

The Water Footprint of Oil and Gas Production using Hydraulic Fracturing from Unconventional Reservoirs in the U.S.

Abstract n°2551

Scanlon Bridget R., Austin | TX, United States

bridget.scanlon@beg.utexas.edu

Reedy Robert C., Bureau of Economic Geology, Jackson School of Geosciences, Austin | TX, United States

KEYWORDS: water energy nexus, hydraulic fracturing, unconventional reservoirs

There is considerable concern about the water footprint of oil and gas production from shale plays. The water footprint includes both water use for hydraulic fracturing and water produced with oil and gas production. In this study we evaluated water use for hydraulic fracturing and management of water produced with oil and gas production in shale plays in the U.S. Most shale plays in the humid eastern U.S. produce gas whereas plays in the semiarid western U.S. produce mostly oil. Mean water use per well does not vary greatly among plays for oil versus gas production+ however, there is considerable variability among wells within plays. Water use for hydraulic fracturing is used up front+ however, with only 5–10% of oil or gas resources recovered, there is concern about additional future water use. Plays that produce oil and gas (e.g. Eagle Ford Shale) show that water use for oil wells is similar to that for gas wells. Sourcing of water for hydraulic fracturing is generally not critical in the humid eastern U.S. where surface water is the dominant source. Water sourcing is more critical in the semiarid western U.S.+ however, systems are adapting by expanding brackish groundwater use and reuse recycling of flowback-produced water. Flowback and produced water, generally referred to as produced water, is managed by deep disposal in most plays, except the Marcellus Shale Play in the eastern U.S. where ~90% of produced water is reused recycled for hydraulic fracturing, accounting for 10–30% of water required for hydraulic fracturing. Injection of produced water is inducing seismicity in some regions. In contrast, the water footprint of oil production from unconventional reservoirs is in the low range of that for oil production from conventional reservoirs where large volumes of water are used for water flooding and enhanced oil recovery. Increasing reuse recycling of produced water would reduce water sourcing and disposal issues but could increase vulnerability to contamination.

