



Hydraulic Fracturing

ENGINEERED SOLUTIONS FOR EFFECTIVE, EFFICIENT WATER MANAGEMENT

xylem
Let's Solve Water



CAPABILITIES

Source Water Extraction

- Surface
- Sub-surface

Water Transfer, Boosting, and Monitoring

On-Pad Management

- Cellar Pumps
- Analytics Solutions

Flowback and Produced Water Management

Engineered and Turnkey Solutions

Water Challenges In Hydraulic Fracturing

The global oil and gas landscape continues to shift as producers increasingly turn to unconventional reserves, such as shale gas and tight oil. Breakthroughs in hydraulic fracturing have led to large-scale commercial production around the world from these shale formations. However, the most critical and costliest input into the extraction process—water—is under stress. Water quality and availability is declining in many regions, threatening the production process and public acceptance. Water productivity is low as trucking and water disposal continue to be mainstays of the industry. The result: producers are using more to get less. More labor, more energy, more time, more water—which leads to higher costs for all of us.

The Water Solution: Xylem

Solving water challenges is your best opportunity to reduce costs, improve profitability, defend against declining water supplies, and preserve the natural environment around extraction points. With our unrivaled water experience and expertise, Xylem is a leading choice for the oil and gas industry. For hydraulic fracturing in particular, our solutions address the most complex water challenges and our local presence gives us a deep understanding of how these challenges vary by region. From source water extraction to waste water management, Xylem can help you become more efficient, effective, and better prepared for long-term success in an ever-changing energy market.

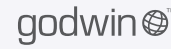


Backed By Experts

Rugged, reliable products are only one reason to partner with Xylem. Behind every Xylem solution is a dedicated team committed to meeting your needs, from system design to ongoing service and support.

Experienced in hydraulic fracturing operations, Xylem engineers use advanced software platforms to map detailed topographies, draft 3D images, specify equipment, construct complex water pipeline networks, and provide advanced monitoring and control solutions. Our technicians and strategic channel partners offer 24/7 service and support for field equipment and are strategically located only a few hours away from even the most remote job sites. Finally, Xylem has dedicated setup crews for both temporary and permanent systems available at a moment's notice. Using multiple crews, we've completed multi-mile pipelines in a matter of days. And after installation, our technicians are experts at operations, ensuring consistent water delivery to any location. It all adds up to a "one-stop-shop" for hydraulic fracturing water solutions.

The Xylem Brands



GODWIN has led the industry for more than 30 years in the design and manufacturing of fully automatic, self-priming pumps, offering diesel- and electric-powered pumps to rent or buy for dewatering and transport.



FLYGT was founded in 1901 and is a world leader in the design and manufacture of dry and submersible pumps, mixers, and related intelligent control systems.



GOULDS WATER TECHNOLOGY manufactures energy-efficient centrifugal and turbine pumps, controllers, variable frequency drives, and accessories, building on more than a century and a half of experience.



YSI provides sensors, instruments, software, and data collection platforms for environmental water quality monitoring and testing, building on a legacy that reaches back to 1948.



Standard Xchange has been developing industrial heat transfer solutions for over 90 years with shell and tube, gasketed plate, brazed plate, and air cooled heat exchangers.



LOWARA is a world leader in stainless steel pump manufacturing technology offering nearly 50 years of excellence in design and production for residential and commercial applications. Includes energy-efficient products that transport clear, contaminated, aggressive, abrasive, hazardous, or high-temperature fluids.



SonTek, advancing environmental science in over 100 countries, manufactures affordable, reliable acoustic Doppler instrumentation for water velocity measurement in oceans, rivers, lakes, canals, harbors, estuaries, and laboratories.



