AquaEo LTD
Environmental Solutions

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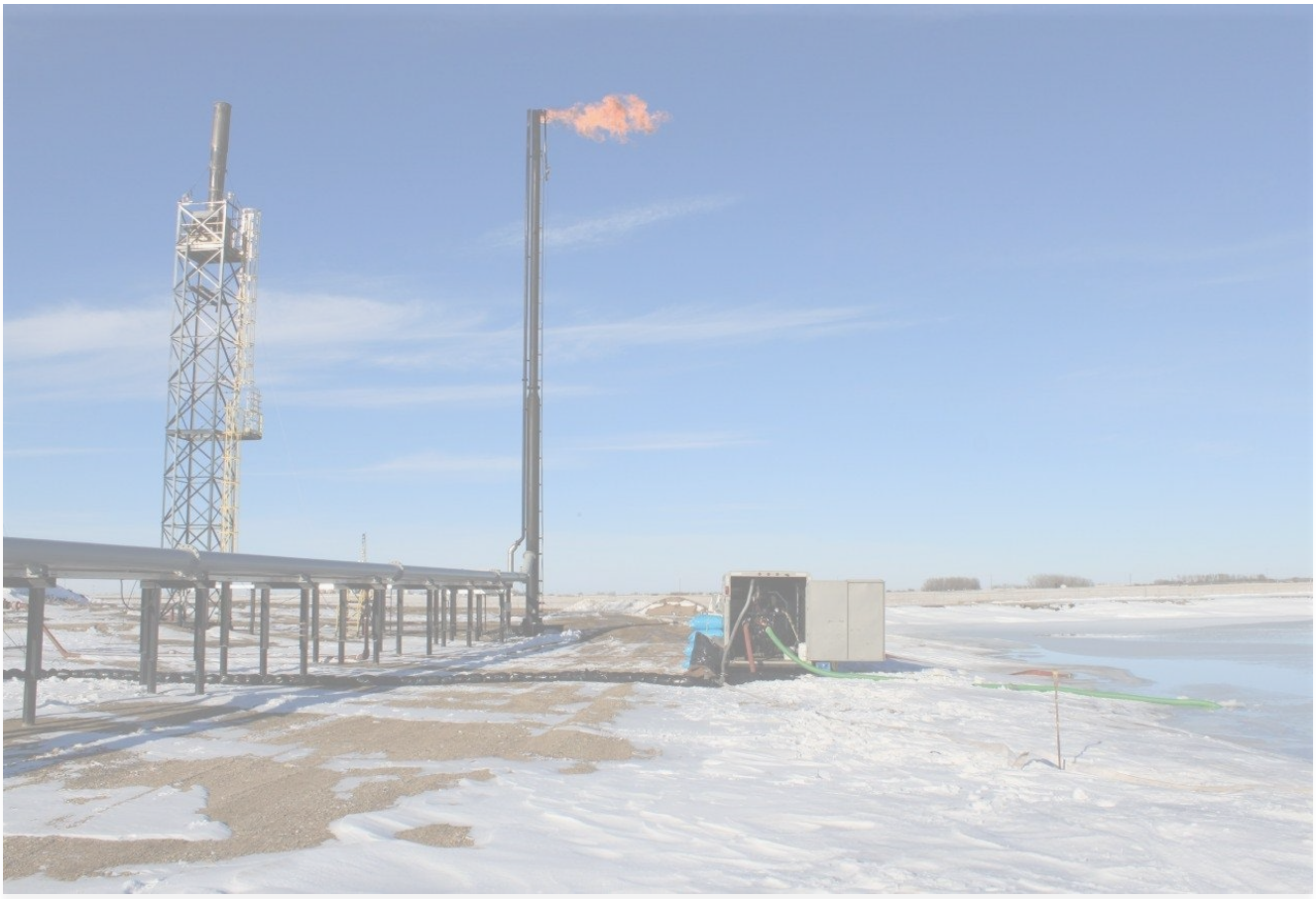

Aqua-Eo Ltd

Development of treatment technologies and solutions for oil and gas industry effluents, which are environmentally conscious, operationally sustainable, and economically feasible.

Intro: Shales' "Oil & Gas" have recently materialized as critical energy sources playing a vital role in meeting fossil energy demands for the future. However, hydraulic formation fracturing (fracking) requires significant water volumes, which puts a considerable strain on the local surface and ground water supplies. Hence, effluent management has become essential in aspects of storage, disposal and recycling or reuse.

Worldwide, the water demands of shale gas and shale oil production are competing with population and environmental needs. Additional water supplies are needed to serve growing populations' requirements and associated agricultural and environmental needs[1]. In many areas, this results in local and regional water supply degradation. Such potential of uncontrolled allocations among different trades and applications is troublesome for regions suffering in a state of water stress. The pertinent question is, "What can we use as a substitute for fresh and groundwater in oil and gas production operations."

Limited water resources and the ensuing impacts of the shale developments are injuring the local water supply-demand balance. It prevents implementing a sustainable water management plan where shale extraction is possible or hinders the expansion or start of the oil and gas exploration (Mexico as an example). There is a pressing need for better water "commodity" management utilizing effluent treatment technologies to better manage water asset recycling, primarily in water-stressed locations. Further, safeguarding this commodity results in preserving oil and gas companies and municipalities' financial means and the environment. Process water can be recycled and re-purposed to sustain and expand access to unconventional hydrocarbon assets. Oil and gas effluents can be treated and released back into the water cycle or used for irrigation or livestock, reducing the competition for water between food and energy production[1] [2].

Lack of disposal "means" is straining procedures and operators overwhelming disposal wells, lined pits, and other storage means. It causes environmental and economic difficulties for all

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[2] EPA Office of Research and Development. "Plan to Study the Potential Impacts of Hydraulic Fracturing on Drinking Water Resources" US Environmental Protection Agency. Washington, DC. (November 2011) http://www2.epa.gov/sites/production/files/documents/hf_study_plan_110211_final_508.pdf.

related parties. Effluent treatment technologies are essential to sustain adequate storage and water availability.

Partial or complete treatment of flowback effluents is crucial. Supplying the Oil and Gas production operations and explorations with a regenerative water source reduces or eliminates freshwater access. It's a win-win scenario for all stakeholders and the environment. It goes without saying that the economic benefits of on-site water recycling are enormous in costs and logistics.

