



## Lowest Cost Per Barrel Delivered Through Automation and Integration

Unconventional shale reservoirs continue to reshape the oil and gas industry at a time when the cost of fresh water is increasing and its availability is declining. As these fields are developed, the amount of produced water that needs to be managed continues to grow exponentially. Effectively managing water is rapidly becoming the leading challenge in drilling and completion operations.

### Increasing Environmental Challenges and Increasing Costs for Water Access, Transport, and Disposal

Shale operations are dealing with higher water management costs and more environmental and operational risk than ever before.

Sourcing fresh water and higher volumes of sand flowback and produced water are the primary causes of these cost increases. Trucking produced water out of these operations for disposal elsewhere adds even more cost and risk. Addressing these challenges in an environmentally responsible way frequently requires adding more services and personnel at each site.

### TETRA's Closed Loop Automation Across a Fully Integrated Service Delivers Unmatched Efficiency

TETRA Technologies (TETRA) delivers innovative and differentiated offerings for produced water transfer, de-sanding, and "on-the-fly" water treatment and recycling.

By integrating these service offerings, we maximize efficiency through job planning and crew optimization. The step change in efficiency is delivered through fully automated technology for water management solutions. From water transfer to treatment/recycling, storage, blending, and distribution, we can help reduce manpower cost for a typical fully integrated completion operation, frequently by over 30%. These systems deliver greater transparency and quality control throughout the transfer, flowback, and recycling of produced water while simultaneously improving environmental considerations.



## Lowest Cost Per Barrel Water Management Solution

### Water Management Solution Offerings

- Automation and Monitoring
- Fresh and Produced Water Transfer
- Pipeline Construction
- Storage and Pit Lining
- Treatment and Recycling
- Oil Recovery
- Blending and Distribution
- Flowback and Testing



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# Delivering More Through Less

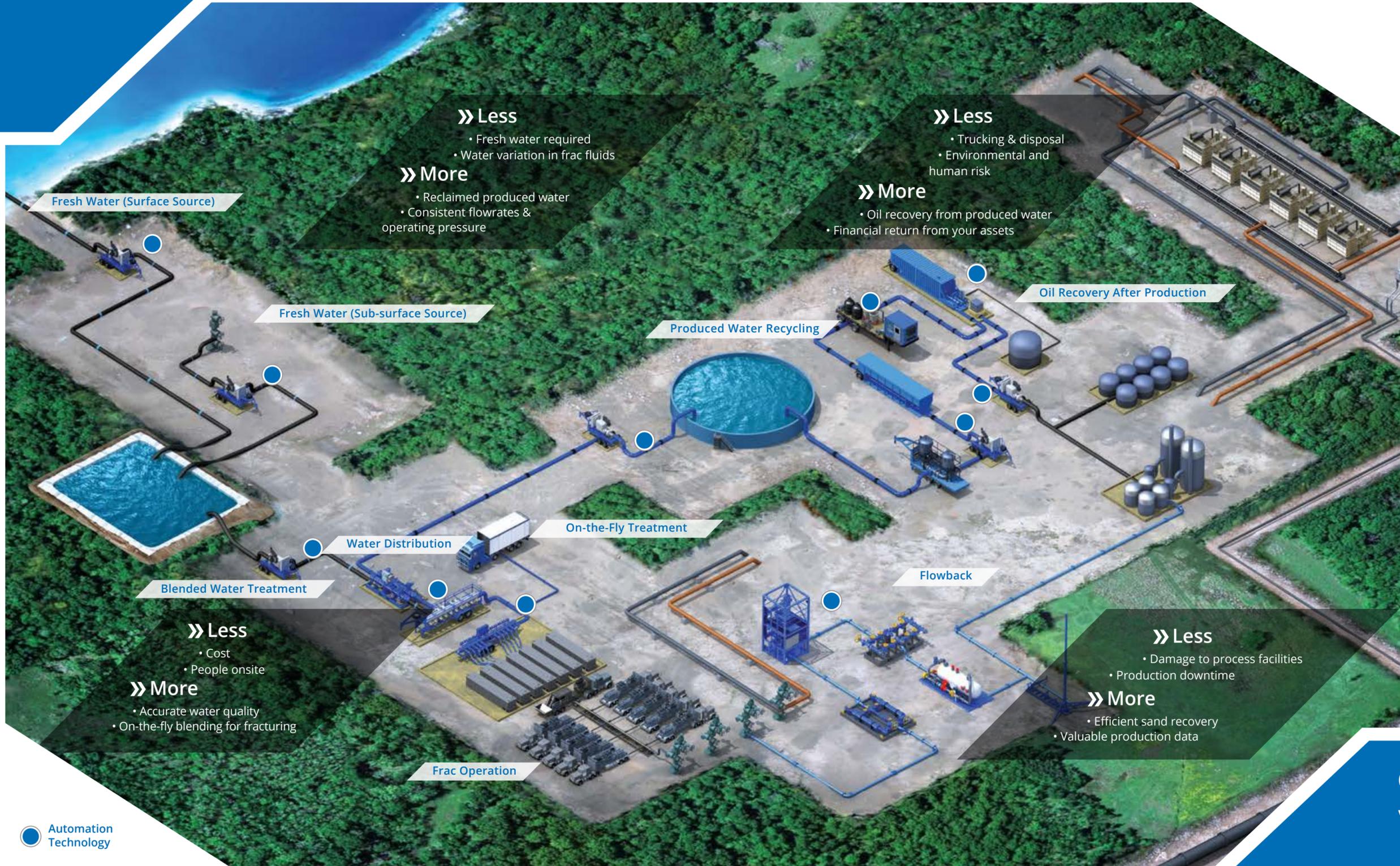
Close the loop and clear the way for a new approach to managing water in shale plays. Our fully automated and integrated water management solution helps meet your increasing water requirements by treating, recycling, and optimizing produced water for fracturing operations – all while yielding significant cost savings and reducing operational and HSE risks. Our systems work in unison to provide you with the lowest cost per barrel water management solution.

