Economic Flexible Operation for coal and gas plant

Based on decades of experience and expertise as an owner/operator of both coal-fired and gas-fired generation plant, our **Economic Flexible Operation** solution enables our clients to meet the challenges of operating power plants flexibly, efficiently and profitably in a rapidly changing energy market.

First-hand experience

Uniper's engineers have developed leading operational expertise from decades of working on power plants all across the world. Our focus on operational results has ensured our success.

We share our experience to help you achieve full value from your existing assets. Our experience is comprehensive and covers all areas of your plant operation.

Providing comprehensive skills from a single source, we leverage our experience and independence of original equipment and component manufacturers to choose the best solution.

We understand the impact of renewables, and of changes in the energy market and environmental legislation.

We have first-hand experience of successfully implementing flexible operation in our own plants:

Plant	Fuel	Commissioned	Operating hrs to 2016	Starts to 2016
Ratcliffe-on-Soar, UK	Coal	1968-70	310,000	2,200
Ironbridge, UK	Coal	1969-70	220,000	3,800
Kingsnorth, UK	Coal	1970-73	210,000	4,000
Staudinger 5, DE	Coal	1992	138,000	1,100
Connah's Quay, UK	Gas	1996	120,000	1,900
Grain B, UK	Gas	2011	25,000	600

Our solution

Uniper's Economic Flexible Operation is a cost-effective commercial solution which offers a unique range of expert flexibility support in a single package.

We take a holistic approach, addressing flexibility issues which will affect plant on an immediate, mid-term and long-term basis.

The component services have been developed and demonstrated over decades, focusing on economic operation, maximizing income and reducing risk.

Our solution will support you to:

- Analyze market opportunities
- Reduce start-up times
- Improve ramp rate and load following
- Reduce major component replacement costs
- Increase maximum load
- Reduce minimum load
- Increase major outage intervals through parts life extension
- Reduce daily maintenance costs
- Extend economic plant life.

Real world value for your business

Target areas and indicative benefits based on our experience*

Reduce start-up times by 20-50%

We help you to understand the cost, life and income impacts of sustainable flexible operation. Optimize operation processes to minimize plant damage, enabling trading and dispatch to optimize asset value.

Improve ramp rate and load following by 50%

Our solution enables your plant to follow fluctuating load requirements accurately. We provide control system tuning and modification, improve your ability to meet transient system demands and optimize dynamic loading rates for income and plant life.

Increase maximum load by 5-10% of Pmax

Maximize your revenue from an existing asset. We will verify the integrity of pressure parts in coal-fired plants, prove firing systems and generator capability, and address turbine and feed systems. For gas turbine assets we deliver market leading technology by challenging strategies.

Reduce minimum load by 5-10% of Pmax

Avoid shutdown operations and plant damage, and increase your revenue while on load. We work with OEMs and also challenge OEM strategies.

Maximize commercial benefits

We offer services in all commercial activities associated with the operation of power plant ranging from consultancy with the negotiation of service agreements, insurance premiums and fuel contracts to continuing services such as emissions trading and energy trading to help plant owners maximize income and profit.

Reduce daily maintenance costs by 10-20%

Better maintenance practices will improve reliability and efficiency and reduce costs by focusing on condition and risk.

Increase major outage intervals by 20-40%

We will work with you to optimize outage works and extend outage intervals. Our strategies for parts life extension are underpinned by first-hand experience of the impact of flexible operation on components.

Reduce major component replacement costs by 20-30%

We provide inspection support, defect analysis and avoidance. We can identify the root cause of defects, propose redesign of components and support your operations short-term while a long-term solution is implemented.

Avoid downtime by gaining early warning of faults

Our advanced online monitoring solutions will reduce cost and risk. Continuously optimize maintenance actions to meet the plant needs, gain a greater understanding of plant operation and be alerted to hidden problems before they become a major issue.

Adapt your plant for best economic operation

We support all aspects of plant modification projects from feasibility through specification, tendering and procurement, to commissioning and acceptance. We act as owner's engineer and provide compliance support.

Gain new insight into market and networks

Take advantage of our extensive expertise in the modeling of networks and markets. Gain a greater understanding of how system and market changes can impact your operations.

Improve staff knowledge

Our world class Engineering Academy offers theoretical and practical training on a complete range of operational, control, maintenance and safety issues.

* Potential achievable benefits are site specific

References

Fuel	Challenge	Solution	Benefit
Coal	OEM hot start drainage procedure resulted in initial cooling of high temperature components leading to avoidable damage and slower start.	Implement progressive drainage through each superheater stage with careful control of heat input.	Significant reduction in start time – first fans to unit synchronization after 8 hour shutdown reduced from 100 minutes to 60 minutes.
Coal	Large temperature differentials in unit hot/warm start resulted in increased tube failures, loss of income, increased maintenance costs.	Implement a furnace off-load pumped recirculation system.	Significantly reduced temperature differentials across furnace. Corrosion fatigue and tube failures reduced.
Gas	Reduce low load operation at 429 MW single shaft plant.	Implement of CO Reduction package, install 50 additional thermocouples for early detection of instabilities and ability to approach real HRSG load limit.	Final settings in pre-defined load range from 210 MW to 190 MW. Resulting CO emissions at 190 MW: 13mg/Nm^3.
Coal	Synchronize 4 x 500 MW units in 60 minutes (from 90 minutes) with a single operator per unit. Original procedures not fit for new flexibility market.	Lean and Operational Excellence concepts used to challenge and improve the start-up process. Electrical infrastructure modified. Operational staff resource planning and task allocation. Standardizing processes refined. Alarm management to avoid operator overload. Sequence Control enhancements.	Four units synchronized in 60 minutes (2 units synchronized simultaneously).
Gas	Ensure reliability during flexible operation of CCGT plant.	Implement Advanced Condition Monitoring on all plant data to support early detection of faults developing.	Early warning of valve failure which was not noticed by the operator. Minimized the long-term effect of acids on the integrity of pipework and components.
Coal	Avoid life reduction due to increasing unit starts. Avoid start-up oil consumption. Take advantage of summer and night-time opportunities. Maintain commercial operation.	New minimum load point determined. Test and demonstration program carried out. Boiler and turbine capabilities established. Stable operation confirmed.	Pmin reduced from 180 MW design to 90 MW (10%).
Gas	Low load factor protection of all plant areas not possible due to plant design. Established preservation methods difficult to implement without compromising start-up times.	Trials of novel technique of amine film forming carried out over three-year period, evaluated via monitoring and inspections.	Amine film forming rolled out across the power plant delivering significant cost savings.
Coal	Increase of secondary response capability up to 15% of MCR.	Dynamic model of power plant and control system created to identify control issues and potentials at low cost and without risk to the real plant. This led to a reduction of real plant tests.	Secondary frequency response capability increased from 10.2% to 15.5% of MCR. Detailed knowledge enabled implementation across the whole plant.
Coal	Cycle chemistry-related damage resulting in significant costs over a number of years.	Bespoke training course developed to meet identified learning needs, with reference to site specific needs. Delivered on-site to match staff availability.	Improved knowledge by plant staff will reduce risk and improve performance.

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