Water risks stand as a threat to most businesses. However, water security and handling are exasperating for the fracking industry. Such issues are not limited to securing exploration water; they're related to waters for exploration, operations, decommissioning, and handling of flowbacks from logistics, environmental, and economic perspectives.

Water restrictions raise the potential to interrupt production, increase costs, and damage reputations and relationships with local populations and regulators.

Increasingly, oil and gas companies are steering their efforts to develop innovative water strategies to increase their efficiency. Forming relationships with water management companies for water solutions is instrumental.

Water scarcity is a complex and progressively critical issue in North America and many other parts of the world. As cities and economies grow and climate changes, water resources come under more pressure from being a free access resource to a rare and expensive commodity. In this regard, Frankfurt-based Deutsche Bank has joined a list of European financiers and insurance companies, setting a new fossil fuels policy prohibiting investments in projects that use hydraulic fracturing (fracking) in countries with scarce water supplies[3].

Shale resource exploration is here to stay. Shale deposit fracking is expanding to new places where conventional oil and gas exploration is dominant (ex: Saudi Arabia, Algeria, Mexico, and Australia). These shale deposits are situated in water-stressed, groundwater-depleted, or arid

[3] The Canadian Press. Total writes off $9.3B in oilsands assets, cancels Canadian oil lobby membership. July, 2020

areas. In these countries, vigilant water resource management plans are required to avoid boosting the “status” of water stress and further depleting freshwater aquifers. For example, regulations might require fracking companies to adopt water-saving practices (e.g., recycling production water, sourcing brackish groundwater, transporting water from a distance) and prohibit oil companies from acquiring freshwater from the agriculture industry.

Ongoing Operational Water Issues/Constraints,

- Licensing the access to production, operational, or process water crucial for stretching existing shale operations or new exploration is increasingly difficult. Most active shale exploration areas in Alberta and the USA have trouble juggling all interested parties' freshwater needs. We expect to see the depletion of major water bodies in some states in the US. Mexico “mostly” restricts unconventional oil and gas operations due to a lack of fresh water or brackish water suitable for hydraulic fracking.
- There are reduced opportunities for securing, procuring, treating, recycling, or disposing thru surface release after strict treatment or forcing it into the formation under pressure.
- Water is an indispensable commodity and prerequisite for the oil and gas operations chain. Energy companies seek solutions to their production water needs and explore efficient technologies to recycle flowbacks for other applications.
- New licensing scarcity to access surface and ground waters is now a growing reality.
- We see strict provincial and federal regulations regarding produced water discharge limits.

Aqua-Eo has focused entirely on developing functional, economic technologies and procedures to recycle water and drastically reduce the cost of handling effluents in Alberta and British Columbia. Aqua-Eo's remediation meets or exceeds CCME and AER aquatic life criteria for on-site treatment of produced waters, flowbacks, and leachate pond filtrates with salinities of up to 80,000 mg/l (ppm) or less. It means up to 90% less water going to disposal. Permeate recovery of 92% is achievable with salinities of 7,000 mg/l (ppm) or less, and in worst-case scenarios, > 50% permeate is recoverable with salinities ranging between 45,000-56,000 mg/l (ppm). For fracking, polymer-flooding of oil reservoirs, and slickwater fracking applications, partial treatment

recovers 98%. Effluent can be reclaimed back into the water pool. The desalination concentrate can be used as starting makeup water for slick/gel fracking fluid, which reduces fluid disposal to around 2% of the total effluent put through.

Given the perpetual growth of shale oil and gas explorations and operations, there is great potential for developing "unconventional" treatment technologies (primary, secondary, tertiary, and complete) to serve the increasing need for operational waters.

Aqua-Eo has a proven, successful track record of water treatment projects, using our process engineering expertise, principal knowledge of flowbacks chemistry, and years of first-hand feedback on formulating treatment chemicals and engineering flowback processes and operating procedures. Aqua-Eo's hands-on experience piloting numerous commercial-size treatment projects has shaped its treatment philosophy. The flexible treatment unit's setup and operation procedures have yielded consistent and sustainable results for partial and complete O&G operations and exploration effluent treatments.

Aqua-Eo Vision 2023-2028 (& Beyond)

Aqua-Eo's vision is a roadmap to becoming a key player in oil and gas flowbacks management for clients across Canada, the USA, and Mexico.

- Business Model:
  - Start constructing the second-generation engineered units of all-season, mobile treatment plants with a minimal footprint. Phase 1.
  - Establishing seasonal (temporary) water hubs using deployable effluent treatment modules in active exploration and operational regions. Phase 2.
- Target Flowbacks: Complete or partial treatment of flowbacks from FRACs, polymer well flood, and leachate pond effluents for reuse or surface release.
- Customers: Our customers and their needs are our priority. Our focus is on technological advancements, treatment capacity, and service to set us apart from competitors. Our core customer crowd includes:

- Oil and gas companies pursue all types of produced effluents.
- Water disposal and management companies, pursuing leachate pond effluents and water reclamation projects.
- Environmental companies, pursuing emulsions and production water spills.
- Municipalities seeking effluent treatment opportunities for year-round operations including effluents in lined storage pits.

- Regulators: Working with local regulators to ease and/or update oil and gas effluent classifications, transfers, and storage directives.
- Partners: Diligently exploring and securing mutually beneficial strategic partnerships in order to increase the reliability of our service offering and cost efficiencies to customers.

Positioning Statement (Part 1)

Part 1: What We Do

- For
  - customers in oil and gas upstream-downstream operations.
  - disposal and water management companies.
  - environmental management companies.
  - fracking companies with special operational water requirements a particular focus.
- Who wants to
  - recycle for reuse or surface release (where applicable) the production and operations flowback waters. Partial or complete treatment.
  - generating new income streams from redirecting the collected water into a usable medium for O&G fracking operations, agricultural applications (where applicable), and surface release (where applicable). Partial or complete treatment.

- treat produced water and emulsion oil mix spills into lakes, ponds, and wetlands for surface release. Complete treatment.
- use of ultraclean water for operations, processing production waters and frack flowbacks as raw effluent. Partial or complete treatment.

