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I want to thank the Chairs, Ranking Members and Members of the Subcommittees for inviting me to appear before you today to discuss the critical role that the Department of Energy's Office of Fossil Energy, in collaboration with the Department of the Interior (DOI) and the Environmental Protection Agency (EPA), is playing to improve the safety and environmental performance of developing our Nation's unconventional oil and natural gas (UOG) resources.

Federal coordination and collaboration is critical to successfully addressing the challenges associated with the development of unconventional oil and gas resources. To this end, the President signed an Executive Order on April 13, 2012, creating a new Interagency Working Group to Support Safe and Responsible Development of Unconventional Domestic Natural Gas Resources.

On the same day, DOE, EPA and DOI's U.S. Geological Survey signed a related memorandum of agreement initiating multi-agency collaboration on unconventional oil and gas research. The objective of this collaborative effort is to better identify and address the highest priority issues associated with the safe and prudent development of unconventional oil and gas resources, and to make effective use of research funds across the Federal government.

This collaboration will only address a subset of unconventional resources: shale gas, tight gas, shale oil, and tight oil, and a robust Federal research and development (R&D) plan is under development. Each of the three agencies has a unique set of core capabilities relevant to this effort. Ultimately, the goal of the interagency collaboration is to ensure that each agency is focused on those tasks that are most relevant to its skill sets, and that the agencies are effectively working together on tasks that require collaboration. The President's FY 2014 budget request includes a combined total of $44.7 million to fund this effort.

Challenges and Opportunities

Shale gas development has brought new options to American consumers, along with new environmental concerns. This is a period of great opportunity for the prudent development of our country's oil and gas resources which could make a positive contribution to our economy,

jobs, and balance of trade. But to get these benefits we must do this right. Through targeted research and development, DOE can work with our agency partners, industry, and other stakeholders to help ensure that we are meeting our shared goal of safe and responsible development of our natural resources.

Natural Gas Technologies

DOE's Natural Gas research program develops technological solutions for the prudent and sustainable development of our unconventional domestic resources. These resources, which include natural gas and oil contained in shale or other low permeability geological formations, are increasingly important components of our Nation's energy portfolio.

The successful applications of horizontal drilling and hydraulic fracturing technologies have enabled production to be extended to vast volumes of unconventional natural gas and oil that was previously uneconomical to produce. To help ensure that development of our resources is done in a safe and responsible way, DOE is implementing research in areas that include water quality and availability, air quality, induced seismicity, and mitigating the impacts of development.

Current Status of Research

The Department is carrying out research directed at quantifying and understanding the environmental and safety risks of shale gas and shale oil development, improving our understanding of emerging and developing shale plays, and increasing the efficiency of technologies for treating hydraulic fracturing flowback water.

For example, DOE partnered with Altela, Inc., to test the AltelaRain® fracturing water treatment process at a well site in western Pennsylvania. Over a 9-month period, 77 percent of the produced hydraulic wastewater was successfully treated onsite, resulting in distilled water as the effluent. Following the DOE-sponsored demonstration project, four AltelaRain modules were sold and installed at a facility in Williamsport, Pennsylvania, to treat Marcellus shale wastewater. Building on the success of this application, Altela, Inc., and its partners are opening two new wastewater treatment facilities in western Pennsylvania. Each facility is able to process up to 12,000 barrels of waste water a day—about 500,000 gallons per facility. The purified water can then be reused for any number of purposes.

Our current program focus is on improving environmental performance by:

- Mitigating impacts related to wellbore integrity and zonal isolation to protect shallow groundwater resources, and

- Reducing water usage, air emissions, and resource degradation through improved unconventional resource stimulation that appropriately matches technology to local geologic and hydrologic conditions.

This work is a critical component of DOE's portfolio to advance the environmentally sound development of unconventional natural gas and oil resources and will support ongoing programmatic efforts.

Summary of DOE Capabilities

DOE has research experience and capabilities in drilling and production technologies, green technologies, complex systems, imaging, materials, earth science and engineering.

DOE capabilities in drilling and production technologies include experience and expertise in quantifying, evaluating and mitigating potential risks resulting from the production and development of the shale gas and oil resources, to include multi-phase flow in wells and reservoirs, well control, casing, cementing, drilling fluids, and abandonment operations. DOE has experience in evaluating seal-integrity and wellbore-integrity characteristics in the context of protection of groundwater.

DOE has experience and expertise in the development of a wide range of new technologies and processes, including innovations which reduce the environmental impact of exploration and production such as flowback water treatment processes and water filtration technologies.

DOE specializes in the development of complex engineered systems, high speed computing and predictive modeling, and has experience in quantifying and mitigating low-frequency, high-impact risks. This includes evaluating human factors which potentially contribute to failures.

DOE has developed and evaluated novel imaging technologies for areal magnetic surveys for the detection of unmarked abandoned wells, and for detecting and measuring fugitive methane emissions from exploration, production, and transportation facilities.

Conclusion

The Office of Fossil Energy is committed to developing the science and technology that will allow the Nation to use its abundant fossil energy resources in a way that meets its energy needs, including sustaining a robust economy and ensuring environmental responsibility. We believe that continued progress will help in addressing issues of energy and environmental security, and ensure the maximum benefit to U.S. taxpayers.

This completes my prepared statement. I would be happy to answer any questions you may have at this time.