



The U.S. Department of Energy's Office of Fossil Energy (FE) supports research and development of technologies that can reduce the volume of natural gas (e.g., methane) flared or vented (released) into the atmosphere during crude oil and natural gas exploration, production, processing, transportation, and storage operations. This fact sheet was created by FE to inform stakeholders on state-level production and regulatory activity regarding natural gas flaring and venting. FE's research portfolio includes efforts to reduce methane (and other hydrocarbon) flaring through the application of improved technologies to capture and utilize small volumes of natural gas at remote locations, as well as technologies to reduce (primarily) methane release during midstream gas processing and transportation. Intermittent flaring that occurs as a result of routine well testing, production facility process shutdowns, or facility and pipeline infrastructure maintenance, are normal aspects of safe oil and natural gas production. Increases in domestic oil and natural gas production have resulted in significant infrastructure buildouts, however, natural gas pipeline capacity constraints have led to regional increases in the flaring of associated gas in some unconventional plays (e.g., Permian Basin in Texas and New Mexico and Bakken Shale in North Dakota) in order to enable oil production.

West Virginia Producing Plays and Basins

According to the U.S. Energy Information Administration (EIA), West Virginia's proven reserves are [211 million barrels](#) of oil and [35.86 trillion cubic feet \(Tcf\)](#) of natural gas (2017). In 2016, the [Potential Gas Committee](#) reported that the "most likely" recoverable shale gas resource for the entire Appalachian Basin is estimated to be 858.7 Tcf, with 27.6 Tcf in non-shale gas resource. These resources are contained within the Marcellus Shale, the Utica Shale, and the Devonian (Ohio) Shale ([Figure 1](#)).

The Marcellus Shale play extends from New York State in the north to southwestern West Virginia, and it is the most productive natural gas play in the Appalachian Basin. The [Marcellus](#) currently produces in four

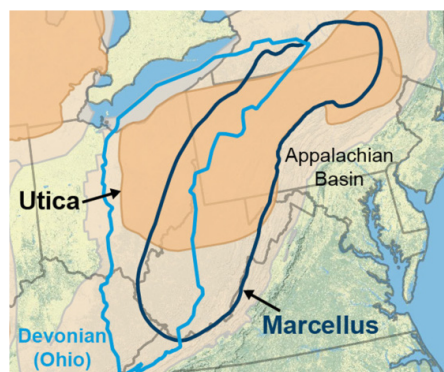


Figure 1: Appalachian Basin and Pennsylvania major unconventional gas plays outlined. Source: EIA

states: Pennsylvania, West Virginia, Ohio, and New York. The Marcellus formation ranges in depth from 100–9,900 feet and primarily produces gas in northeast Pennsylvania but becomes more liquid

rich in less thermally mature areas of southwestern Pennsylvania, West Virginia, and southeastern Ohio. According to the [U.S. Geological Survey \(USGS\)](#), the Marcellus Shale play contains about 84 Tcf of natural gas and 3.4 billion barrels of natural gas liquids (both undiscovered, technically recoverable). However, the Institute for Energy Research has estimated that the [Marcellus](#) could hold as much as 500 Tcf of recoverable resource.

The [Utica Shale](#) is a stacked play underlying the Marcellus that includes both the Utica formation and the underlying Point Pleasant formation. The most productive areas of the Point Pleasant formation are located in eastern Ohio and western Pennsylvania. The Utica extends over 115,000 square miles and the Point Pleasant slightly

West Virginia [Oil](#) and [Natural Gas](#) Statistics (EIA)

	2013	2014	2015	2016	2017	
Crude Oil Production (Average Thousand Barrels/Day)	19.8	28.3	31.7	20.9	25.9	34.7
Natural Gas Gross Withdrawals and Production (Average MMcf/Day) *	2,032	2,924	3,603	3,793	4,386	4,929
Natural Gas Gross Withdrawals and Production (Vented and Flared) (MMcf/Day)	West Virginia does not maintain a database with the total permitted amount of gas flared statewide.					
Natural Gas Gross Withdrawals and Production (Oil Wells) (MMcf/Day)	101	125	124	109	109	N/A
Natural Gas and Gas Producing Oil Wells (Thousands)	52.8	55.7	51.5	55.4	N/A	N/A

MMcf – million cubic feet

2017 ranking among 32 U.S. oil and natural gas producing states — [Oil](#): 15 [Natural Gas](#): 9

less, of which about 75% is prospective. The [Utica play](#) could hold technically recoverable volumes of 782 Tcf of natural gas and nearly 2 billion barrels of oil. [EIA estimates](#) that proved reserves of 6.4 Tcf for the Utica play (2017).

The Devonian (Ohio) Shale is a shallower formation that extends across the Appalachian Basin, including parts of eastern Ohio, West Virginia, Kentucky, and Pennsylvania. This low-pressure shale has produced gas since the late 1800s, and large numbers of stripper gas wells continue to produce at low rates. Western Pennsylvania, western Ohio, and northern West Virginia also produce limited amounts of crude oil from shallow formations.

West Virginia Key Regulations Associated with Flaring and Venting

The West Virginia Department of Environmental Protection's [Division of Air Quality](#) is responsible for enforcing regulations associated with natural gas flaring, and its [Office of Oil and Gas](#) enforces oil and gas exploration, drilling, storage, and production more broadly. The state regulations are guided by the West Virginia Code, Chapter 22, Articles 5 and 18 and Legislative Rules 45CSR Series 6 and 13. Per [West Virginia Code 22-6-31](#), the Office of Oil and Gas requires that oil and gas producers submit a [Plan of](#)

[Operation for the Flaring of Natural Gas](#) to report the purpose of flaring, volume of gas to be flared, hours per day of flaring, etc.

[Legislative Rule 45 Series 13 \(45CSR13\)](#), entitled *Permits for Construction, Modification, Relocation and Operation of Stationary Sources of Air Pollutants* requires permits for permanent flaring and venting and outlines procedures and criteria for obtaining necessary permits. West Virginia Legislative Rule 45, Series 6, entitled *Control of Air Pollution from Combustion of Refuse*, provides that any incinerator must obtain a permit prior to construction. Section 6 (45-6-6) outlines the conditions that describe which flares and flare stacks may be exempt from the preconstruction permit required by 45CSR13. Exempt flares must meet the following criteria: are used for maintenance and repair of natural gas pipelines; are temporary (active for less than 30 days cumulatively or on-site for less than 10 days); and are low in emission volume (not to exceed threshold amounts as defined in [45CSR13](#)). Exempt flares must have sufficient monitoring results that will be recorded to confirm compliance with relevant state emissions rules and national ambient air quality standards. While the Division of Air Quality does permit flares and limits the amount of gas that can be flared, the office does not maintain a database that tracks the amount of gas flared statewide.

West Virginia State Points of Contact

West Virginia Department of Environmental Protection: Division of Air Quality

Contact the Division of Air Quality's Compliance and Enforcement section to learn more about air quality monitoring and permitting.

Website: <https://dep.wv.gov/daq/Pages/default.aspx>

Email: James.Robertson@wv.gov

Phone: 304-926-0499, ext. 1697

West Virginia Department of Environmental Protection: Division of Oil and Gas

Contact the Division of Oil and Gas Compliance and Enforcement section to learn more about natural gas flaring and venting regulations.

Website: <https://dep.wv.gov/oil-and-gas/Pages/default.aspx>

Email: James.A.Martin@wv.gov

Phone: 304-926-0499, ext. 1654

Visit energy.gov/fe/state-natural-gas-flaring-and-venting-regulations for a digital version of this fact sheet that includes hyperlinks to information sources.