- Our product is/are
  - a proven treatment and filtration technology include effluent's surface tension equilibrium and flocking chemicals, Dissolved Gas Flotation, Multi-filtration with the Ultrafiltration stage, Desalination, and adsorption stages.
  - the chemical formulas associated with the treatment and filtration operations.

- That features
  - mobility and deploy-ability, where its capable of attaining partial or complete production wells and hydraulic fracks flowbacks treatments meeting CCME and most stringent surface release criteria (i.e., aquatic life criteria).
  - reliability and customer focus, with mobility and remote site outreach, customized for O&G operations (Class/DIV II) for the early stages.
  - significant cost savings vs disposal-trucking-procuring/securing new operations waters. Saving up to 40% of disposal costs alone, without any other associated costs.
  - control of their water resources by lowering third-party control of prices and resource access.

- high volume processing to meet most fracking operations flowback volumes (1 metric cube per minute- around 6.3 bbl. per minute).

Our Positioning Statement (Part 2)

Part 2: Why We Will Win

- Unlike:
  - other oxidizing technology that converts the water contaminants into other compounds without removing them (ruining new frack mixtures and causing problems more than solutions without significant freshwater dilution).
  - disposal, where all these treatable and recyclable water commodities are wasted for good.
  - evaporation technologies and evaporation pits, where all the contaminants in the waters spread over the adjacent perimeter, polluting the soil and affecting the air quality[4].
  - evaporation technologies and evaporation pits, where water reclamation should be an objective for water management[5].
  - the high cost of fuel burned per cubic meter processed
- Our product provides:
  - Sustainable quality of output for partial and complete treatments
  - A genuine understanding of the technology and the targeted effluents

[4] E. Allison and B. Mandler. Water in the Oil and Gas Industry - An overview of the many roles of water in oil and gas operations. Petroleum and the Environment-Part 2. American Geoscinces Institute. 2018.
[5] Ebenezer T. Igunnu and George Z. Chen, Faculty of Engineering, Department of Chemical and Environmental Engineering, and Energy and Sustainability Research Division, University of Nottingham, Nottingham NG7 2RD, UK. Produced water treatment technologies. April 30, 2012.

- Customized in-house design, construction, commission, and operation where the company fully controls the technology
- Less customer pain by providing turnkey project execution
- Significant savings irrespective of recoveries (volume-driven)
- Low cost of fuel burned per cubic meter processed

- As supported by:
  - List of successful projects and trackable records in treating flowbacks from produced waters, frack flowbacks, production water spills, leachate bonds, and polymer wells floodwaters in 1) Jupiter-XTO-AER frack flowback projects in Grande Cache for surface release trials and reuse purposes in 2014-2015, 2) Harvest Energy produced water spills for surface release in Viking 2011 and 2012, 3) Apache Zama spills cleanup for surface release in 2013-2014, 4) Aquaterra production water for reuse pilots 2014-2015, 5) Ridgeline leachate water treatment 2015, 5) Twin Butte emulsion production water treatment for surface release 2015, 6) Northern Blizzard polymer-flood well flowback pilot project in 2013, and other projects)
  - In-house development of process and chemical formulas R&D
  - In-house technology engineering and construction
  - Ownership of projections on data collection and analytics

- And protected by:
  - Ownership of engineering, chemicals, process IP
  - Proven technology with unique engineering, process integration, and operation
  - Economies of scale

Mission 1 (Next 12-36 Months)

Over the next 48 months, our mission is to lay the groundwork and foundations for achieving our vision's first part. In the coming 12-36 months, the company's focus is on becoming a leading “in situ” effluent treatment services company in western Canada. Recycling after partial or complete treatments; high-quality quantities of water recovered from O&G explorations and production flowbacks, O&G landfill leachate ponds, and producing water storage pits.

Mission 1: Associated Objectives

- Demonstrate through bench testing the developed chemicals' capability to break the flowbacks surface tension and the formation of the chemical-contaminant flocculation.
- Demonstrate the client’s cost savings compared to other effluent handling alternatives
- Increase water volumes treated and recovery percentages (less water to procure for subsequent operations, less wastewater to disposal, or both)
- Organically engage more plants to serve the clients or as redundancy plants to minimize or eliminate operational downtimes.
- Focus on the Client's need to save their water commodity; greener compared to other water handling processes)
- Demonstrate sustainable product quality/volumes
- Focus on local regulatory bodies. Prove our ability to maintain output quality
- Monitor local regulators' directives and possibilities for reclassifying O&G flowbacks as industrial effluent. Obtain exemption permits to surface release
- Prove up the economies of scale (show amounts of recoverable waters that can be saved from the disposal, showing the money companies spare by salvaging effluents compared to other technologies, and showing the revenues Aqua-Eo can generate handling more effluent per unit per year)

Objective 1: Strategies

1. Approaching Clients/end-users regarding:

- Savings guarantee compared to disposal/other technologies.
- Quality guarantee compared to other technologies (for reuse or surface release applications).
- Water volume guarantees compared to other technologies—the money to be credited back for any volume not trucked to disposal.

2. Client demonstrations (bench testing)

Objective 2: Strategies

1. The guaranteed delivery date for the first set of equipment
2. Deliver on technology promises by commissioning the first unit plant with the client present or carrying out the commissioning at their site.
3. Demonstrate the economy of scale effect on client dollars spent, on the environmental impact, and on Aqua-Eo revenues

Objective 3: Strategies

1. Municipality's data sharing and commercial piloting to capture the market of cleaning produced water collection-lined-pits
2. Local regulator(s) education/pilots engagements/data sharing

Objective 1/Strategy 1/Action Plan

What: - Setting up a lab in the fabrication shop for bench testing and demonstrations.