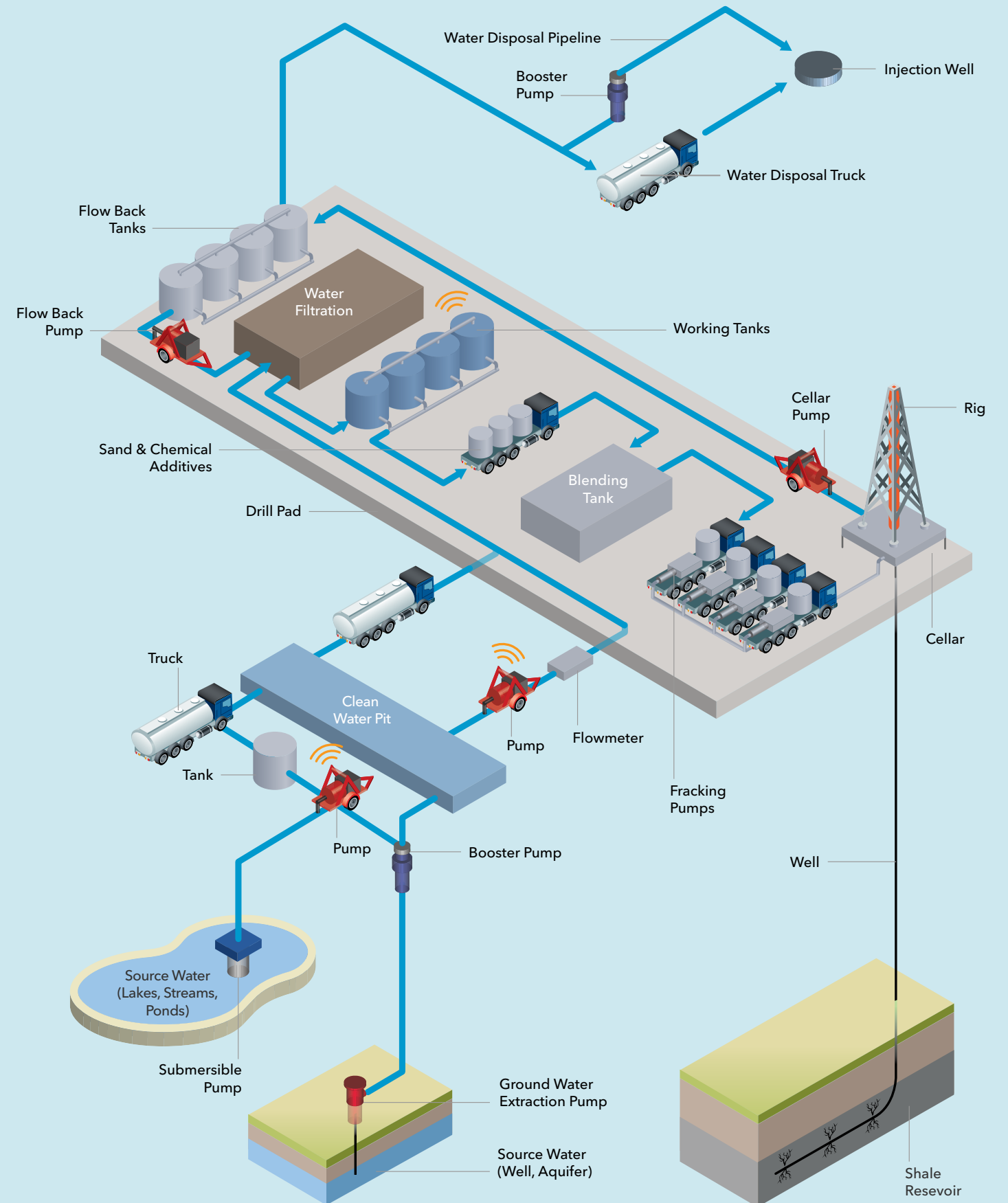
MJK is a global leader in manufacturing flow, level, and analytical instruments and controls for water and wastewater applications, with a 30-plus-year history of innovation.



WTW offers the worlds' most complete line of instrumentation products for measuring and controlling wastewater, drawing on a 60-year history of proven sensor and analysis technology.



WEDECO has been a leader for more than 30 years in the environmentally friendly treatment of water and wastewater with ultraviolet light and ozone that eliminate microorganisms in wastewater or treat process water for industrial purposes.



Source Water Extraction

Hydraulic fracturing can be water intensive when compared to conventional oil and gas production methods. As a result, effective and environmentally conscious extraction of water from surface or subsurface sources is vital to the success of any fracking operation. We offer a variety of proven pumps and analytics giving you an ideal solution for your specific challenge.



Source Water Extraction

Surface Water (Lakes, Streams, Ponds)



Godwin Dri-Prime® Pumps

- Fully automatic self-priming for easy operation by field personnel
- Wide range of flows and pressures available
- Simple, in-field maintenance



Single Bag Filter Pods

- Skid-based filter units
- Operating range of 1 micron to 100 microns
- Can operate up to 150 psi
- System flow of 300 GPM
- Secondary containment base
- Walkway platform for servicing and changing of bag elements



Flygt Submersibles

- Compact, lightweight design
- Wide range of flows and pressures available
- Available with optional flotation raft (as pictured)

Ground Water (Wells, Aquifers)



Submersible Well Pump

- Extract source water from aquifers
- Submersible well pump
- 6", 8", 10", 12"
- Up to 540 HP
- Available in full stainless steel or duplex stainless steel
- Capacity: Up to 2,300 GPM
- Head: Up to 2,200 ft.



