Coalbed Methane in Wyoming

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ABSTRACT

Biogenic or thermogenic coalbed methane may exist in all of Wyoming's coal fields. Biogenic methane is derived from microbial action on low-rank coals that has occurred at relatively shallow depths and at low temperatures prior to thermogenic methane generation by devolatilization. Thermogenic methane is derived from higher temperature coalification and is associated with higher rank coals that have been or are presently more deeply buried—and (or) have been more thermally metamorphosed—than low-rank coals.

Biogenic methane is found at relatively shallow depths both in coalbeds and in sandstone reservoirs associated with coalbeds. Although much of this methane occurs in thermally immature, low-rank coals with low gas yields—usually less than 100 CF/T (3.1 cc/g)—the great number of coals and the exceptional thicknesses of some in Wyoming's coal-bearing areas indicate a large in-place methane resource. The most significant quantity of biogenic methane occurs in shallow Tertiary coalbeds (and associated sandstones) in the Powder River Coal Field, where production of the methane is now occurring.

Thermogenic coalbed methane probably exists in many Wyoming coal fields, where Cretaceous and some Tertiary coalbeds buried in the structurally deep parts of sedimentary basins have become more thermally mature (higher in rank) and have generated large volumes of methane. This methane has become trapped either in the coal or in reservoir rocks associated with the coal. Although these higher rank coals usually are not as thick as low-rank coals, their methane content probably is higher, exceeding 500 CF/T (15.6 cc/g) in western Wyoming. Exploration for thermogenic methane is occurring in many Wyoming coal fields. and production of methane from coal has been reported on the northern flank of Rock Springs uplift and in southeastern Washakie basin.

Our estimate of in-place coalbed methane resources in Wyoming ranges from 7.25 to 145.0 TCF (0.205×10^{12} to 4.1×10^{12} m^3). The wide range of this estimate reflects very limited data on the gas content of coalbeds and assumes that the statewide gas content of all coal is between 5 and 100 CF/T (0.2 and 3.1 cc/g). If only a small part of this resource can ultimately be recovered, the volume of methane in coalbeds is still quite large. This coalbed methane resource has the potential of becoming a significant contribution to Wyoming's energy industry.