- Training of staff to perform a specific demonstration to conserve time and resources

Who: R&D/Engineering division

When: Start within two months and complete after six months. Subsequent pilot bench testing to be done upon new effluent sample(s) testing or client request(s)

Objective 1/Strategy 2/Action Plan

What: - Marketing cost-saving and reduction of environmental impact, detailing effluents treatment all-in costs against other technologies or disposal alternatives (referenced and reliable dollar figures data are requisites for this article)

- Customer quality/volume guarantee vs treatment cost discount/sharing/eliminating any extra charges from the client's invoice stating performance failure

Who: CEO/Sales

When: Start within two months and complete after six months. Subsequent pilot bench testing to be upon new effluent sample(s) testing or client request(s)

Objective 2/Strategy 1/Action Plan

What: Prepare a final copy of the process and instrument diagrams (P&IDs) and preliminary and detailed engineering drawings (dwgs) for shop work-trailers, tanks, and skids. Prepare a final copy of the detailed engineering processes drawings for shop work- the rest of the process integration. Prepare undetailed P&ID layout dwgs, and copy for investors' and clients' demonstrations

Who: Engineering, Drafting

When: Start within two months and complete in four months

What: Prepare BOQ and start the procurement process

Who: Engineering to set specs, issue PO, procurement to place orders and manage logistics

When: Start within two months and complete after six months (ongoing process to the end of the manufacturing stage)

Objective 2/Strategy 2/Action Plan

What: Unit testing and commissioning - Share the experience with potential clients/customers

Who: CEO chooses unit commissioning company, contacts clients. Engineering sets the designated site for the demo, executes the operation, and a third party collects and submits the samples for approval. The results go straight to the client.

When: Preparing for the treatment unit commissioning to start after eight months. Commissioning date to take place after eight months (upon completion of manufacturing and testing)

Objective 2/Strategy 3/Action Plan

What: Proving the effect of adding more units on operation efficiency, redundancies and economy of scale to potential clients, customers, and investors

Who: VP Engineering, CEO

When: After 18-24 months (upon obtaining enough data from the first operating plants)

Objective 3/Strategy 1/Action Plans

What: Approaching municipalities with data and working partnership based on deliverables and guarantees in order to participate in the produced water collection ponds oil recovery operations (third party) and effluent cleanup for reuse or surface discharge (mainly in Wyoming, Oklahoma, and Texas in the United States, and work with PEMEX through our joint venture partners in Mexico)

Who: CEO, Sales, VP Engineering

When: Upon executing a few projects (max.3) to retain enough data and testimonials to share with the nominated municipalities. Expected in 9-18 months

What: Working with local regulators to eliminate/relax water storage, pumping via flexible hoses, and surface release. Appoint third party liaison for data monitoring and reporting to Aqua-Eo and local regulators

Who: Engineering, Operations, and CEO

When: After completing the first treatment project (handling produced and/or frack flowback effluents) that is expected to take place in 9-12 months.

Mission 2 (36-48)

After improving the financial position in Mission 1, the company's mission is to become a key player in the water management business in the countries of interest (the USA and Mexico.) Such growth in reaching new markets is to be approached through acquisitions and joint ventures with local water management companies and municipalities. Along with increased sales volumes, costs could further decrease as economies of scale increase.

Mission 2: Associated Objectives

- Client focus; taking the burden of water processing off the client's worry list
- Local regulators' Directives win-over
- Redirection of the treated waters into other agricultural and municipal operations
- Economies of scale

Mission 3: (48-Beyond)

Market the technology in countries outside of North and Central America like South America, The Middle East, Australia, and Africa. Mission 3 can be partially carried out through licensing agreements and leases of equipment with contract guarantees related to the leasing period's supply of operating chemicals.

New Opportunities in Water Management (Treatment for Recycling & Surface Release)

Produced waters, hydraulic fracturing flowbacks, and other oil and gas-related wastewaters are commodities and valuable assets that operation and service companies can use to reduce their demand for fresh and ground waters. Performing so shall slashes costs and increases sustainability, protecting local water supplies and the environment from contamination by developing efficient programs to treat the water used in their production processes.

Capitalizing on water treatment and recycling projects can help O&G companies deepen their partnerships with stakeholders, investors, regulators, and local communities. In most cases, O&G companies are the only available players with the capabilities, resources, and incentives to address water scarcity matters. However, these companies' discrete technologies -dedicated to a particular project- are unlikely to secure oil companies or investors' interest in engaging resources towards achieving broad objectives that could be directed towards exploration or other production revenue-related efforts.

Oil and gas companies, many lead industrial water equipment makers, and engineering companies invested significant resources into sourcing viable, operator-friendly, economically feasible, commercially deployable, and operationally sustainable technologies. These investments resulted in evaporation technologies, transforming the flowbacks to vapour and release into the atmosphere. This process ended by spreading the contamination from the collection ponds into nearby vicinities that caused significant environmental and ecological chaos over time. Also, it lost the chance to recapture this commodity and reuse it again or put it back into the water cycle. In the case of consultant firms, these firms worked as advisors to oil and gas companies where they were selling projects, not actual solutions or outcomes. Such an act questioned the consulting firms' credentials for looking for their incentives without aligning their interest with the client's goals. It wasted vast resources and completely missed a well-designed, tested, robust, and sustainable technology available in the market.

The flowbacks treatment market is economically feasible and crucial for water reuse and surface release applications ("Global Fracking Water Treatment Market 2020-2024" | Evolving Opportunities with Aquatech International LLC and DuPont de Nemours Inc[6]. And "Global Produced Water Treatment

[6] Global Fracking Water Treatment Market 2020-2024 | Evolving Opportunities with Aquatech International LLC and DuPont de Nemours Inc. https://www.bloomberg.com/press-releases/2020-04-03/global-fracking-water-treatment-

Market, By Source, By Service, By Application, By Region, Competition, Forecast & Opportunities, 2024[7].") Aqua-Eo has seen this opportunity coming since 2005 and invested significant resources over the past years to develop a sustainable, practical, and customized technology that collaborates and obtains real results with the client's interests, the environment, and regulators. Aqua-Eo's end products met or exceeded surface release environmental guidelines in all assigned projects. Eo-Cycle technology has proven to be a real competitor, outperforming well-known technologies within the flowbacks treatment domain developed by companies like Evoqua and SUEZ (formerly GE water.)

Technavio has announced its latest market research report titled Global Fracking Water Treatment Market 2020-2024 (Graphic: Business Wire)[8]

Aqua-Eo has massive potential and substantial opportunity to succeed and thrive with all the experience they've acquired over long years handling a wide range of oil and gas operations flowbacks.

