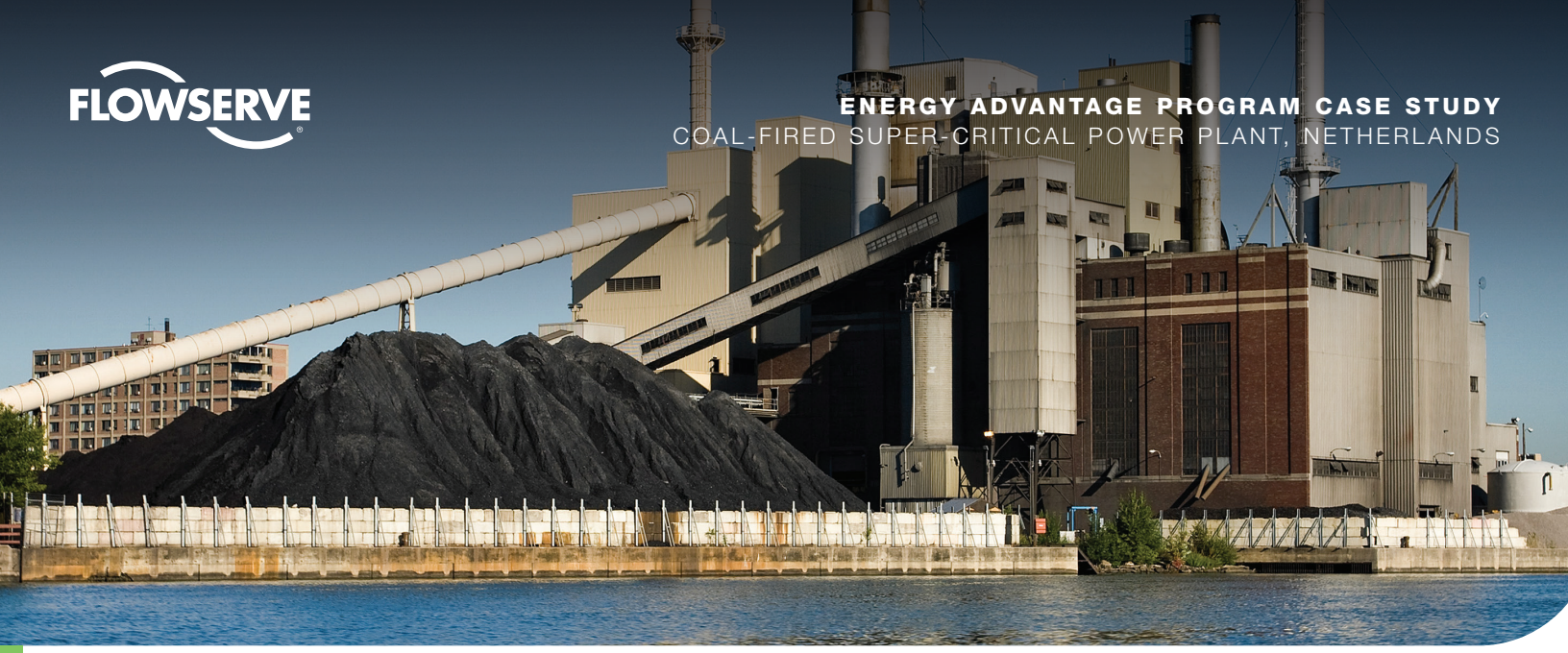
FLOWSERVE

ENERGY ADVANTAGE PROGRAM CASE STUDY
COAL-FIRED SUPER-CRITICAL POWER PLANT, NETHERLANDS



Energy Optimization of Coal-fired Power Plant Boiler Feedwater System Reduces Energy Consumption and Carbon Footprint

Project scope

Flowserve supported a power plant operator in improving the efficiency of their steam-turbine-driven 30-MW main boiler feedwater pump. This six-stage barrel pump, operating close to 5,000 RPM, was a main parasitic power consumer, negatively impacting plant thermal efficiency. Additionally, sustained reliability of this process-critical pump across a range of speeds and plant outputs was key to the operator. To minimize turn-around time and investment cost, the new design needed to reuse existing pressure boundaries, bearings and mechanical seals while increasing rated efficiency by a minimum of three percentage points.

Methodology

Flowserve Energy Advantage Program experts re-engineered the hydraulic passages to minimize wake losses while reducing the tangential velocity components upstream of the series stages. The changes in rotordynamics, incipient Net Positive Suction Head (NPSHi) and axial thrust characteristics were validated through a variety of simulations prior to validating the hydraulic design using scaled model tests. Final validation of performance was conducted on site using thermodynamic testing. The improvements were validated through CFD analysis and factory tests prior to final on-site validation of the savings.

FLOWSERVE ENERGY ADVANTAGE PROGRAM
DECARBONIZE BY DESIGN

Sustainability Impact

Implementing the Energy Advantage Program allowed the power plant operator to achieve:

- Power consumption reduction of approximately **10,200 MWh p.a.**
- Estimated financial benefit of **€ 816,000 p.a.**
- Approximate CO2 savings of **6,120 metric ton p.a.**
- Increased reliability through greater separation margin between operating speeds and rotor critical speeds

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