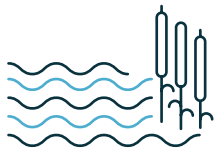


California Oil & Gas Water Usage: Setting the Record Straight

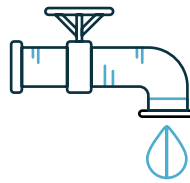
The Bottom Line

The oil and gas industry is a net supplier of water in the state of California. Through the provision of beneficial reuse water, California's oil and natural gas industry provides several billion gallons of water a year to agriculture. So, If enhanced oil recovery and hydraulic fracturing stopped today, the state would be even worse off in the drought.



Non-Produced Water Usage

The oil and gas industry uses 6.4 million gallons of freshwater/year in enhanced oil recovery.



Beneficially Reused Water Supply

The oil and gas industry supplies several billions of water/year for beneficial reuse, making them a net supplier of water.

State Water Usage

How does California Use Water?

1. Environmental (50%)

Mainly consists of water in rivers protected as "wild and scenic," water required for maintaining habitat within streams, and water that supports wetlands.

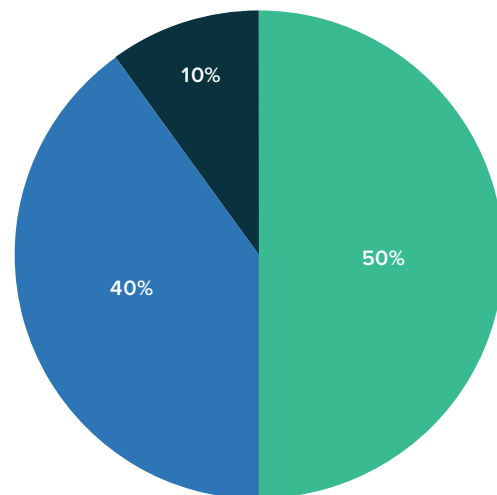
2. Agricultural (40%)

Used for crop production.

3. Urban (10%)

Includes residential, commercial, and industrial uses.

In a wet year, these uses represent 104 million acre-feet (13 trillion gallons) of water and in a dry year, 61 million acre-feet (7.7 trillion gallons) of water.



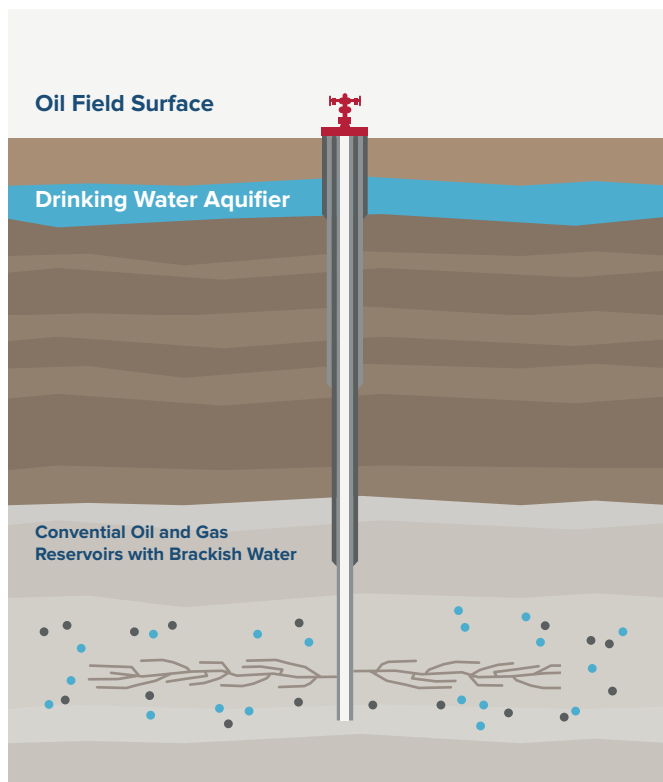
● Environmental ● Agriculture ● Urban

(Public Policy Institute of California, 2019)

Hydraulic Fracturing

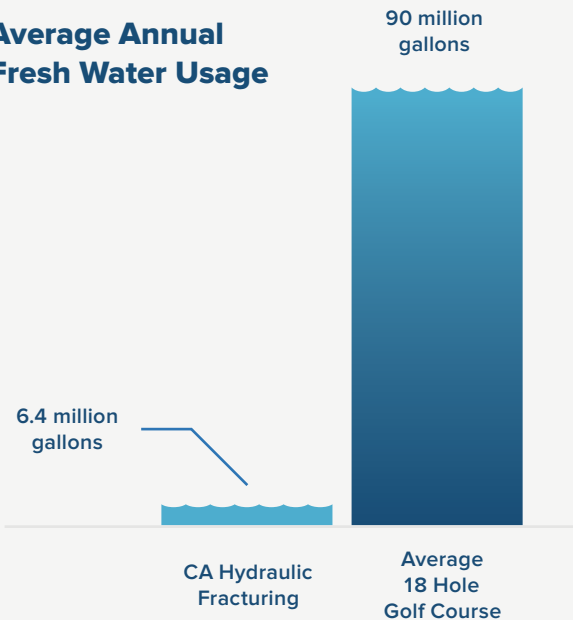
According to the California Council on Science and Technology, hydraulic fracturing requires an estimated 320 million gallons of water in the state annually. 98% of that water is recycled “produced water” taken from inside the oil field during hydrocarbon recovery (illustrated in figure 1). The remaining 2% (6.4 million gallons) of freshwater accounts for 0.00008% of the state’s water usage. The 6.4 million gallons a year pales in comparison to the average 18-hole golf course, which uses almost 90 million gallons of water per year.

Figure 1



* Brackish water is both produced and stored back underground during the recovery process.

Average Annual Fresh Water Usage



Produced Water

What is Produced Water?

For every 42 gallons of produced hydrocarbon, there are approximately 630 gallons of salty, “brackish water” with traces of hydrocarbon and other mineral elements like Boron that are recovered (shown in graph 1). This water is referred to as “produced water,” because it is produced alongside hydrocarbons during the recovery process. Most of this water is infeasible for any other use besides enhanced oil recovery like hydraulic fracturing and maintaining geologic formation integrity.

Reclaiming and Recycling Produced Water

Most produced water is put back underground where it came from. In some unique parts of California, this water has a relatively low salinity and has considerably lower concentrations of Boron and other minerals. The oil and gas industry has established partnerships with adjacent agricultural end-users and has invested billions of dollars in developing technologies to treat and beneficially reuse this high-quality produced water for agricultural purposes.

(<http://www.cagolf.org/how-california-golf-courses-are-conserving-water-during-the-drought/>).