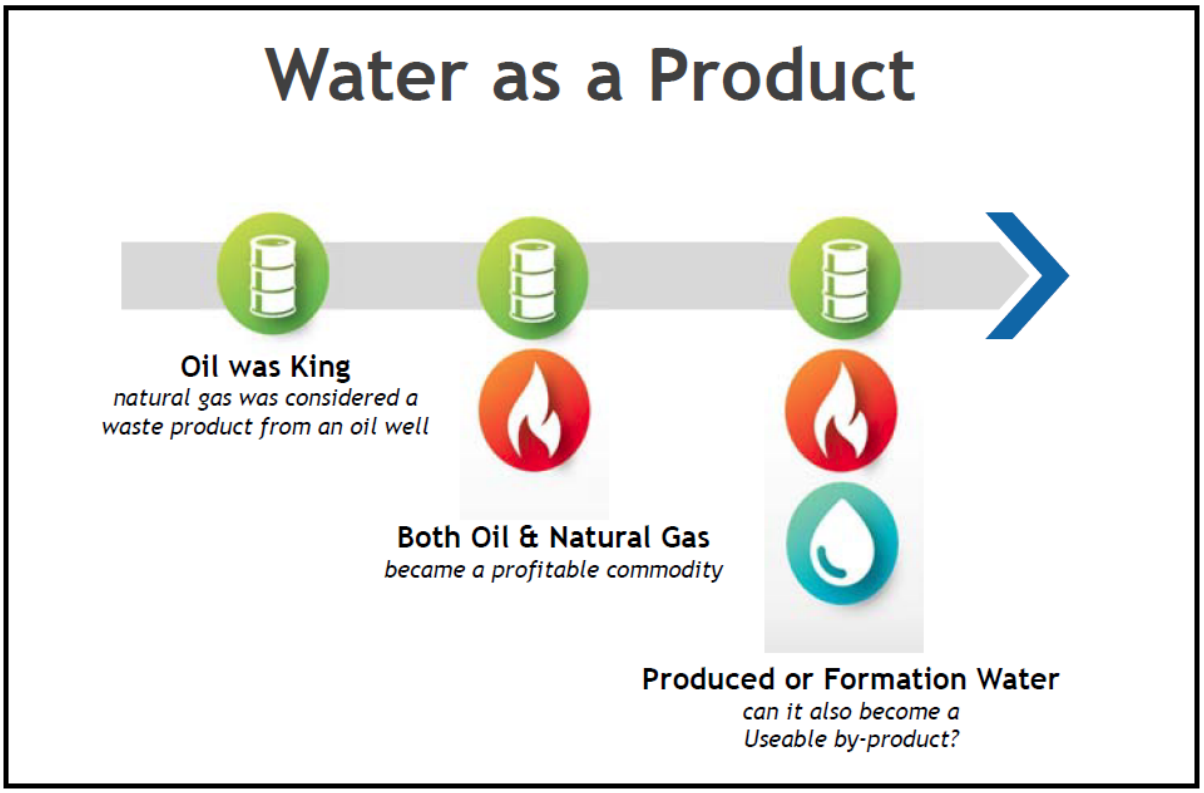
market-2020-2024-evolving-opportunities-with-aquatech-international-llc-and-dupont-de-nemours. February 20, 2020.

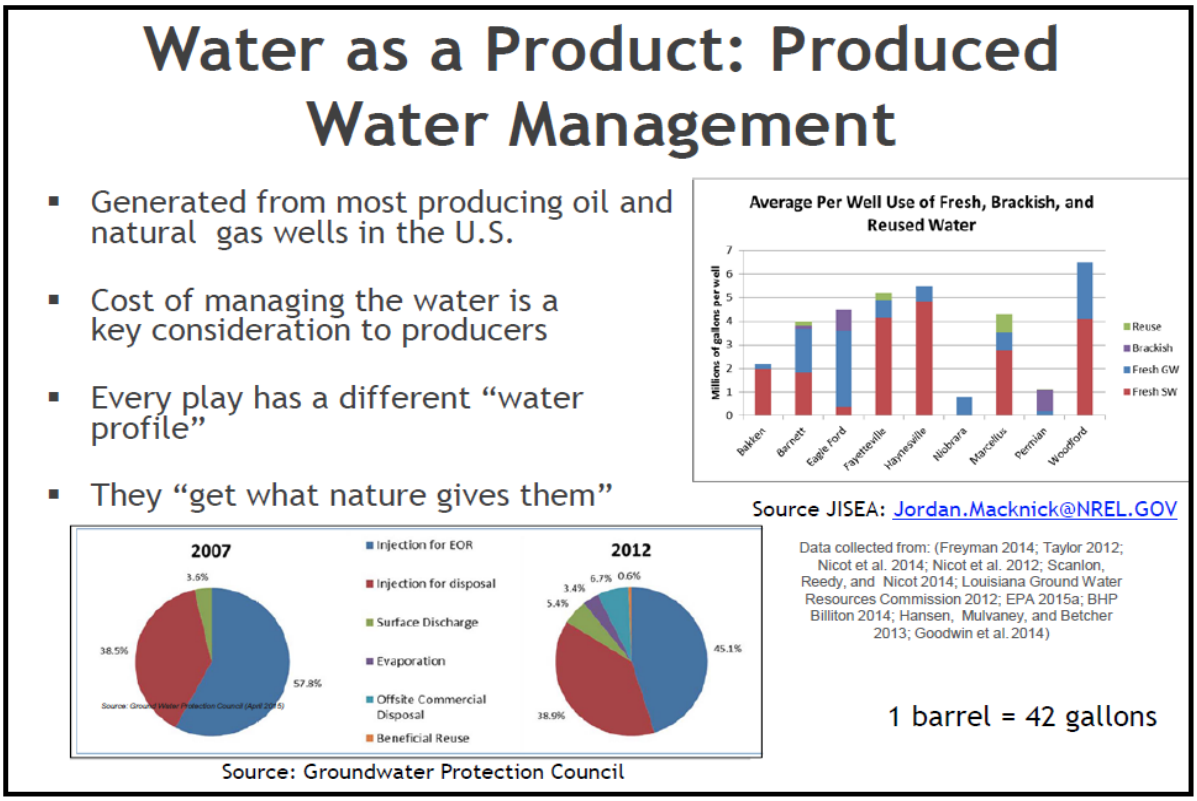
[7] Reportlinker.com announces the release of the report "Global Produced Water Treatment Market, By Source, By Service, By Application, By Region, Competition, Forecast & Opportunities, 2024" - https://www.reportlinker.com/p05843944/? Utm source=GNW. New York, Feb. 05, 2020 (GLOBE NEWSWIRE.)

