

Oil & Natural Gas in Kentucky

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Fact Sheet No. 7

Background: Oil and natural gas occur across Kentucky. Early explorers and settlers found natural oil and gas seeps to be common. The first oil boom occurred after the Civil War in south central Kentucky.

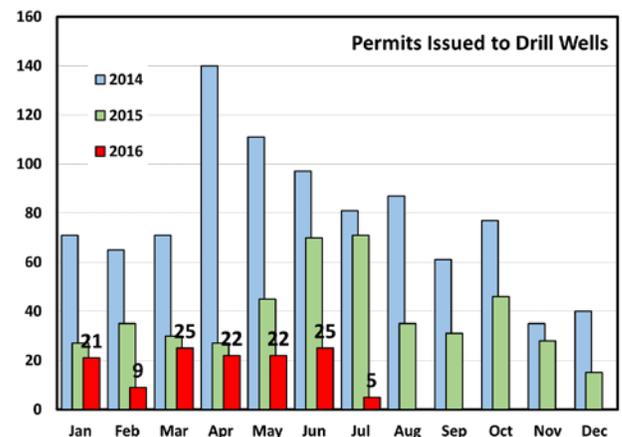
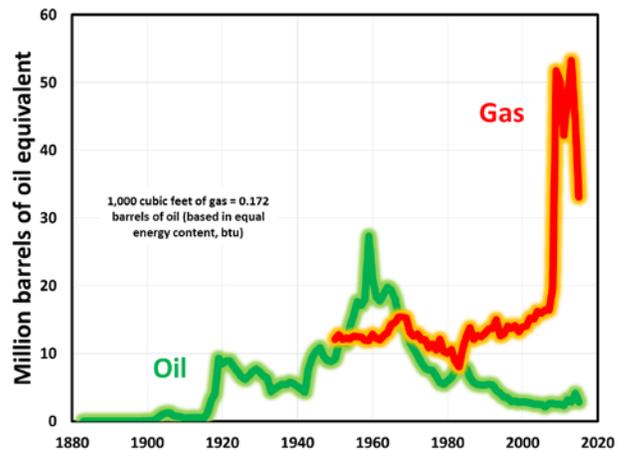
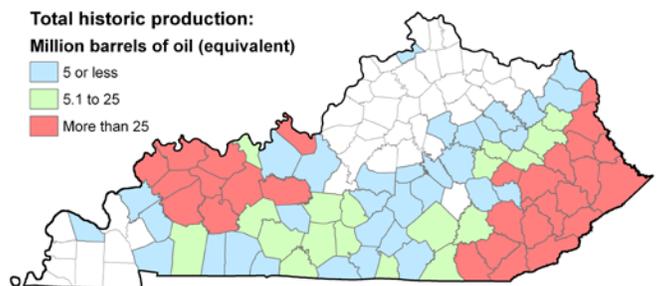
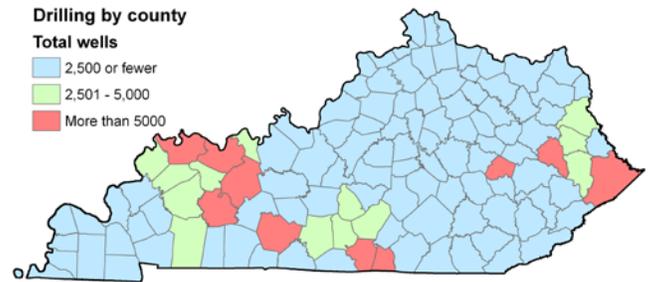
First commercial well: 1818, Beatty well, McCreary County, drilled for brine, produced oil.

Deepest well: Exxon No. 1 Duncan in Webster County, 15,200 feet (1977).

Leading Producing Zones: Cambrian to Pennsylvanian rocks produce oil or gas in more than 1,500 pools in Kentucky. Oil is produced from Pennsylvanian sands and Mississippian limestones and sandstones in eastern and western Kentucky and Ordovician limestones and dolomites in south-central Kentucky. Most natural gas is produced from the Devonian black shale of eastern Kentucky.

Activity: In eastern Kentucky, horizontal wells in the Devonian Berea of Lawrence County has made it the leading oil producing county. The Cambrian Rogersville is attracting interest in Lawrence and Johnson Counties. In western Kentucky, the Devonian New Albany shale is producing oil in Breckinridge and other counties. Low prices have significantly slowed drilling across the State.

