


GE Power & Water  
Water & Process Technologies



# Water Treatment Solutions for **Unconventional Gas**



imagination at work



## Addressing Today's Challenges

Today, corporations, individuals and governmental bodies alike are focused on energy issues—and rightly so. According to the International Energy Agency, by 2030 the world's energy demand is estimated to be 40 percent more than in 2007, with China and India accounting for more than half of that increase. At the same time, countries are seeking ways to reduce greenhouse gas emissions.

The prospects of natural gas are powerful. Unconventional gas sources—shale and tight gas, and coal seam gas are among the three most viable today—and innovative drilling methods are making up an increasingly larger percent of the supply picture for a renewable energy future. The opportunities are great and so are the challenges.

While the severity varies with geography, water scarcity and wastewater quality are critical issues for the shale and tight gas production industry. Meanwhile, the regulatory climate and environmental policies are evolving rapidly and differ widely by city, state and country. Yet, the need for economically viable and environmentally sound solutions is urgent and industry-wide.



## Unconventional Gas Solutions

We understand the challenges and recognize the opportunities of today's unconventional gas industry. With ever increasing regulatory, environmental and financial pressures to survive and thrive in today's unconventional gas industry, GE provides innovations in chemical and equipment technology to enhance efficiencies while safeguarding natural resources and saving money. Our effective, cost-efficient methods treat and supply the millions of gallons of water needed for shale and tight gas production.

- **Frac water treatment technology** determines pretreatment requirements and optimizes recovered water composition and beneficial use byproducts.
- **Salt removal and recovery** offerings combine physical separation and chemistry optimization to reduce the total operating cost of salt water disposal well operations.
- **Discharge water management and reuse** provides integrated solutions for water recovery treatment and recycling.
- Thermal products group of **brine concentrators and crystallizers** combines expertise related to zero liquid discharge and pure salt production.
- **Thermal mobile solutions** can operate in multiple shales and are designed to handle flowback and produced water.
- The **mobile water fleet**—the largest in the world—meets demand for on-site water treatments through emergency, short-term leases and long-term outsourcing.
- Complete range of **membrane and filtration technologies** provide influent treatment of a diverse variety of non potable water sources.
- **Zero Liquid Discharge (ZLD) systems** offer extensive experience in evaporation and crystallization to eliminate wastewater discharge and can enable the recovery of valuable byproducts.
- **Chemical solutions**—including boiler, cooling, industrial and hydrocarbon process chemicals and monitoring—optimize plant productivity and water systems while safeguarding assets and ensuring environmental protection.
- Range of biological filtration and coagulation technologies enable **heavy metal removal** to improve wastewater quality.
- **Water treatment** provides deposit and corrosion control.

# The GE Advantage

For more than a century, GE has provided sustainable solutions to help customers around the globe address some of the world's most pressing challenges. And today, our commitment to doing so is even stronger. We are a forward-thinking and thoughtful leader in developing water, water reuse, wastewater treatment and process solutions our customers need to operate more efficiently and profitably while minimizing their environmental footprint. Our goal is the same as yours: to help industry and communities prosper.

As a strategic business partner, GE can provide a complete set of integrated chemical and equipment solutions to help manage and optimize water resources inside and out of the field. Our proven technologies help unconventional gas facilities convert wastewater into beneficial byproducts as well as treat and reuse water for industrial and municipal purposes. From reduced water usage to increased productivity, we deliver the results to drive your performance—financial and environmental. Whether power and water, energy services, oil and gas, financial or rail, we combine the best of GE to help solve your biggest challenges.



# Shale Gas/Tight Gas Pilot Studies

## Water Reuse

### **GE Reduces Water Solids by 95 Percent, Improves Productivity and Saves Money**

A North American gas producer was challenged with increasing solids accumulating in water storage tanks, increasing the frequency of service and elevating chemical costs with the need for additional biocides, scale and corrosion inhibitors to the brine water.

To address the gas producer's issues and help remove the suspended solids from salt water going to deep well injection, GE implemented a One Pass filter on the water prior to tankage, resulting in a reduction of more than 95 percent on the suspended solids greater than .5 micron. The filter also provided a reduction in sulphate and acid-producing bacteria from more than one million cfu/ml to near zero.

The significant reduction in tank solids and chemical feed presented the potential for improved operations at lower cost.

## Frac Water

### **Marcellus Shale Pilot Study**

GE conducted treatment pilot studies on flowback and produced waters taken from wells throughout the Marcellus Shale. The tests were performed using both lab glassware simulation and full pilot system apparatus. The frac water was treated using evaporation and crystallization processes. The study successfully achieved complete recycle of the frac water into components of distilled water and a beneficial use salt product.



Glassware evaporator simulations on frac water before and after pretreatment



Frac water shown with distilled water and beneficial use salt byproducts

# A Trusted Business Partner

A name synonymous with quality around the world, GE is a trusted global partner for unconventional gas companies with installations around the world. With a broad range of products and services for each step of the process, GE's integrated solutions and unique expertise help manage and overcome important challenges in an ever evolving industry, while ensuring the responsible and sustainable resource savings our customers across the globe have come to expect. Through innovation, breakthrough technology and dedicated teams of global experts, we help you successfully compete—and win—in today's unconventional gas industry.

We can help unconventional gas customers to:

- Create and maintain a sustainable, quality water supply through recycling and reuse
- Adhere to policies and meet regulatory requirements
- Increase equipment and facility lifecycle with solutions that inhibit corrosion and scaling
- Meet current and future energy demands, helping drive a favorable economy for local community and industry
- Achieve an optimal sequence for frac water treatment – from identification of the source water to the point of brine disposal
- Optimize recovered water composition by identifying beneficial use byproducts, such as salt and distilled water
- Maximize physical separation and chemistry optimization to reduce the total cost of source water





Learn how GE is helping customers solve their greatest challenges by visiting [www.ge.com/water](http://www.ge.com/water)

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