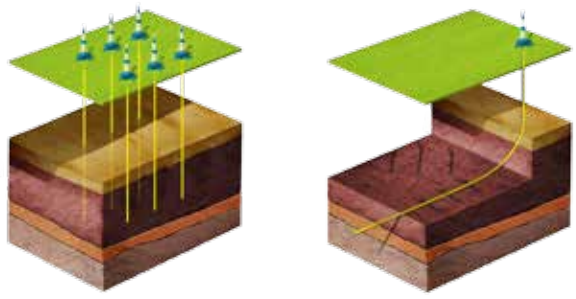
PAD SITE EFFICIENCY

Progressively over the last 60 years, oil and natural gas producers have demonstrated an ability to increase annual footage drilled per rig, while reducing overall surface footprint and drilling time. The catalyst for these advancements and efficiencies is comprised of new drilling technologies, techniques and rig designs.

Prior to the 1990s, most wells were completely vertical, but the pace of horizontal drilling technology development and its use has accelerated rapidly. In fact in 2013, more than 90 percent of the wells drilled in Oklahoma were horizontal. This ability to access production zones horizontally is vital to recovering additional hard-to-reach reserves while reducing overall environmental impact. In Oklahoma, a typical deep horizontal well can replace as many as six vertical wells, which reduces the overall physical footprint on the landscape.



Traditional Well | Horizontal Drilling

The use of horizontal and directional drilling makes it possible for a single well to produce natural gas from much bigger areas than in the past.

Pad drilling has also helped to increase efficiency. This technique allows a number of separate wells to be drilled from the same location. By keeping drilling and production on one location, producers are able to avoid clearing larger areas of land and reduce the number of roads and pipelines needed to service dozens of wells. Today's typical horizontal pad sites range from three to five acres in size.

"Pad" drilling techniques allow rig operators to drill groups of wells more efficiently; because improved rig mobility reduces the time it takes to move from one wellbore to the next, while reducing the overall surface footprint. A drilling pad is a location, which houses the wellheads for a number of horizontally drilled wells. The benefit of a drilling pad is that operators can drill multiple wells in a shorter time than they might with just one well per site.

– Energy Information Administration
Pad Drilling and Rig Mobility – 2013

DRILLING RIG AGILITY

New rig designs are helping speed up oil and natural gas production. What once could take weeks, like moving a rig, now takes hours. Some of today's new rigs have the ability to "walk" from one wellbore to another. "Walking" rigs can turn 360 degrees and move any direction, up to 15 feet, in two hours.[1]

In the past, drill assemblies could only dig straight down, but now they are agile enough to change directions underground without having to be drawn back up to the surface. These technologies allow drillers to precisely orient wellbores in

PAD SITE EFFICIENCY

"target zones" greatly reducing overall drilling time. These improvements have helped some producers reduce drilling time by as much as 40 percent since 2011.[2] A reduction in drilling time also means less construction traffic, noise and dust in the area.

[1] U.S. Energy Information Administration, Quantifying Drilling Efficiency, John Cochener: http://www.eia.gov/discussionpapers/drilling_efficiency.pdf

[2] Anadarko Petroleum Operations Report, Third Report, Third Quarter, October 2012. https://www.anadarko.com/SiteCollectionDocuments/PDF/Operations%20Reports/3Q12%20Operations%20Report.pdf

LEARN MORE

To find out more about how land is being protected and efficiencies are being gained in oil and natural gas production, visit these additional sources.

U.S. Energy Information Administration, Pad Drilling and Rig Mobility Lead to more efficient drilling: http://www.eia.gov/todayinenergy/detail.cfm?id=7910

U.S. Energy Information Administration, Quantifying Drilling Efficiency, John Cochener: http://www.eia.gov/discussionpapers/drilling_efficiency.pdf