

Seawater will enable industrialized fracturing in areas of the world with severely stressed fresh waters. Look at some of the Pros and Cons of seawater onshore.

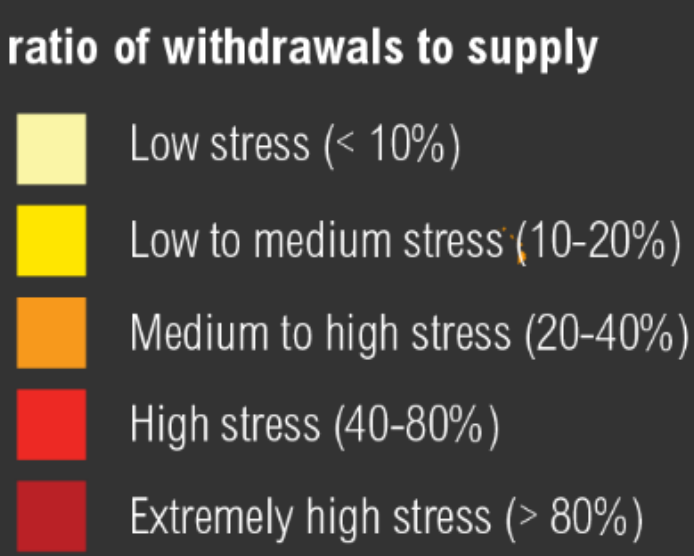
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Abstract

CHANGING HABITS
USING SEAWATER-BASED FRACTURING FLUIDS ONSHORE

The patented process of bringing seawater on land for fracturing delivers a long term, environmentally conscious solution for the supply of frac water in severely water stressed areas of the world.

WATER STRESS BY COUNTRY



This map shows the average exposure of water users in each country to water stress, the ratio of total withdrawals to total renewable supply in a given area. A higher percentage means more water users are competing for limited supplies. Source: WRI Aqueduct, Gassert et al. 2013

AQUEDUCT

WORLD RESOURCES INSTITUTE

The “seawater as a base fluid for fracturing” story is not a new one. In the 1970’s, and earlier, as “frac boats” came on the scene, there was an obvious need to use seawater offshore for fracturing, in order to remove the logistics of taking large amounts of freshwater offshore to mix as frac fluids and acid. That was considered a niche market by some, and the R&D efforts were not as enthusiastic toward seawater based fluids as they were toward fresh water, and definitely not for saline and higher TDS fluids. Well, times have changed, and so have the needs of the industry. Currently, operators and service companies alike are searching for ways to use all sorts of waste waters and higher TDS saline fluids including seawater, which was overlooked by many and considered too difficult to work with. Sure, seawater as a base fluid for fracturing comes with its challenges (viscosity development and scaling tendencies), but we believe that these challenges can be overcome, and that the benefits of seawater far outweigh the negative aspects highlighted by the critics. **People do not like change, especially when it is somebody else’s idea.** The facts are, shale and unconventional frac job sizes are growing, fresh water is becoming more scarce and regulated, and the overall picture of using fresh surface and ground waters is not sustainable, nor good for the environment. Fresh water is a scarce or rare natural resource in many parts of the world and should be protected from abuse. The world population was estimated to have reached 7.6 billion as of October 2017. **Political, environmental, social, and industrial pressures all point in the direction of using seawater for fracturing oil and gas wells, whenever economically and logistically possible to do so.**



A NATURAL AND UNLIMITED ALTERNATIVE TO FRESH WATER

Moving Oceans®

Brent E. Smith
Seawater Technologies, LLC
November 6th – 8th, 2017
SPE Forum - Houston, Texas

USING SEAWATER FOR FRACTURING HAS VIRTUALLY NO DETRIMENTAL EFFECT ON ALL OTHER WATER SOURCES ON EARTH. FRAC JOB SIZES ON UNCONVENTIONALS IN THE PERMIAN BASIN ARE 300% LARGER THAN 2013 AND GROWING



PHOTO COURTESY OF HALLIBURTON

SOCRATES HAS BEEN CREDITED WITH SAYING:

QUOTE COURTESY OF QUOTESGRAM

“THE SECRET OF CHANGE IS TO FOCUS ALL OF YOUR ENERGY, NOT ON FIGHTING THE OLD, BUT ON BUILDING THE NEW”

SEAWATER PROVIDES AN UNLIMITED SUPPLY OF FREE FRAC WATER AT THE SOURCE

Higher salinity may help shale fracturing?

