legislation, in particular relating to NOx emissions.

Solution
We reviewed state-of-the-art NOx controls and advised the installation of Selective Catalytic Reduction (SCR). We supported tendering, procurement and design processes, identified novel adaptations and challenged the OEM.

Benefits
The SCR system we proposed was cost-effective and safeguarded the ability to operate in baseload. Novel elements saved time and cost during construction and reduced operating costs.

To support our client in meeting future emissions limits in the most cost-effective manner while protecting plant availability and extended life, we called on our first-hand experience of retrofit DeNOx systems and how such technology can be best integrated into plant.

Protecting baseload operation

An ability to continue operation at baseload whilst complying with forthcoming environmental legislation was integral to plans to extend the life of the 2000 MW Ratcliffe coal-fired plant. In particular, the plant will need to meet NOx emission limits arising from the European Industrial Emissions Directive and the associated Large Combustion Plant BREF.

Identifying best technology

After reviewing the cost-effectiveness and feasibility of retrofit DeNOx technologies, we proposed that SCR was the best available technology for all units on the site, representing least risk to baseload operation while delivering the lowest NOx emissions of technologies available.

We developed the specification and reviewed suppliers' proposals, considering existing component and operational factors on-site to assess the system's integration into the plant.

Our support minimized risks with regard to new structures, gas path, catalyst and reagent system. We introduced novel elements which reduced capital and operational costs. These included a new reagent injection and flow balancing technology, reduced reactor height, and the use of acoustic horns instead of steam sootblowers for catalyst cleaning.

The support provided by Uniper has been invaluable in helping us deliver this major project. Their added value contribution, I estimate, has saved us circa €80million and we would have had great difficulty in delivering this project without them.
Dave Johnson
Plant Manager, Ratcliffe

Technical insight

We work with clients to develop the scope and specification of projects to ensure the project intent is clear to all parties and the risk of costly variations is reduced.

We produced a specification for the engineering, procurement and construction of the complete DeNOx system at Ratcliffe. We technically reviewed the solutions proposed by equipment suppliers before making a recommendation.

Based on our experience in retrofitting our own coal assets, as well as supporting clients, we understand how the performance and design of the power plant will influence the success of an SCR system. Therefore we took account of existing heat transfer surfaces, boiler auxiliaries, control and instrumentation, civil and geotechnical factors, and plant management procedures.

We have expertise in selecting fit-for-purpose technologies and installation approaches, whilst not being restricted to choosing more costly conventional approaches where this is not supported by value engineering.

NOx control experience

We have wide experience in the deployment of NOx control techniques across the full range of power plants fired by coal, gas, waste and biomass. We use our experience in the specification, tendering and assessment of contractor proposals for NOx control, including SCR plant, along with on-site implementation, to act as the owner's engineer.

We also support the ongoing operation of our clients' assets through reactor tuning and optimization, inspection and upgrading.

This ensures continued compliance with new and future environmental, as well as health and safety regulations. We also assist our clients to engage with environmental regulators to shape the approach to implementation and in developing upgrade solutions that meet the needs of both the power plant and the authorities.

€80m+

Estimated saving on cost of environmental upgrade

Impact of our expertise

Our in-house expertise made a significant impact on the efficiency, cost-effectiveness and safety of the SCR system installed:

- We reviewed and challenged modeling of the site using computational fluid dynamics and cold flow physical modeling to support the use of a novel reagent and injection flow balancing technology. The system gives excellent mixing of reagent and flue gas, but requires less steelwork, hence reduced construction time and cost.
- We proposed the use of acoustic horns rather than steam sootblowers for catalyst cleaning which delivered significant capital and operating cost savings.
- We supported intensive process safety assessment and activities such as Hazard and Operability studies into the project.
- We carried out assessment which showed that the use of ammonia as the feed for the catalysts would have least impact on plant efficiency and traffic flows to site.

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