Goolds Water Technology Vertical Turbine Pumps

- Extract and transport source water from aquifers
- Alloy construction with external flush of critical wear areas available for corrosive/abrasive services
- Available in 316, Duplex, or Super Duplex Stainless Steel (SS)
- 6" and larger diameter pumps
- Capacity: Up to 20,000 GPM
- Head: Over 1,000 ft.



MJK Magflux Flowmeters

- Designed with the latest microprocessor technology to ensure accurate measurements
- Supplied with a technically advanced enclosure made of glass reinforced polycarbonate giving maximum protection against harsh industrial environments
- Built-in datalogger with graphic display and user-friendly menu

Analytics

Water Transfer, Boosting, and Monitoring

Getting source water to your fracking operation reliably and efficiently is vital to profitability. Our solutions can ensure your success, and our next-generation analytics allow you to monitor data and control pumps remotely using your smartphone, saving time and money.



Water Transfer, Boosting, and Monitoring

Pumps



Multistage MP

- Booster pumps for delivering source water over elevation
- Maintenance friendly design
- Horizontal and vertical configuration for optimum use of available installation space
- Construction based on over 100 years' experience in multistage development and manufacturing
- Capacity: 1,500 GPM
- Head: 1,640 ft.
- Closed radial impellers with wear rings on both sides and balancing holes for minimum axial thrust, minimum bearing loads, and maximum bearing life time
- Optional variable speed drive HYDROVAR for automatic performance adjustment and energy minimization
- Available in cast iron, ductile iron, stainless steel, or duplex stainless steel
- Efficiency optimized closed radial impellers and diffusers



Godwin CD Series

- Moving source water to storage or pad
- On pad water transfer
- Wide range of flows and pressures available
 - Capacity: 15,400 GPM / 370 BPM
 - Head: 180 ft. / 80 psi
- Available with sound-attenuated enclosures



Godwin HL Series

- Moving source water to storage or pad
- Long distance water transfer
- Wide range of flows and pressures available
 - Capacity: 5,280 GPM / 125 BPM
 - Head: 500 ft. / 220 psi
- Available with sound-attenuated enclosures



Godwin WT Series

- High discharge pressure, dry-running, and portability for convenience and performance
- Automatic or manual starting/stopping, including optional wireless remote
- Capacity: 4,950 GPM
- Cast iron with bronze wear rings and sil-brass impeller

Analytics



SonTek-IQ® Pipe

- Can provide accurate flow values in pipes from 0.5 - 5.0 m
- Four pulsed Doppler velocity beams provide superior section coverage
- Modbus, SDI-12, RS232, and Analog ready
- Installs with limited or no earthworks
- Ultra-low power consumption
- Self-calibrating water level using vertical beam and pressure sensor



MJK Magflux Flowmeters

- Designed with the latest microprocessor technology to ensure accurate measurements
- Supplied with a technically advanced enclosure made of glass reinforced polycarbonate giving maximum protection against harsh industrial environments
- Built-in datalogger with graphic display and user-friendly menu

Water Transfer, Boosting, and Monitoring

Analytics

Godwin PrimeGuard Field Smart Technology: Next-Generation Analytics

Field Smart Technology (FST) expands the PrimeGuard's functionality by collecting engine and pump data in one-minute intervals. Data is transmitted to a password protected website for viewing and reporting. FST communicates through both cellular and satellite networks to provide a reliable connection in the most remote locations. FST allows users to start and stop pumps and displays the same information that is shown on the PrimeGuard 2 panel so operators know exactly what their remote equipment is doing. These features allow for the optimal use of labor and can eliminate the need for on-site pump watch.

