Incorporating Geologic Insights into Shale Gas Assessments

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Economic decisions on unconventional hydrocarbon accumulations such as shale gas are extremely sensitive to recovery factor and production rates, both of which are typically tied to a specific development program. Unfortunately, many critical business decisions must be made well in advance of having such information available. Decisions regarding play entry and acreage acquisition often must be made with little or no local production information. Nevertheless, such decisions should be constrained by as much of the available geologic information as possible.

Play assessment provides a powerful mechanism for integrating geologic knowledge into relevant business decisions. To help incorporate the unique aspects of unconventional analyses, we apply a hybrid grid and polygon based approach. The play is subdivided into a series of analysis polygons that provide the basis for probabilistic calculations. The polygon boundaries can be dynamic (mapped geologic limits), static (leases), arbitrary, or some combination of these. Polygons should be defined at a granularity that captures, but does not overwhelm, regional trends. Geologic properties that can be mapped and represented as grids (e.g., gross thickness, net-to-gross, or porosity) are evaluated within each analysis polygon to obtain inputs for the probabilistic assessment. Properties that are not available as spatially varying estimates (e.g., recovery factor) can be assigned directly with appropriate ranges of uncertainty. Resource uncertainty can be captured as ranges around a mean value and within different geologic or operational scenarios. Risk dependency and volumetric correlation relationships must be defined to obtain a robust probabilistic aggregation of multiple analysis polygons. Fully probabilistic results lead to better informed business decisions by providing information on highside and lowside outcomes. The grid-based assessment approach ensures that the results incorporate and are consistent with local geologic understanding.