



YOUR CATALYST FOR

CHEMICAL PROCESSING

Overcome Critical Industry Challenges With Proven Expertise and Solutions

ENSURE CHEMICAL PROCESS RELIABILITY, EFFICIENCY AND SAFETY

Chemical companies face new challenges every day. Operating parameters change. Energy costs fluctuate. Environmental factors evolve and competitive landscapes shift.

That's why Flowserve helps your team identify emerging issues and develop solutions that can streamline processes, enhance reliability, and increase efficiency.

Best-in-class pump technology

Maximizing performance is critical to your company's profitability, but it can't come at the expense of personnel or environmental safety. We've pioneered best-in-class advancements in pump technology that improve performance while reducing power consumption and environmental risks.

Flowserve fluid motion and control products are designed for uncompromising safety and reliability — all to help you extend equipment availability and keep plant personnel and assets safe.

Ideal solutions to tackle critical industry challenges

Chemical processes vary widely across the industry, from basic organic and inorganic to specialty and fine chemicals. And the production of biofuels, petrochemicals and pharmaceuticals certainly requires unique equipment and systems. But with Flowserve as your partner, you can leverage our deep experience and proven pumping solutions for these sectors.

There's no one-size-fits-all solution because companies have such unique requirements. Yet they share fundamental business needs to innovate products and processes. All seek solutions to the following urgent challenges:

- 1. Reduce** capital and operating costs to minimize the total cost of ownership (TCO).
- 2. Protect** people and the environment to ensure compliance and avoid risks.
- 3. Increase** energy efficiency to achieve business goals and energy transition objectives.

Introducing your knowledgeable partner

We highlight each of these industry challenges inside — and recommend the Flowserve pumps and our other advanced equipment and systems that offer ideal solutions for chemical plant operators.

Discover more about how Flowserve and our global network of distributors and certified service centers can help you achieve your company's business goals, meet compliance requirements, and successfully complete energy transition initiatives.

OPTIMIZE CHEMICAL PROCESSES WITH IDEAL PUMPING SOLUTIONS

The industry-leading brands and superior pumping solutions designed by Flowserve can withstand extreme conditions and meet the unique requirements of chemical processing.

DURCO®



MARK 3™

- Available in ASME (ANSI) B73.1, ISO 2858, ISO 5199 and ISO 15783 configurations
- Mechanically sealed or magnetic coupling design
- Mark 3 unitized self-priming pump
- Mark 3 recessed impeller pump

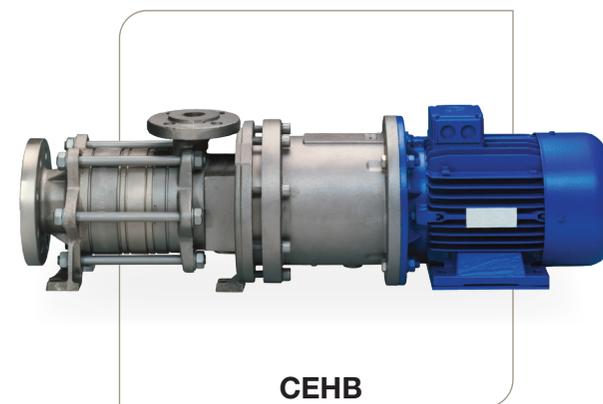
INNOMAG®



TB-MAG™

- Available in ASME (ANSI) B73.3, ISO 2858, ISO 5199 and ISO 15783 configurations
- Sealless, thrust-balanced process pumps
- Pure ETFE casing liner

SIHI®



**CEHB
Side Channel**

- SIHI side channel pumps, horizontal or vertical, self-priming and gas handling series
- Liquid ring vacuum pumps
- Liquid ring compressors
- Dry vacuum pumps (SIHI Dry, SIHI Boost)



SUCCEED IN THE MOST DEMANDING APPLICATIONS

Leverage our engineering expertise and global pump manufacturing and technical support resources to enable your chemical company to solve application challenges involved in the production of:

- Adhesives and sealants
- Agri-chemicals
- Catalysts
- Construction materials
- Cosmetics
- Dyes, inks and pigments
- Food additives
- Industrial cleaners
- Lubricant additives
- Mining
- Paints and coatings
- Pharmaceuticals
- Plastic additives
- Polymers
- Renewable fuel production
- Rubber processing
- Semiconductors
- Solvents
- Starch sugars and sweeteners
- Textiles
- Volatile organic compounds (VOCs)
- Water treatment



PIONEERING TECHNOLOGIES FOR TYPICAL PROCESSES

We introduced chemical process pumps more than 75 years ago. Our pioneering solutions offer customers an extensive range of products, design features and corrosion-resistant materials in addition to Flowserve's materials application expertise.