FST Features and Benefits

- Monitor engine and pump parameters
 - Troubleshoot remotely with ECU codes
 - Ensure proper system operation
 - 24/7 pump operation without manual pump watch
- Start and stop remotely for improved system control
- Cellular and satellite communication offers a reliable and strong connection
- Log data and hours for accurate, easy reporting
- Alarm for engine off/on and failure
- Automatic geofence alerts with streamlined tracking
- Integrate with asset management software to manage equipment from a single platform

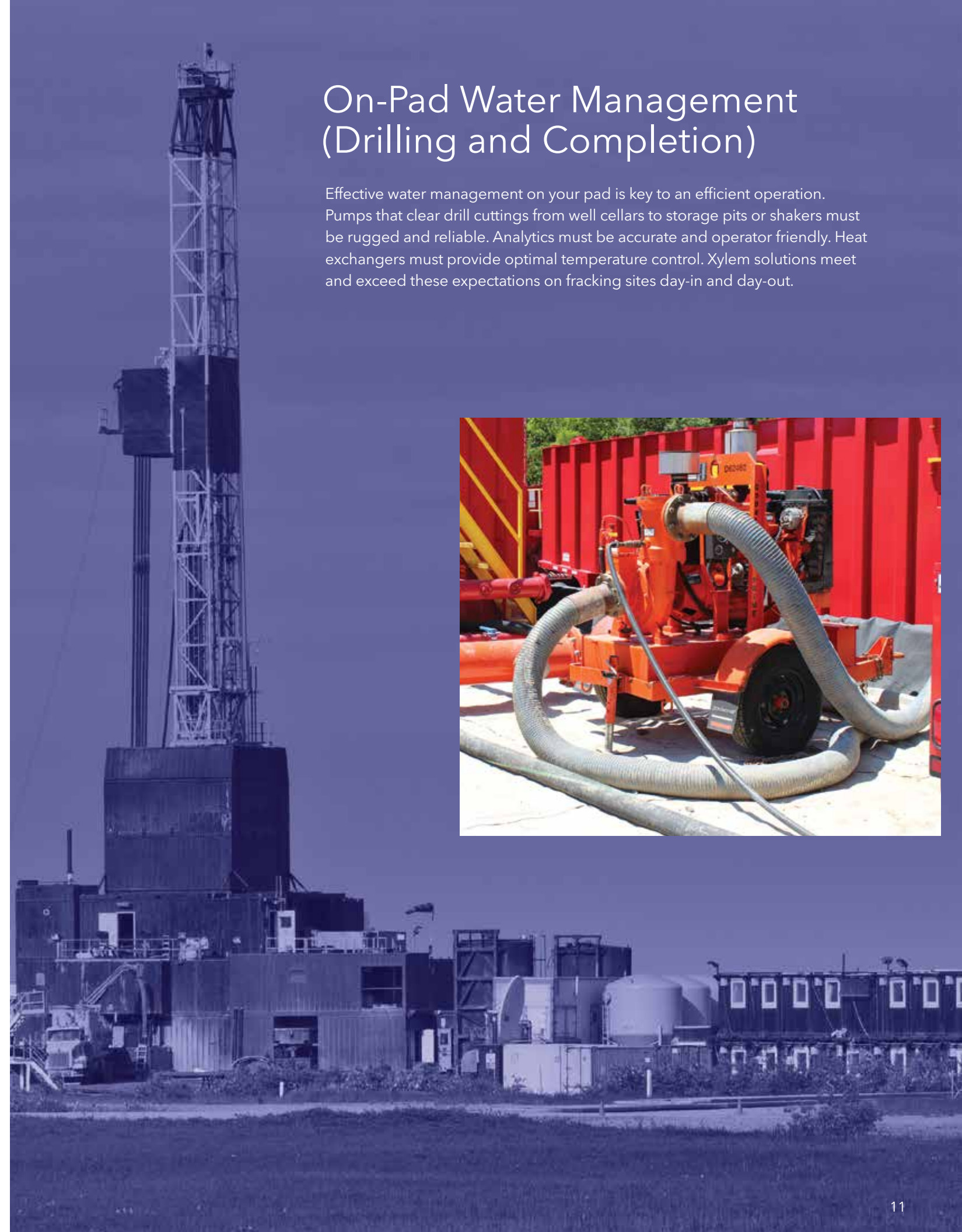
Advanced Control Systems

- Monitor complex pumping systems from one panel
- Control speed of equipment to optimize processes
- Custom built control panels for specific applications



On-Pad Water Management (Drilling and Completion)

Effective water management on your pad is key to an efficient operation. Pumps that clear drill cuttings from well cellars to storage pits or shakers must be rugged and reliable. Analytics must be accurate and operator friendly. Heat exchangers must provide optimal temperature control. Xylem solutions meet and exceed these expectations on fracking sites day-in and day-out.