Future: Success in the deep Rogersville play of eastern Kentucky could open up a new continuous resource, but low commodity price has halted exploration. A better understanding of oil generation in low maturity plays could open additional areas of Kentucky shales to renewed interest.



Oil and Natural Gas Production in Kentucky 2015		
	Oil	Natural Gas
Producing wells <small>(KyDOG status "PR" and not abandoned)</small>	12,019	15,153
Producing Counties	62	31
Top counties (2015 data)	Lawrence (506 Mbo ¹) Henderson (233 Mbo) Union (225 Mbo) Lee (223 Mbo) Webster (148 Mbo)	Floyd (93.8 bcf ³) Pike (35 bcf) Letcher (14 bcf) Knott (13 bcf) Perry (11 bcf)
2015 Total	2.85 MMbo ²	192.1 bcf
2015 Total value (tax paid)	\$136.3 million (\$6 million)	\$229.5 million (\$10.3 million)
Top counties (all years)	Henderson (114 MMbo) Lee (89 MMbo) Union (88 MMbo) Daviess (57 MMbo) Ohio (51 MMbo)	Floyd (1,322 bcf) Pike (902 bcf) Knott (329 bcf) Letcher (225 bcf) Perry (217 bcf)
Statewide total	803 MMbo	7.6 trillion cubic feet

¹Mbo – thousand barrels of oil

³bcf – billion cubic feet

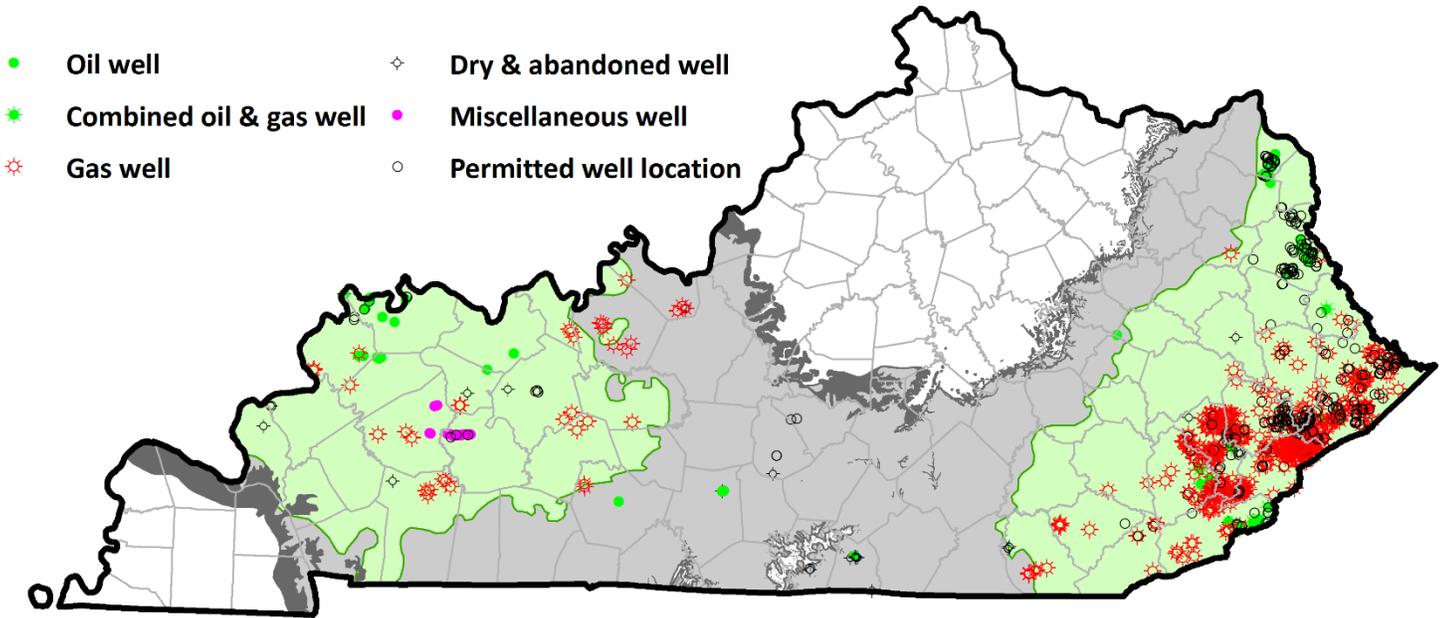
²MMbo – million barrels of oil

Search for oil and gas well data: <http://kgs.uky.edu/kgsweb/DataSearching/OilGas/OGSearch.asp>

