Reducing gas flares—and pollution—from oil production

August 17 2016

Last year, dozens of major oil companies and oil-producing nations agreed to end the routine flaring of natural gas from wells by 2030. This burning off of uncaptured methane in addition to simply letting it escape into the air—a process called venting—releases pollutants and the greenhouse gases carbon dioxide and methane into the atmosphere. Now in ACS' journal *Energy & Fuels*, researchers report a strategy that could help producers work toward this goal.

Although the percentage of gas from oil production that is vented or burned off rather than captured has decreased over the past few years, the total volume is still considerable. Operations in the Northwest's Bakken Formation, one of the largest oil reservoirs in the U.S., flares and vents an estimated 250 million standard cubic feet of natural gas per day. Oil production in Texas' Eagle Ford formation flares and vents nearly 100 million standard cubic feet per day. Environmentalists and others have called for oil companies to capture the gas, which could be used to generate power or recover even more oil, rather than burn it off or release it into the atmosphere. But the infrastructure to do this hasn't caught up with the rapid growth of oil production. Milind Deo and colleagues set out to design a better facility for handling gas associated with oil operations.

The researchers investigated the application of staged separation, using a high-pressure step followed by a lower-pressure one, and demonstrated that this could reduce the rates of venting and flaring by up to 70 percent. The concept of staged separation has been used in production

from conventional oil reservoirs, but has not been widely applied in the production of liquids from shale formations. Upfront costs would be higher than separating oil and gas in one step, but in the long run, the cuts in waste gas would result in a more sustainable process, the researchers say.

More information: Richard Roehner et al. Reducing Gas Flaring in Oil Production from Shales, *Energy & Fuels* (2016). DOI: 10.1021/acs.energyfuels.6b01126

Abstract

It is estimated that about a third of the total gas produced from the prolific Bakken Formation, amounting to about 250 million standard cubic feet (MMSCF)/day, is either vented or flared. The gas flared in the Eagle Ford formation in Texas is also of the order of 100 MMSCF/day. The main target in these plays is liquid (oil and condensate), and the associated gas is flared or vented. Any liquid production from shale will ultimately involve surface production facilities for stabilization, treatment, and transport of produced fluids. The design and operation of the surface production facilities affect the amount and quality of the liquid produced and significantly affect the amount of gas vented. In this paper, we show that using a two-stage design improves liquid quality while reducing venting rates by up to 70%. The two-stage operation will require additional infrastructure and cost upfront but will yield considerable technical and environmental benefits and move tight oil production to a more sustainable operation. The impact of operational change in surface facility and wellhead on the sub-surface flow is also investigated in this study by simulating a conventional condensate process flowsheet with Eagle Ford fluid. Major pressure drops occur in the vertical section of the well and in the wellhead choke valve, where a change in the flow regime is observed. Up to 10% liquid fallout inside the reservoir causes a loss of production and creates a condensate bank near the wellbore, hindering the gas flow.