Our technologies consider safety, reliability, environmental and lifecycle solutions for typical chemical processes such as:

- Acid transfer
- Auxiliary services
- Caustic and chlor-alkali
- Clean rooms
- Condensate extraction
- Cooling
- Distillation
- Drying
- Evaporation
- Filtration
- Fluid and gas handling
- Hazardous and lead-free products handling
- Intake water
- Product transfer
- Slurry processing
- Solvent recovery
- Sterilizers
- Waste processing



REDUCE CAPITAL AND OPERATING COSTS

Chemical companies prioritize ways they can optimize capital expenditures and better manage operating costs. Accomplishing both will require investments in reliable equipment that maximizes uptime and reduces maintenance requirements.

Add value by enhancing reliability

High equipment reliability is essential. Chemical plant operators can ensure availability and dependability, minimize unplanned downtime, and reduce maintenance costs over the pump lifecycle with:

- Robust design and materials of construction that extend mean time between repair (MTBR)
- Maximum interchangeability of pumps designed with modular components
- Quick-delivery programs from original equipment manufacturers (OEMs)
- Spare parts kits
- Inventory analysis and management services

FEATURED PUMPS AND BENEFITS

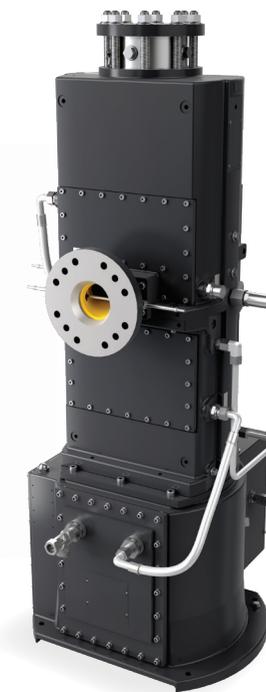
SIHI Dry running vacuum pump

With no gearbox, couplings, shaft seals or other sources of friction energy losses, the SIHI Dry running vacuum pump is the most efficient vacuum pump on the market.

It requires significantly less power while delivering faster pump-down cycle times and optimal finished product throughput. Accurate electronic rotor synchronization permits quiet operation without any process-contaminating lubrication. And it's ATEX-certified.

Customer benefits

- Reduces power consumption and energy costs
- Eliminates costs for lubrication fluids
- Enables uncontaminated solvent and process vapors to be recovered downstream
- Provides operational flexibility for batch processes



Durco Mark 3 sealed pumps



The highly efficient design of Durco Mark 3 chemical process pumps reduces power consumption and provides unmatched performance and reliability.

Rugged construction enables plant operators to avoid unplanned downtime and lowers maintenance costs.

Customer benefits

- Provides maximum application flexibility with a modular design
- Optimizes performance with extensive hydraulic options
- Reduces spare parts inventory due to interchangeability of components
- Shortens lead times with quick delivery in two days for assembled-to-order (ATO)
- Improved safety, efficiency and ease of maintenance due to the unique reverse-vane impeller design that offers repeatable performance
- Increases reliability due to the ideal seal environment created by the SealSentry chamber

SIHI KPH liquid ring compressor



With best-in-class efficiency, the proven design of the SIHI KPH liquid ring compressor can be used with any type of service liquid and operate under the most severe conditions requiring reliability and safety.

API 681-compliant, this product offers reduced TCO with its easy installation and maintenance, low power and service liquid consumption, and simplified on-site service.