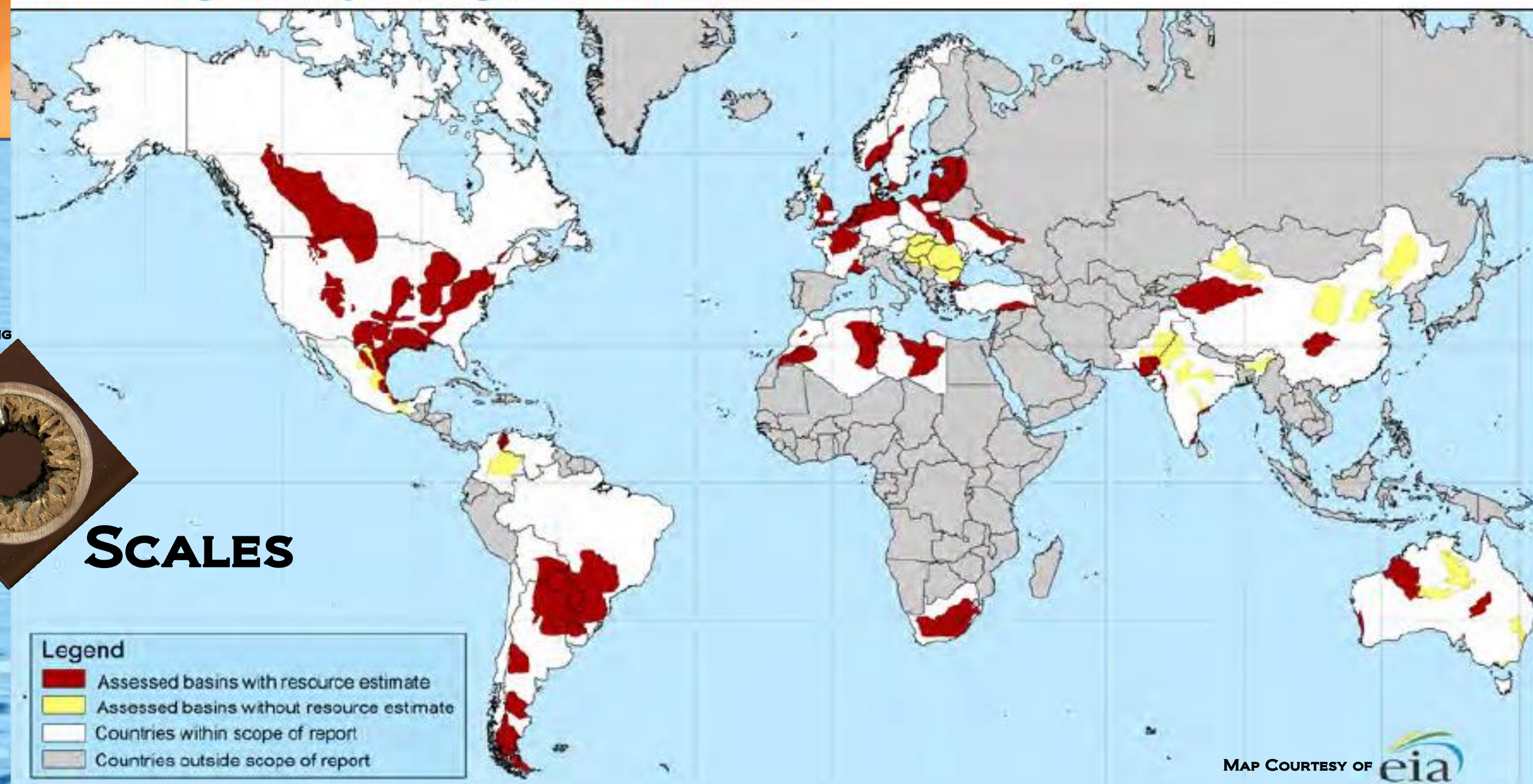
The Challenges

Chemistry
Logistics

SOME COUNTRIES HAVE NO FRAC WATER!



Map of 48 major shale gas basins in 32 countries



MAP COURTESY OF EIA

Shale gas reserves all over the world

China and the US are potentially the biggest shale gas exporters, with Argentina and Mexico not far behind. (Figures in trillion cubic feet)



CAN THE U.S. GOVERNMENT INCENTIVIZE SEAWATER USE? LIKE...

CURRENTLY, PATENTS IN THE U.S.A. AND CHINA, AND A DOZEN MORE TO COME SOON!