On-Pad Water Management (Drilling and Completion)

Cellar Pumps



Flygt N-technology Submersible Pumps

- Clear drill cuttings from Well Cellars
- Wide range of flows and pressures available
- 7.5 to 24 HP
- Sustained high-efficiency performance reduces cost of operation
- Self-cleaning ability decreases labor requirements
- Reliable operation for fewer unplanned service calls



Godwin CD Series

- Water transfer to tanks and surface water impoundments
- Water supply to frack operations
- Wide range of flows and pressures available
 - o Capacity: 15,400 GPM / 370 BPM
 - o Head: 180 ft. / 80 psi

Filtration



Godwin Duplex Filter Pods

- Skid-based filter units
- Operating range of 1 micron to 100 microns
- Can operate up to 150 psi
- Secondary containment base
- Walkway platform for servicing and changing of bag elements
- System flow of 1,500 GPM with 6 bags per pod

Analytics



YSI ORP Pro1030

- Measures ORP and PH of frac water
- Less than 3 seconds for reading
- Smart calibration allows easy calibrations with the press of a button, remembers previous values and walks you through the calibration
- 1+ year life
- Temperature 23° to 158°F
- Wireless radio connectivity available



MJK Expert™ Hydrostatic Transmitters

- Accurately shows water supply levels at all times, even in rough conditions
- Flexible performance, designed for immersion in open tanks, ground water wells, and reservoirs
- Remote monitoring capabilities reduces labor needs and costs



Standard Xchange Heat Exchangers

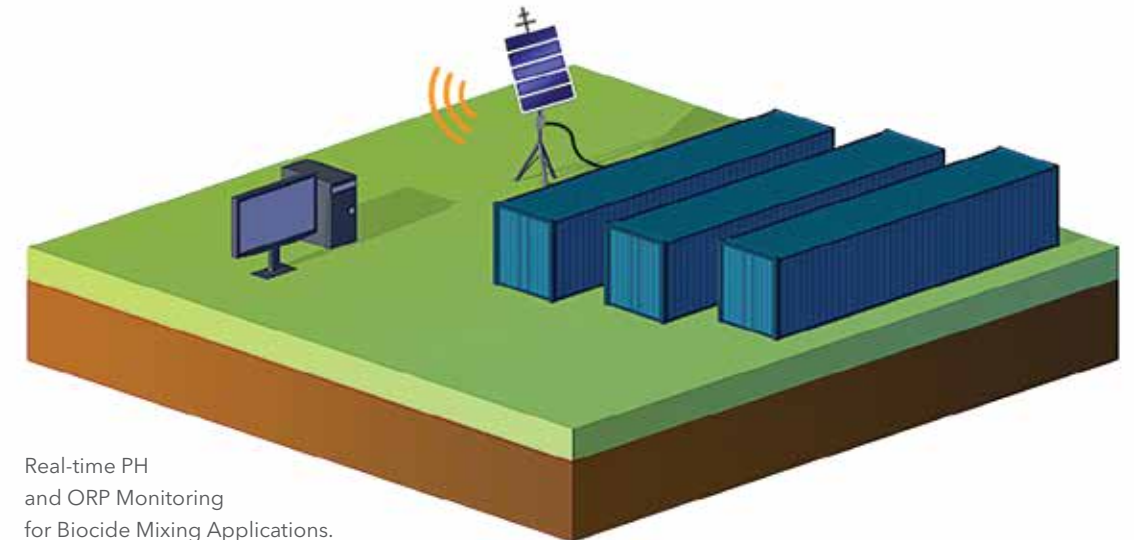
- Used for well drilling fluid, fracturing water, or fracturing gas temperature control
- Custom Shell and Tube 5"-60" dia.
- Pre-Engineered Shell and tube 2"-8" dia.
- Gasketed Plate and Frame 2" - 20" connections
- Brazed Plate ¾" - 4" connections
- Air Cooled 1" - 3" connections

On-Pad Water Management (Drilling and Completion)

Real-time Water Quality Measurement for Biocide Mixing

Understanding water characteristics are crucial to any hydraulic fracturing operation. Our unique engineered solution aims to improve water productivity by providing real-time information on the quality of water. This information is collected using our YSI sensors, which are placed inside tanks and relayed to a solar-powered transmitter that wirelessly sends the data to a laptop or PC over a secure network. By using Xylem's proprietary Aquamanager software, customers can take this data and make intelligent decisions about biocide mixing.