[8] Technavio has announced its latest market research report titled Global Fracking Water Treatment Market 2020-2024 (Graphic: Business Wire). https://www.businesswire.com/news/home/20200220005563/en/Global-Fracking-Water-Treatment-Market-2020-2024-Evolving. 2020.

Aqua-Eo’s treated emulsion effluent was surface discharged for irrigation purposes. The site is located in northern Alberta in the Foothills area. The raw effluent came from emulsified surface water. The treated water passed all aquatic life criteria and obtained AER’s approval for surface release.

Appendixes: Market Data[9]





[9] Fundamentals of Produced Water Treatment in the Oil and Gas Industry, 4/25/2019.

Water as Product: Produced Water as Part of the Solution

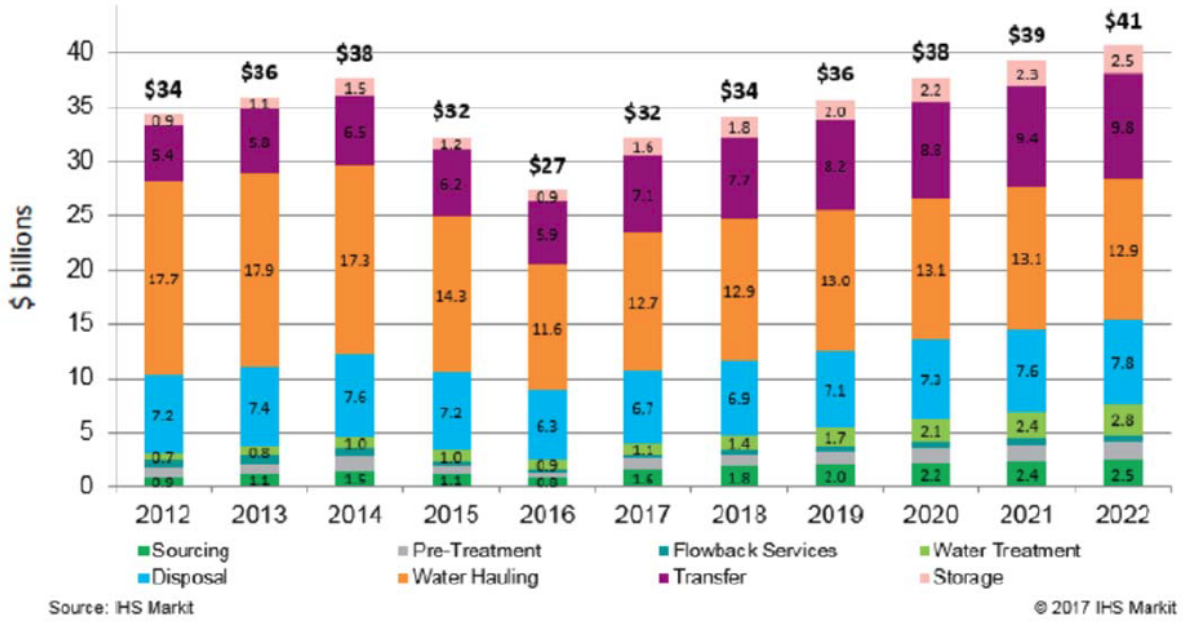
- **Opportunities**
  - Water sourcing, management and disposal
  - Not a significant user of water compared to other sectors
  - Bring "trapped water" to the surface -net gain to the system
  - Collaboration to achieve progress
- **Actions necessary to maximize opportunities**
  - Laws and regulations that support beneficial reuse of water
  - Improvements in water treatment technologies
  - Reduced cost of water treatment
  - Entities interested in accepting the treated water

Water as Product: Energy Water Initiative (EWI)

INDUSTRY TRENDS	BENEFITS
Improving Fracturing Chemistry	Increasing use of non-fresh water
Innovation in Treatment Technology	Increasing feasibility of produced water reuse
Increasing Water Conveyance Systems	Reducing truck traffic
New Water Storage Designs	Provides flexibility and reliability when using non-fresh water
Increasing Transparency	Improves relationships with stakeholders
Dedicated Water Staff	Improves water management, planning technical support and performance