Interactive oil and gas well map: <http://kgs.uky.edu/kgsmap/kgsgeoserver/viewer.asp>

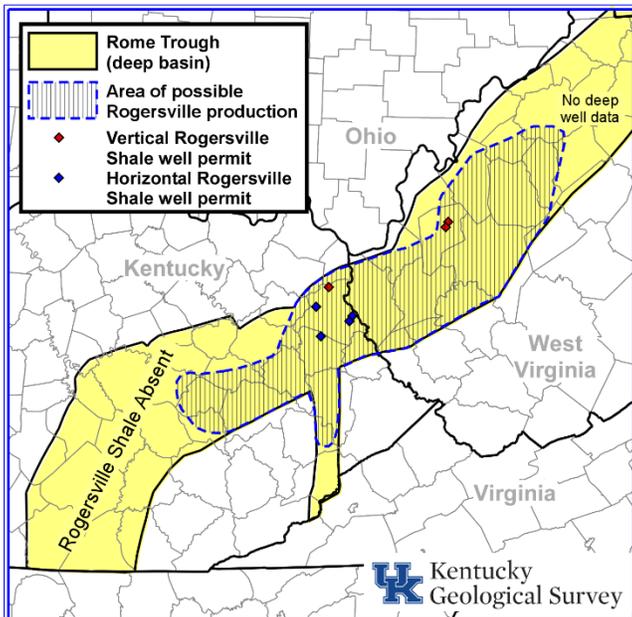
Kentucky virtual field trips: <http://www.uky.edu/KGS/geoky/fieldtrip/index.htm>

Horizontal Wells in Kentucky



More than 1,400 horizontal wells have been permitted and drilled in Kentucky since 2006, most in eastern Kentucky to black, organic-rich, gas zones in the Devonian Ohio Shale. Dark gray areas indicate the outcrop of the shale (central and south-central Kentucky) and the subsurface pinchout of the shale in western Kentucky. Light gray shows the area of Kentucky where the shale is present in the subsurface. Light green indicates where the shale is at least 100 feet thick and at least 1,000 feet deep.

New Deep Cambrian Rogersville Shale Play



A potential new unconventional oil and gas play targeting the Cambrian Rogersville Shale is developing in eastern Kentucky. The Rogersville Shale is one of six formations in the Conasauga Group, and occurs in parts of eastern Kentucky, West Virginia, and eastern Tennessee. Thickness and organic content of the Rogersville is greatest in the Rome Trough, a deep fault-bounded graben. Total organic carbon for the Rogersville Shale ranges from 1.2 to 4.75 percent. The Rogersville Shale ranges in thickness from 200 to more than 1,200 ft at depths from 6,000 to 13,000 ft below sea level.

Seven Rogersville test locations have been permitted in the last 2 years, and five have been drilled to date. The apparent discovery well is the Bruin Exploration No. 1 Young well in Lawrence County, Kentucky, drilled vertically to 11,967 ft into the Rome Formation. Bruin hydraulically fractured a 576 ft interval in the Rogersville, and reported initial production of 115 MCFGD and 19 BOPD. A surface shut-in pressure of 2,599 psi was reported. Although these volumes are modest, a vertical well may not reflect the full potential of the zone. This well is currently shut-in. A second well, the Cabot No. 50 Amherst Industries, was permitted in mid-2014 to 14,000 ft, targeting the Rogersville Shale in Putnam County, West Virginia. Records have not been released, but the

well was producing gas in late 2015. Speculation about the Bruin well resulted in extensive leasing and sales of deep mineral rights in eastern Kentucky in 2014-15. Three additional wells were drilled in Kentucky in 2014 and 2015: one horizontal well by Horizontal Technology Energy and two vertical wells by Chesapeake Energy. These wells are still being evaluated, or pending completion. More recently, permits were issued for a horizontal lateral from the Bruin Young discovery well, a second Bruin horizontal well, and a horizontal lateral from one of the Chesapeake vertical wells (all in Lawrence County, Kentucky).

The Rogersville play concept has been proven, but economic viability will depend on the production rates established and higher commodity prices.