Customer benefits

- Achieves market-leading isothermal efficiency when the gas is pumped against the cool-running liquid ring
- Minimizes wear and tear of non-metallic contact between the rotating parts
- Prevents process contamination
- Enhances safety and reliability



PROTECT PEOPLE AND THE ENVIRONMENT

As the planet gets warmer, nations and companies are establishing ambitious decarbonization goals to minimize the impacts of climate change. That's a major commitment for the chemical industry at a time when demand for basic chemicals, plastics and high-value, speciality chemicals is increasing.

Reduce emissions and operate profitably

- The chemical sector is the largest **industrial energy consumer**.
- Ammonia production is responsible for the **highest share of emissions**, followed by high-value chemicals (i.e., ethylene, propylene, benzene, toluene and mixed xylenes) and methanol.

Therefore, chemical companies need equipment, systems and solutions that enable them to remain profitable while minimizing emissions and shrinking their carbon footprint.

Minimize health, safety and environmental risks

To help chemical plant operators reduce these risks, Flowserve offers a broad portfolio of close-coupled pumps that enclose all moving parts within the pump body.

They feature no-coupling alignment that prevents the catastrophic failure of bearing systems. Secondary controls reduce leakage if primary containment fails.

FEATURED PUMPS AND BENEFITS

INNOMAG TB-MAG magnetic drive pump

INNOMAG pumps are hermetically sealed. That means no leaks — even if they fail. They're not only cleaner and safer for operators and the environment but also more cost-effective. They consume 10 to 46% less energy on average than typical sealed and sealless pumps.

The INNOMAG TB-MAG pump complies with ASME B73.3, ISO 2858, ISO 5199, ISO 15783, ATEX and CE standards.

Customer benefits

- Protects personnel, since it's essentially maintenance-free so technicians can avoid contact with hazardous conditions
- Reduces operating costs due to its high efficiency and longevity
- Delivers reliable performance by handling process fluids with up to 30% solids content of 0.13 mm (0.005 in.)
- Expedites maintenance and keeps associated costs low as a result of its design



SIHI CEHB side-channel magnetic coupling pump



The CEHB pump is well-suited for handling any liquids and liquefied gases near their vapor pressure. The key to its exceptional performance is an integrated first-stage centrifugal pump impeller that makes low-NPSHR operation possible.

Customer benefits

- Ensures environmental compliance with zero emissions as a result of the magnetically coupled design
- Provides better performance in applications with liquids and liquified gases that are difficult to seal
- Moves gas-entrained fluids at net positive suction heads less than 0.5 m (1.64 ft), owing to its combination side channel-centrifugal pump design
- Increases uptime and reduces maintenance time by eliminating mechanical seals
- Avoids emissions with self-priming capabilities

Durco Mark 3 magnetic drive sealless pump



For maximum personnel and environmental safety, the Durco Mark 3 magnetic drive sealless pump provides dependable, leak-free performance in all types of applications.

It's particularly well-suited for handling toxic, explosive and valuable liquids. It complies with ISO 2858, ISO 5199 and ISO 15783 and is ATEX and food-grade certified.

Customer benefits

- Minimizes energy usage with high-efficiency performance over the life of the pump
- Avoids unplanned downtime with unrivaled reliability and low mean time between failure (MTBF)
- Reduces TCO by eliminating maintenance and reducing the need for a spare parts inventory

INCREASE ENERGY EFFICIENCY TO ACHIEVE BUSINESS GOALS



Pumps represent up to 60% of total energy costs for chemical companies. Rising energy prices can disrupt operations and put achieving business objectives and energy transition goals at risk.

Enable economical pump performance

So the transition to a low- or zero-carbon profile starts by increasing the energy efficiency of current operations:

- Economical performance is enabled by low power consumption and fast pump-down from the atmosphere.
- Variable-speed and pressure control can be provided with intelligent drive systems that perform ongoing rotor diagnostics.

Plant operators can rely on Flowserve to provide hydraulic options that enable them to match pump size and capacity to process requirements.

FEATURED PUMPS AND BENEFITS

SIHI Boost dry vacuum PB-System

The SIHI Boost dry vacuum PB-System provides deep vacuum performance with less energy and maintenance.

Its unique design harvests kinetic energy stored in the spindles, which can be exposed to atmospheric pressure at their full speed of 15,000 rpm — five times faster than traditional Roots-type machines. Mass inertia is stored during idle periods and can be released immediately.

