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Mr. Chairman and Members of the Committee, thank you for the opportunity to appear here today to discuss with you the U.S. Geological Survey's role in research related to the Marcellus Shale. My testimony today will focus on USGS work in studying, understanding, and assessing domestic energy resources and, specifically, our recent resource assessment of the Marcellus Shale. I understand the Environmental Protection Agency is here today to discuss the potential environmental and human health issues associated with the development of this significant shale gas resource.

Role of the U.S. Geological Survey in Energy Resource Assessments

The USGS conducts scientific investigations and assessments of geologically based energy resources, including conventional resources (oil, gas, and coal), emerging resources (gas hydrates), underutilized resources (geothermal), and unconventional resources (shale gas, shale oil, tight gas, tight oil, coalbed methane, and heavy oil). The USGS also conducts research on the effects associated with energy resource occurrence, production, and (or) utilization. The mission of the USGS Energy Resources Program is: (1) to understand the processes critical to the formation, accumulation, occurrence, and alteration of geologically based energy resources; (2) to conduct scientifically robust assessments of those resources; and (3) to study the impact of energy resource occurrence and (or) production and use on both environmental and human health. The results from these scientific studies are used to evaluate the quality and distribution of energy resource accumulations and to assess the energy resource potential of the Nation (exclusive of Federal offshore waters) and the petroleum resource potential of the world.

The results from these studies provide impartial, robust scientific information about energy resources that directly supports the U.S. Department of the Interior's (DOI's) mission of protecting and responsibly managing the Nation's natural resources. USGS information is used by policy and decision makers, land and resource managers, other federal and state agencies, the energy industry, foreign governments, nongovernmental groups, academia, other scientists, and the public.

It is important to note the distinction between the terms "resource" and "reserves." Resource is a concentration of naturally occurring solid, liquid, or gaseous hydrocarbons in the Earth's crust, some of which is, or potentially is, technically and (or) economically extractable. Reserves specifically refer to the estimated quantities of identified (discovered) petroleum resources that, as of a specified date, are expected to be commercially recovered from known accumulations under prevailing economic conditions, operating practices, and government regulations. Primarily, the USGS conducts assessments of undiscovered, technically recoverable oil and gas resources. The USGS also conducts select assessments of economically recoverable resources. These resources include coal in various basins of the United States and oil and gas in frontier areas such as Arctic Alaska. Economically recoverable resources are a subset of technically recoverable resources and are generally less than the technically recoverable amount.

2011 USGS Marcellus Gas Shale Assessment

On August 23, 2011, the USGS released its new assessment (http://pubs.usgs.gov/fs/2011/3092/) of gas and natural gas liquid resources in the Marcellus Shale in the Appalachian Basin of the Eastern United States. According to this assessment, the USGS determined that the Marcellus Shale contains a mean of approximately 84 trillion cubic feet (TCF) of undiscovered, technically recoverable natural gas and 3.4 billion barrels of undiscovered, technically recoverable natural gas liquids. These gas estimates are significantly more than the last USGS assessment of the Marcellus Shale in the Appalachian Basin in 2002 (http://pubs.usgs.gov/fs/fs-009-03/), which estimated a mean of about 2 TCF of gas and 0.01 billion barrels of natural gas liquids. The significant increase in the undiscovered, technically recoverable resource is due to new geologic information, engineering data, and technological developments since the 2002 assessment. This Marcellus Shale estimate is of unconventional (or continuous-type) gas resources, and significant technological developments in producing unconventional resources have been made in the last decade.

Since the 1930's, almost every well drilled through the Marcellus found noticeable quantities of natural gas. However, in late 2004, the Marcellus was recognized as a potential reservoir rock, instead of just a regional source rock, meaning that the gas could be produced from it. Improvements in drilling and completion engineering resulted in commercially viable gas production and the rapid development of a major, new continuous natural gas and natural gas liquids play in the Appalachian Basin, the oldest producing petroleum province in the United States.

This USGS assessment is an estimate of continuous gas and natural gas liquid accumulations in the Middle Devonian Marcellus Shale of the Appalachian Basin. The estimate of undiscovered natural gas ranges from 43.0 to 144.1 TCF (95 percent to 5 percent probability, respectively), and the estimate of natural gas liquids ranges from 1.6 to 6.2 billion barrels (95 percent to 5 percent probability, respectively). There are no conventional petroleum resources assessed in the Marcellus Shale of the Appalachian Basin.

These new estimates are for technically recoverable oil and gas resources, which are those quantities of oil and gas producible using currently available technology and industry practices, regardless of economic or accessibility considerations. As such, these estimates include resources beneath both onshore and offshore areas (such as Lake Erie) and beneath areas where accessibility may be limited by policy and (or) regulations.

The Marcellus Shale assessment covers areas in Kentucky, Maryland, New York, Ohio, Pennsylvania, Tennessee, Virginia, and West Virginia. The Marcellus is one of several existing and potential shale gas reservoirs in the Appalachian Basin. In West Virginia and other states, operators may co-mingle production from one or more of these shale gas reservoirs with their Marcellus production. The USGS assessed the resource potential of the Marcellus only and did not include an assessment of potential future contributions from these other, co-mingled reservoirs.

The USGS worked with the Pennsylvania Geological Survey, the West Virginia Geological and Economic Survey, the Ohio Geological Survey, and representatives from the oil and gas industry and academia to develop an improved geologic understanding of the Marcellus Shale. The USGS Marcellus Shale assessment was undertaken as part of a nationwide project assessing domestic petroleum basins using standardized methodology and protocol.

The Marcellus Gas Shale in West Virginia

The USGS assessment process examines petroleum basins and assessment units (AU's), based on geologic features, not specific states. Assessment units are mappable areas with common geologic traits. The Marcellus Shale extends over almost the entire state of West Virginia. The three assessment units of the Marcellus Shale are all present in West Virginia as follows: the Western Margin Marcellus Assessment Unit (27% of area), the Interior Marcellus Assessment Unit (22% of area), and the Foldbelt Marcellus Assessment Unit (15% of area). By applying the allocated areal percentages for each of the AU's, the estimated mean value of Marcellus undiscovered resource potential for West Virginia calculates at approximately 563 billion cubic feet of gas (BCFG) for the Western Margin Marcellus AU; 18,000 BCFG for the Interior Marcellus AU; and 114 BCFG for the Foldbelt Marcellus AU, and thus a total mean resource of 18,677 BCFG or a little more than 18½ TCF of natural gas in West Virginia.

Conclusion

The USGS oil and gas resource assessment of 2011 for the Marcellus Shale of the Appalachian Basin concluded that undiscovered, technically recoverable volumes range between 43.0 and 144.1 TCF, with a mean value of 84.2 TCF. Of this amount, West Virginia has an areal allocation mean value of approximately 18.7 TCF, or approximately 22% of the total estimated resource.

Thank you for this opportunity to provide an overview of the recent USGS resource assessments of the Marcellus Shale. I would be happy to answer your questions.