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The natural gas revolution – Scale, cost and uncertainty

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Over the past decade, the natural gas industry landscape in North America has undergone tremendous change. The focus of exploration and production has shifted from “conventional” to “unconventional” resources, and in particular to shale formations. The fact that some shale formations contain significant volumes of gas-in-place has been known for as long as gas production has taken place – these rocks have always been viewed as the source rock for conventional gas resources. What changed over the past decade is that it became possible to recover this gas directly from the source rock at economically attractive production rates. Horizontal drilling and hydraulic fracturing technologies were key to these developments. This presentation will describe how the unlocking of shale gas through horizontal drilling and fracturing has changed perspectives regarding the scale of the overall recoverable natural gas resource in the United States. The potential impact of shale gas on the global gas resource will also be described. The results of volumetric assessments of recoverable shale gas will be presented and the critical issue of uncertainty surrounding these estimates will be highlighted. The economics of shale gas relative to conventional resources in the United States will be described, and this will be compared with the economics of gas elsewhere in the world. In discussing the economics of shale gas, the very important issue of intra and inter-play well-to-well performance variability will be highlighted. The presentation will also describe some of the major environmental concerns that surround that shale gas production. The issue of water intensity in hydraulic fracturing operations will be examined, as will the concerns regarding surface and subsurface water contamination. The debate regarding the GHG footprint of hydraulic fracturing operations will be described and an assessment of “potential” and “actual” fugitive methane emissions from hydraulic fracturing operations in the major U.S. shale plays will be presented.