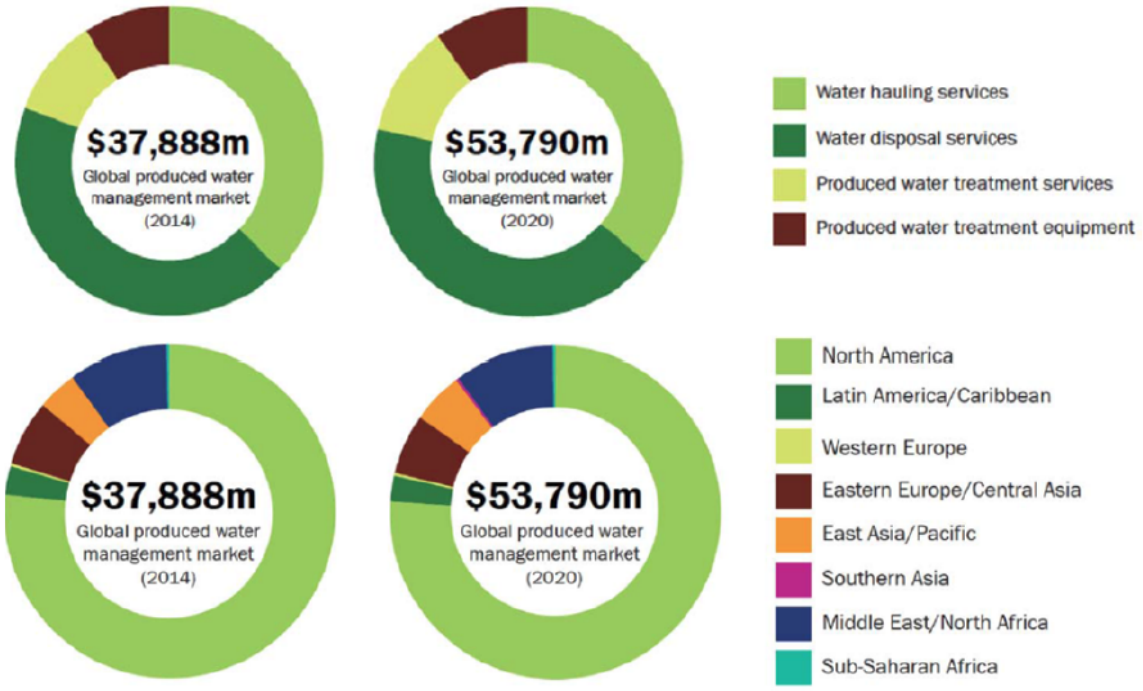
Source: EWI: 2015 Case Study Findings

US O&G Water Services by Sector



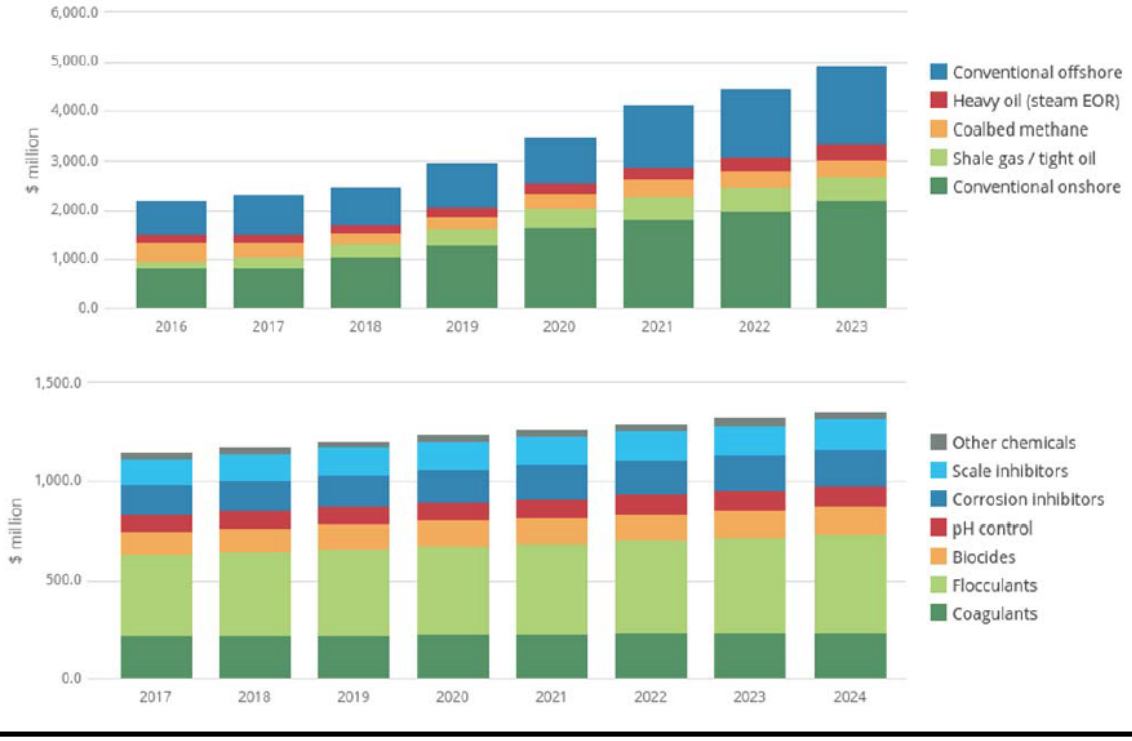
Source: IHS Markit

O&G Water Services by Sector & Region

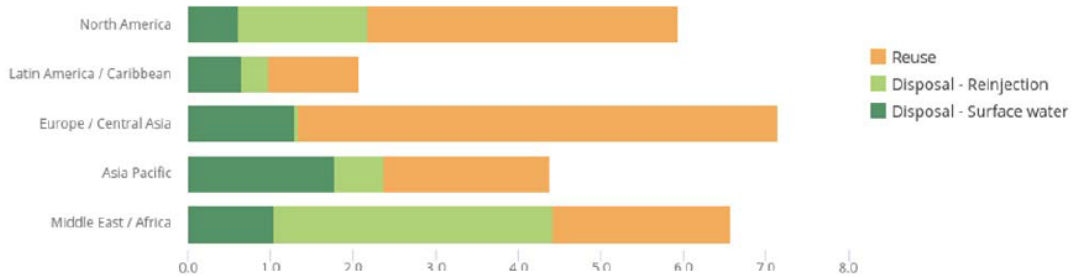


Upstream CapEx by Region & Technology

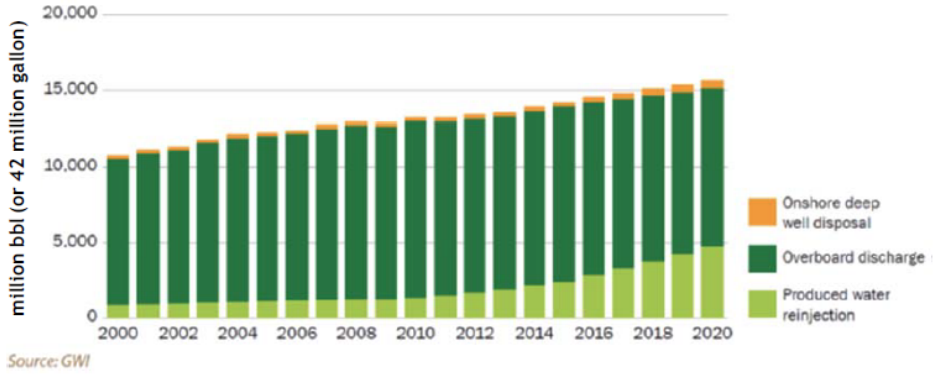
Upstream CapEx by Resource & Spending by Chemical



