



Flow Loop Analysis in Petrochemical Plant Reduces Energy Consumption and Carbon Footprint

Project scope

Flowserve partnered with a petrochemicals plant operator to optimize the energy usage of a cooling water system that consisted of five parallel VS3 pumps (rated 600 kW each) connected to a cooling tower in an open system. The system presented a range of operating scenarios based on diverse plant needs and the cooling water temperature (i.e., summer vs. winter). Flowserve was tasked with minimizing energy consumption across all operating scenarios — from reducing the operational risk of having to operate all installed pumps to meeting the duty requirements and maintaining the existing electric motor and drive train, discharge head and motor frame.

Methodology

Flowserve Energy Advantage Program experts initiated the project by performing validation testing using specialized equipment for open channel flow measurements. This data was used to benchmark a dynamic system model that took into consideration the different operating scenarios. This allowed new duty conditions to be defined for the pumps to achieve optimal energy efficiency at a system level. Following an extensive data-driven analysis on the complete flow loop, Flowserve determined the most cost-effective, impactful upgrade was limited to retrofitting the CW pumps with a custom hydraulic end. The improvements were validated through CFD analysis and factory tests prior to final on-site validation of the savings.



Quantified Sustainability Impact

Implementing the Energy Advantage Program allowed the petrochemical operator to achieve:

- Combined power consumption reduction by approximate 3810 MWh per annum.
- Estimated annual savings from reduced energy consumption of \$230,000.
- Approximate CO2 savings of 2285 metric ton per annum.
- Increased redundancy (5oo5 to 4oo5 operation).
- Increased reliability through higher NPSH3% margin.

Contact us for further details - EnergyAdvantage@flowserve.com