- Monitor water quality variables, such as ORP and PH, in real-time in order to make informed decisions about bacteria levels and biocide mixing
- Portable system designed for scalability - can accommodate any size operation
- System comes equipped with solar panel and batteries, ensuring system is completely self-powered, and radio transmission capabilities, which allows for secure transmission of data locally on-pad
- Rugged installation built for use in heavy duty oil field applications
- Can be used along with our handheld YSI Photoflex Colorimeter, which measures 138 parameters, including pH



Real-time PH and ORP Monitoring for Biocide Mixing Applications.

Flowback and Produced Water Management

At the back-end of your operation, the disposal or treatment of flowback and produced water has caused public concern. Addressing this issue is vital to your ongoing success, and reliable movement of that water to disposal wells is the first step. Our Goulds Water Technology and other pumping solutions can help.



Pumps

Godwin CD Series

- Moving source water to storage or pad
- On-pad water transfer
- Wide range of flows and pressures available
- Capacity: 15,400 GPM / 370 BPM
- Head: 180 ft. / 80 psi
- Available with sound-attenuated enclosures



Multi-Stage Pumps

- Movement of produced water to saltwater disposal wells
- Vertical and horizontal configuration
- Stainless steel, duplex
- Capacity: 1,500 GPM / 36 BPM
- Head: 1,640 ft. / 710 psi
- Up to 800PSI (application typically calls for 400 to 450PSI)

Engineered and Turnkey Solutions

Engineering and Design

Our product design and application engineers have more than 100 years of experience and the expertise to provide the right pump for your application. Whether the job is big or small, our people provide the extra attention and support needed to make your job run on time and on budget.

The Design Engineers utilize the most current computer-aided drafting (CAD) and computational fluid dynamics (CFD) tools to design and engineer everything from a new pump model, to a large-scale or highly-complex pump systems.

The engineering department has great diversity among its engineers: backgrounds including civil, mechanical, electrical, and chemical. Depending on the job, we use relevant experience to design the best solution for you. Working in cooperation with the engineering department in our Quenington, UK facility and the staff of other Xylem locations, we provide engineering support regardless of where in the world you are.

Our Application Engineering team designs pumping systems specific to your applications. You can be sure the system is efficient and optimized for the job before a single pump is installed.

Technical Proposals

Our expert engineers develop tailored system designs with curves to illustrate the best solution for a pending job.

Based on the physical conditions of a job, pump system requirements, and equipment capabilities, our engineers generate technical proposals that are tailored to your specific needs and operate at the highest levels of efficiency and reliability.

Contact our engineering department for the technical proposals you need; you will be glad you did.

Maximum Efficiency Means Better Margins For You

Xylem turnkey solutions can improve your water management across every step of the fracking process. Our industry-leading pumping technology improves performance while our proven reliability reduces maintenance hassles and costs. But pumps are just the start. Our next-generation analytics systems can truly streamline your operation for more effective water management with savings you can take to the bottom line.

- Godwin Field Smart Technology (page 10): Eliminates the need for on-site pump watch and control. Monitor and start/stop pumps from anywhere in the world with your smartphone tablet or computer.
- MJK Expert™ Hydrostatic Transmitters (page 7): Accurate groundwater level monitoring with remote capabilities reduces labor costs and saves monitoring time.
- Real-time PH and ORP Monitoring (page 12): The total solution for efficiency and accuracy in biocide mixing applications.
- Flowback Salinity Sensors (page 12): Accurate, real-time monitoring and control of fresh water blending.

Consider a comprehensive, turnkey Xylem Water Management System for the most effective and efficient performance available.

Everything you need.

Xylem is your complete source for water solutions.

Our comprehensive line of accessories and capabilities include:

- Aluminum Pipe and lay flat hose
- Low profile road cross-overs
- iManifold trailers
- Filter pods
- Light towers
- Fuel tanks
- Various Flanges, suction tees, back-up rings
- HDPE Pipe
- Centrifugal water transfer pumps
- Generators
- Magflux Flow Meters
- Portable Colorimeters
- Turbidity Meters



For more information, visit www.xylem.com/oilandgas

xylem
Let's Solve Water

Godwin, Flygt, Goulds Water Technology, YSI, Standard Xchange, Lowara, SonTek, MJK, WTW and WEDECO are brands of Xylem, whose 12,000 employees are addressing the most complex issues in the global water market.

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