PW Volumes by Disposal Options & Off-Shore PW



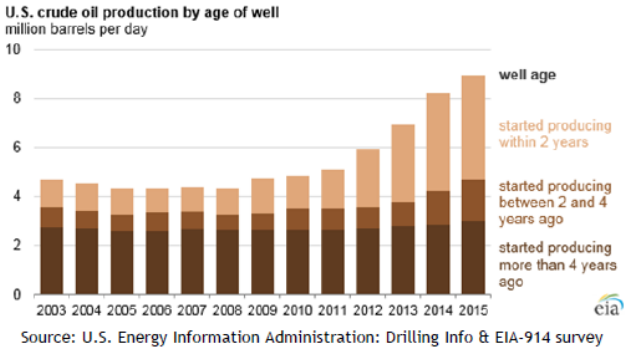
billion m^3 (or 2.64 $x10^5$ million gallon)



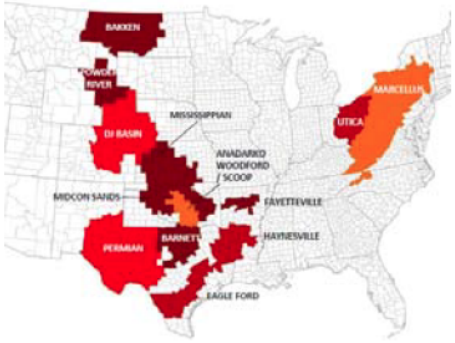
Source: GWI

Shale Play Water Market

- Huge quantities of water required
- Challenges sourcing water
- Some water recycled, a long way to go
- Treatment has changed a lot
- Midstream investment changing the market
- Opportunities all along supply chain



Source: U.S. Energy Information Administration: Drilling Info & EIA-914 survey



Shale Play Water Cycle

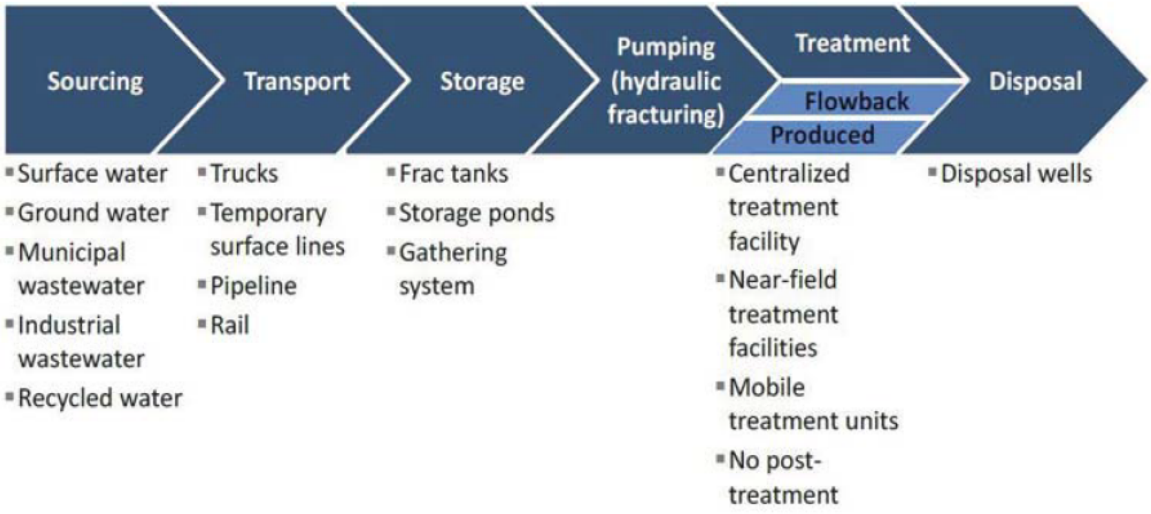


Figure 1. Oilfield water management life cycle (PacWest 2012)

Shale Play PW: Disposal Options

Dispose produced water in salt water disposal wells

Recycle produced water

Treat produced water for beneficial reuse

PA: 8 disposal wells

- 90% of the water is recycled
- Trucking to OH & WV may cost $10/bbl

TX: >14,000 disposal wells

- Even when it is less expensive to recycle
- About 10% of water is recycled

1 barrel = 42 gallons

Fracking PW: Water Treatment

Vast changes in quality of water required	• Initially fresh water was required • RO, evaporation, crystallizers, etc.
Now modified fracking chemistry packages	• Marginal quality waters • High TDS recycle waters • Deep brackish water aquifers
Disposal	• Virtually no treatment
Recycling	• Chlorine Dioxide • Electrocoagulation • Floc & Drop • Filtration for TSS • Biocides

Shale Play PW: Cost & Water Trends

Truck transportation ($1-3/bbl)

- Higher risk with Noise and congestion
- Road damage

Pipeline ($0.15-$0.25/bbl)

- Requires large investment
- Long term contracts

- More water used per well
- Companies desire to cooperate (share water)
- More pipelines to treatment or disposal wells
- Planning for larger scale infrastructure
- Mid-Stream companies will control the water

1 barrel = 42 gallons

Contaminants: Water Treatment Challenges for PW

Hydrocarbon Recovery Strategy	Field Location	Fluid Characteristics	Disposal Options & Regulation	Contaminants/ Challenges
Primary	Onshore	Moderate gravity	Disposal well	***Large solids, oily solids***
Primary	Offshore	Wide range	Overboard	***TOG, toxicity***
Primary	Near shore	High GOR	Reuse, Surface discharge	***TOC, COD, BOD***
Water flood	Onshore	Moderate gravity	Flood	***Solids, oily solids, iron compounds***
Water flood	Onshore	Low gravity	Flood	***Oily solids***
Water flood	Offshore	Not relevant- seawater used	Flood	***Solids, oxygen, H_2S***
Steam flood	Onshore	Heavy oil, bitumen	Recycle	***Silica, hardness, TOC***
Chemical EOR	Onshore	Various	Polymer makeup	***TSS (polymer), TDS***
Shale	Onshore	Gas, light oil	Disposal well	***Sourcing water, transportation & storage***
Shale	Onshore	Gas, light oil	Reuse/Recycle	***TSS, TDS***
Coal Bed Methane	Onshore	Gas, light oil	Evaporation, Surface discharge	***Desalination for surface discharge (may be)***

Produced Water Treatment