The SIHI Boost dry vacuum PB-System complies with ATEX, NEC and CEC Class 1 Div 2.

Customer benefits

- Lowers power consumption with a proprietary spindle design and an integrated drive, which make it the most energy-efficient booster on the market
- Eliminates process contamination with oil-free operation
- Avoids maintenance and unplanned downtime with long-life bearings that have no wearing parts or rotating shaft seals



Durco Mark 3 metallic sealed pump

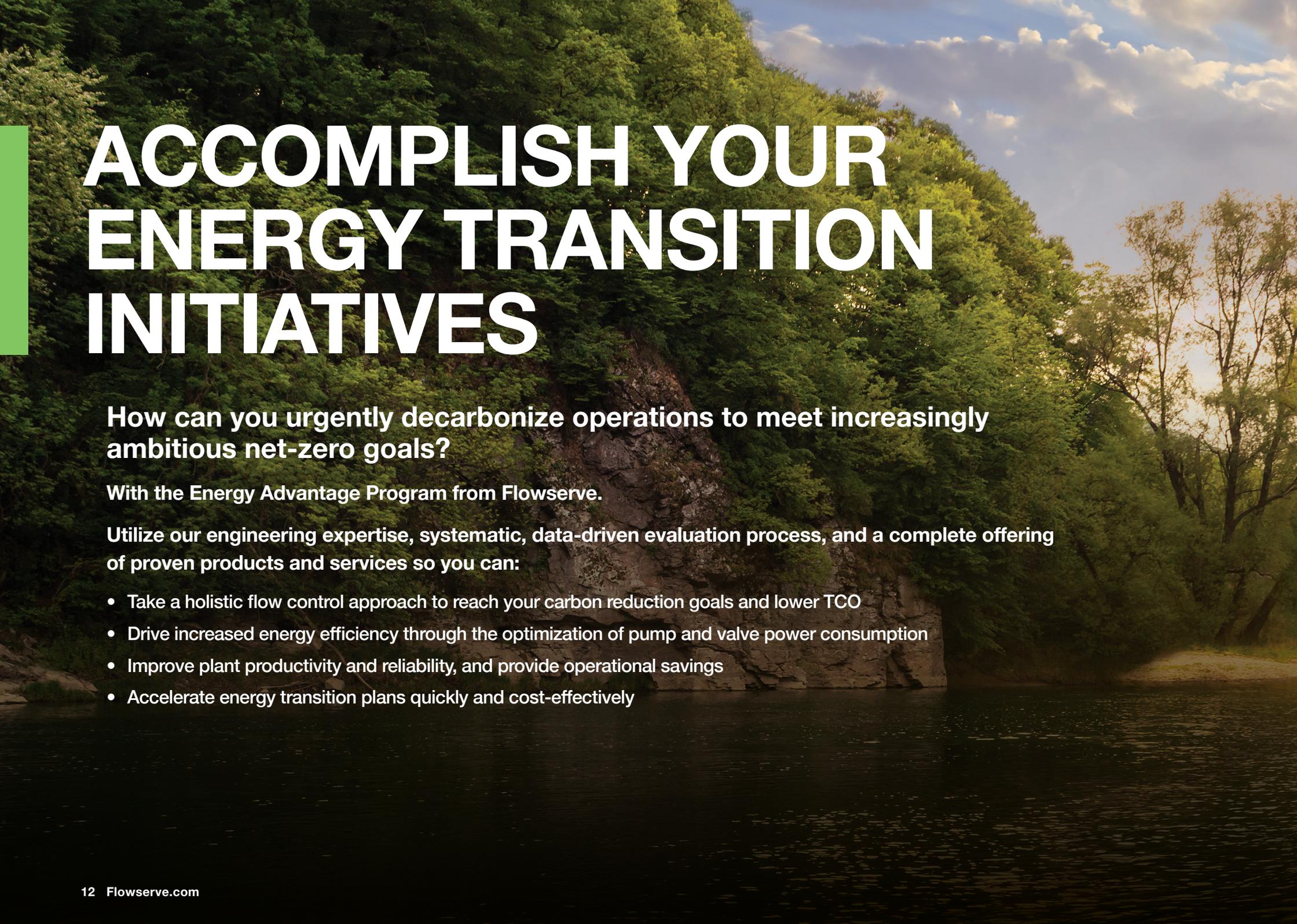


The highly efficient design of the Durco Mark 3 metallic, sealed pump reduces power consumption and provides unmatched performance and reliability.

