



June 12, 2014

**The United States House of Representatives
Committee on Natural Resources
Subcommittee on Energy and Mineral Resources
*Oversight Hearing: American Energy Jobs: Opportunities for
Innovation***

**Opening Comments of James King,
Vice President – Unconventional Completions**

Mr. Chairman, Ranking Member Holt, Members of the Subcommittee, good morning. I thank you for the great honor of appearing before you today. My name is James King, and I am the Vice President of Unconventional Completions for Baker Hughes Incorporated.

Baker Hughes is a leading global supplier of oilfield technology and services to the oil, natural gas, and geothermal industries. The company was founded on innovation more than 100 years ago, when R.C. Baker's inventions launched the oilfield equipment business and Howard Hughes Sr. revolutionized drilling with the rotary drill bit. Innovation is in our DNA. Innovation is our culture. Innovation is why after 100 years Baker Hughes remains on the leading edge of oilfield technologies.

The role of innovation in the unconventional oil and gas boom has been written about extensively, along with the profound economic and political implications of the abrupt reversal in outlook from scarcity to abundance. While this innovation is frequently captured with the catch-all "horizontal drilling and hydraulic fracturing," this convenient summation often obscures how far the industry has come from its origins, and over the past decade. The first shale gas well was dug, by hand, in Fredonia, New York in 1825. The gas it produced, delivered through a series of hollowed-out logs sealed with tar and rags, powered four homes and a grist mill. Last year a single pad on which we worked in the Marcellus shale produced enough gas over 30 days to satisfy a month's worth of demand for the entire City of Philadelphia. This is breathtaking.

Our top 20 customers alone will spend over \$100 billion this year on well services to achieve this kind of result. Our job is to drive greater efficiencies in the placement and drilling of wells, to optimize the operator's production rate, and to increase the overall amount of resources



recovered from any given well. Innovation is critical to each of these endeavors, regardless of whether one is looking to the conventional, unconventional or deepwater markets. The technology needed is complex and interdisciplinary, requiring advances in materials science, mechanical engineering, electronics, fiber optics, communications, data acquisition, modeling, and analytics. In materials research alone we have labs dedicated to metallurgy, composites, elastomers, fluids, and nanotechnology.

In 2013 Baker Hughes invested \$556 million in research and development spanning this vast array of disciplines, an investment rate we expect to sustain in 2014. We are introducing 130 new products this year—essentially averaging a new product every 67 hours. Some of these products will have a commercial life of only 18 months, meaning that our industry faces development lifecycles similar to those in the hypercompetitive mobile phone business.

The human capital and physical infrastructure needed to support this pace of product development are enormous. Baker Hughes employs hundreds of R&D scientists and engineers throughout the United States. Many work in interdisciplinary project teams at state-of-the-art facilities designed to foster creativity and innovation.

For example, our Center for Technology Innovation in Houston, Texas, allows integrated project teams to design, manufacture and test prototypes in a single workspace. A similar concept was integrated into our Artificial Lift Research and Technology Center in Claremore, Oklahoma, where this February we completed a \$60 million expansion. In May we opened our new Western Hemisphere Education Center in Tomball, Texas, which includes fluid, chemical, mechanical, and electrical science labs among its classrooms, workshops, nine training wells, operational rig, and Pressure Pumping pad.

These and other flagship technology centers are located in well-established energy production areas, but Baker Hughes expects and encourages innovation to come from anywhere in the company. Last year Baker Hughes launched a company-wide innovation contest, the Wildcat Challenge. The winners received a \$1 million budget and are now working to deliver functional prototypes of their ideas. We have invested hundreds of millions of dollars in infrastructure, including labs and other technical services, in states that are welcoming to new unconventional production, such as Louisiana, North Dakota and Pennsylvania. In those areas, our entry-level field engineers are placed in a three-year training program and empowered with design tools,



technical support and oversight that allow them to develop their ideas—from concept to prototype to commercial deployment. I have seen several engineers graduate from this program in the last few years with patents to their names, for technologies that Baker Hughes has deployed globally.

In short, at this moment, innovation in our sector presents endless opportunities for talented and motivated scientists, engineers and technicians. As we've all seen, this innovation and the accompanying increase in domestic oil and natural gas production mean opportunities for so many more beyond the lab. Thank you.