



2016 Shale Exchange Conference Highlights

On October 5 – 6, 2016, a diverse group of experts on sustainable shale gas development gathered to discuss emerging technologies and business opportunities and to visit shale field operations. This was the 3rd year of the Shale Exchange Conference, presented by the Gas Technology Institute (GTI). In addition to U.S. subject matter experts, participants included international representatives from Argentina, China, Europe, Poland, Portugal, Netherlands, Denmark and Mexico. Others included exploration and production companies, environmental and engineering service companies, universities, research and development organizations, consultants, the U.S. Department of Energy (DOE) National Energy Technology Laboratory (NETL), and environmental and legal firms. The program comprised keynote presentations, environmental, innovation and international panel discussions, networking and a technical reception held at the University of Pittsburgh.

Technology challenges and solutions discussed through topical presentations and audience participation included air emissions, wastewater and subsurface risks. Important shale research wells being conducted were reviewed. Learnings from U.S. operations and challenges in countries outside of the U.S. were also discussed.

Europe's M4ShaleGas consortium research into measuring, monitoring, mitigating, and managing the environmental impacts of shale gas being conducted by 18 European research institutions and coordinated by TNO – Netherlands Organization for Applied Scientific Research was reviewed. The objective of this research is to identify science-based best practices for minimizing the environmental footprint of shale gas exploration in Europe.

Hydraulic Fracturing Test Site (HFTS) is a collaborative, comprehensive hydraulic fracturing diagnostics and testing program in horizontal wells at a dedicated, controlled field-based site in the Permian Basin, Texas. HFTS is conducting conclusive tests using advanced technologies to adequately characterize, evaluate, and improve the effectiveness of individual hydraulic fracture stages as well as improved well spacing, leading to optimal resource recovery. One highlight of the program features through-fracture cores to characterize hydraulic fractures in an attempt to validate fracture models and diagnostic tools. Developed by GTI, DOE and a consortium of hydraulic fracturing experts from industry and government, the program will provide a clearer understanding of the fracturing dynamics key to controlling fracture dimensions and vital to the productivity and minimizing environmental impacts.

Marcellus Shale Energy and Environment Laboratory (MSEEL) located in the West Virginia Marcellus play will provide a long-term field site to develop and validate new knowledge and technology to improve recovery efficiency and minimize environmental implications of unconventional resource development. This project will demonstrate the best approach to drill, complete and produce shale wells that minimizes environmental/social costs while maximizing economic productivity. The project team includes West Virginia University, Ohio State University and DOE.

Operational Field Tours that included Universal Well Services technology center, and shale drilling and hydraulic fracturing operations at an EQT shale well sites offered an important perspective of the size, complexity, and professional level of management of shale development activities. Prior to the conference, participants toured the National Energy Technology Laboratory to gain insight to the research activities being conducted at this DOE laboratory.

The following are highlights of the dialogue between the presenters and audience participants:



- With less than 10% of the world's shale reserves, the U.S. is the number one oil and gas producing country. This also means that 90% of shale reserves lie in countries outside the U.S.
 - Because of the prolific Marcellus and Utica shale production, if Ohio, West Virginia and Pennsylvania were a country, they would be #3 in gas production.
 - U.S. natural gas prices are less than one half of those in European countries—providing businesses competitive advantage and households are saving approximately \$1,200 per year due to lower energy prices.
- Since only about 10% of the acreage has been developed in the Appalachian region and there are three shales to be developed, it is early in the first decade of this multi-decade play.
 - U.S. CO₂ emissions are at a 20-year low (due in large part to gas power generation) and the land footprint of shale gas development can be advantageous since the size of the wells is increasing and the number of wells per pad can be 20 or more. Yet, environmental concerns and technological challenges remain for future consideration.
 - It is estimated that world energy demand will grow by 50% by 2040, and it is anticipated that much of that energy will come from fossil fuels, so minimization of environmental impact will result in significant value over many years.
 - Since approximately 25 – 30% of gas and 10 – 15% of oil in-place can currently be extracted from shale with current technology (recovery ranges vary depending on region), there is considerable opportunity for advanced technology to improve efficiencies and increase production to even greater levels.
 - Following the science to produce more resources with fewer, less environmentally impactful wells was an underlying theme of the conference as participants strive to increase well efficiency while concurrently minimizing environmental impact.

About The Shale Exchange: Founded in 2014 by GTI, The Shale Exchange brings shale gas companies, consultants, and researchers from around the world to Pittsburgh, PA, to forge business connections and discuss technology, policy and best practices about the global shale revolution.

About GTI: GTI is the leading research, development and training organization addressing energy and environmental challenges to enable a secure, abundant, and affordable energy future. For 75 years, GTI has been providing economic value to the natural gas industry and energy markets by developing technology-based solutions for industry, government, and consumers.