**Leak-Free Water Transfer** – Moving water, especially produced water, through often harsh environments presents risks. TETRA Steel™ hose is the industry's only double-jacketed, UV-resistant, quickly deployable hose. It delivers leading flow rate capability and withstands the highest operating pressure of any lay flat hose on the market.

**ClO<sub>2</sub> Treatment** – This environmentally selective oxidizer is used by TETRA to remove bacteria, H<sub>2</sub>S, FeS, and other sulfides on the fly prior to fracturing, providing continuous and accurate chemical dosage volume.

**Homogeneous Water Blend** – Our patent-pending TETRA blending controller and patented blending manifold help conserve fresh water by mixing reclaimed produced water on the fly to deliver an accurate combination of fresh and produced water.

**Optimal Frac Water Supply** – In addition to minimizing environmental and personnel risks, the distribution manifold ensures your frac tanks receive the optimal water supply regardless of its source.



## » Less

- Fresh water required
- Water variation in frac fluids

## » More

- Reclaimed produced water
- Consistent flowrates & operating pressure

## » Less

- Trucking & disposal
- Environmental and human risk

## » More

- Oil recovery from produced water
- Financial return from your assets

## » Less

- Cost
- People onsite

## » More

- Accurate water quality
- On-the-fly blending for fracturing

## » Less

- Damage to process facilities
- Production downtime

## » More

- Efficient sand recovery
- Valuable production data



**Produced Water Recycling** – TETRA enables you to put your produced water back to use through automated recycling facilities designed to optimize this resource. Recycling and reusing produced water also reduces each site's HSE risks associated with trucking produced water for disposal.



**Oil Recovery After Production** – The TETRA Oil Recovery After Production Technology (ORAPT™) oil separation units enable you to separate oil from your produced water and returns it to your tanks and sales pipeline.



**Automated Treatment** – The TETRA advanced treatment system provides continuous and accurate chemical dosage volume. This ensures that your produced water is optimized to your exact specification.



**3x Efficient Sand Recovery** – TETRA sand recovery technology delivers a step change in sand. It monitors activity and captures data in real time, allowing you to improve overall frac design, unload more proppant faster without creating back pressure on the well, and recover sand at rates up to 90%.