Its rugged construction enables plant operators to avoid unplanned downtime and lower maintenance costs.

Customer benefits

- Optimizes performance with extensive hydraulic options available to adapt to different process fluids
- Improves reliability with shaft and bearing components that reduce deflection and vibration
- Provides maximum flexibility and unmatched application coverage due to a modular design and a large number of impeller options
- Lowers costs for spare parts and maintenance as a result of part interchangeability



ACCOMPLISH YOUR ENERGY TRANSITION INITIATIVES

How can you urgently decarbonize operations to meet increasingly ambitious net-zero goals?

With the Energy Advantage Program from Flowserve.

Utilize our engineering expertise, systematic, data-driven evaluation process, and a complete offering of proven products and services so you can:

- Take a holistic flow control approach to reach your carbon reduction goals and lower TCO
- Drive increased energy efficiency through the optimization of pump and valve power consumption
- Improve plant productivity and reliability, and provide operational savings
- Accelerate energy transition plans quickly and cost-effectively



Decarbonize operations quickly and cost-effectively

The Flowserve Energy Advantage Program enables senior executives to look across the enterprise for ways to accomplish ambitious business objectives and environmental, social and government (ESG) commitments. It also helps operational leaders responsible for maximizing chemical process performance.

Here are the three offerings available:



Carbon Advantage offers a range of cost-effective, tailored solutions to reduce hydrocarbon and greenhouse gas (GHG) emissions.



Efficiency Advantage enables significant efficiency gains by optimizing pump and valve energy consumption and effectively recapturing wasted energy.



Cost Advantage provides multiple service offerings along with comprehensive digital solutions focused on increasing equipment reliability, reducing maintenance spend, and optimizing operational expenses.



SUPPORT AND SERVICES THAT REDUCE PROCESS COSTS AND RISKS

Keeping chemical plants operating to achieve production targets and avoid unplanned downtime requires superior technical capabilities. Critical to success are resolving problems quickly, optimizing equipment and systems, and predicting equipment issues before they happen.

With a global network of Quick Response Centers and technical support service capabilities, Flowserve provides the expertise to help you eliminate emissions, extend equipment life, and reduce expenses throughout chemical processes.

Dedicated local support, worldwide

Chemical companies can benefit from the broad range of Flowserve engineering and technical support services, such as:

- Sizing and selection of equipment
- Startup optimization and performance testing
- Configuration and calibration
- Training for products and systems
- Shutdown, turnaround, and outage planning and execution support
- On-site and off-site maintenance and repairs
- System assessments and optimization
- Troubleshooting and leak detection
- Upgrades and retrofits
- Service agreements that span asset monitoring, custom services, lifecycle management, long-term customer support and parts



Predict maintenance needs in order to increase uptime

Precise and reliable flow control is the lifeblood of chemical plants. Bring the full power of RedRaven from Flowserve to provide predictive maintenance that enables you to increase uptime and minimize costs.

RedRaven helps improve plant performance by detecting anomalies in pumps (and other rotating equipment), enabling you to:

- Predict why your critical assets may experience issues
- Take preventive action

RedRaven integrates sensors, software and experienced Flowserve personnel to monitor your critical assets for performance abnormalities. Data modeling and analysis identify potential asset issues with root cause analysis (RCA) and advice from experienced Flowserve technicians in our monitoring center.

As a result, you can use the original insights to make informed decisions that improve reliability. Plant operators are able to prioritize assets that require attention by spending less time evaluating healthy equipment. TCO is lowered by minimizing spare part inventories.

Discover what you can improve with RedRaven





Your complete fluid motion and control partner

Flowserve offers superior **pump, valve, seal, automation and predictive maintenance** solutions.

Let's discuss your needs.

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Watch our
video now.

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