

Volumes, Uncertainty and Costs of Undiscovered Arctic Petroleum

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Undiscovered Arctic petroleum is one of the greatest remaining uncertainties of future energy supply. Most land areas north of the Arctic Circle have been at least partially explored, but the continental shelves are largely undrilled. Using a geology-based methodology, the U.S. Geological Survey has assessed the area north of the Arctic Circle. The Circum-Arctic Resource Appraisal (CARA) comprises three parts: (1) compilation of a geological map of sedimentary successions that are prospective for petroleum, (2) probabilistic assessment of undiscovered technically recoverable resources, and (3) appraisal of the costs to find, develop, and deliver the resources to market. Based on the new mapping, the Arctic was subdivided into 69 assessment units (AUs), 49 of which were quantitatively assessed. The CARA results suggest that approximately 30% of the world's undiscovered conventional gas and 13% of the world's undiscovered conventional oil might remain to be found in the Arctic, most of it offshore under less than 500m of water. The resources are unevenly distributed; billion BOE-plus oil or gas accumulations are predicted at a 50% probability in the South Kara Sea, the Barents Sea, East and West Greenland, the Mackenzie Delta, the Chukchi and Beaufort Seas, the Lena River Delta, and the Yenisey-Khatanga basin. Undiscovered natural gas is three times more abundant than oil and concentrated in Russian territory, where some of the world's largest conventional gas accumulations may still be found. The costs of finding, developing and delivering the yet-to-find resources are expected to be among the highest in the world. About half of the undiscovered Arctic oil can be delivered at 2008 costs of \$300/barrel. Successful Arctic exploration will need to account for both geological and economic uncertainty.

Speaker Biography: Dr. Donald L. Gautier is a geologist with the Energy Resources Program of the United States Geological Survey. Born in Los Angeles, he holds a Ph.D. in geology from the University of Colorado and worked for Mobil Oil Corporation before joining the USGS in 1977. He is the author of more than 200 publications, many of which concern evaluation of undiscovered oil and gas resources. Gautier leads the USGS World Energy Project and was the principal investigator for the recently-completed USGS Circum-Arctic Resource Appraisal. His residence is in Palo Alto, California.