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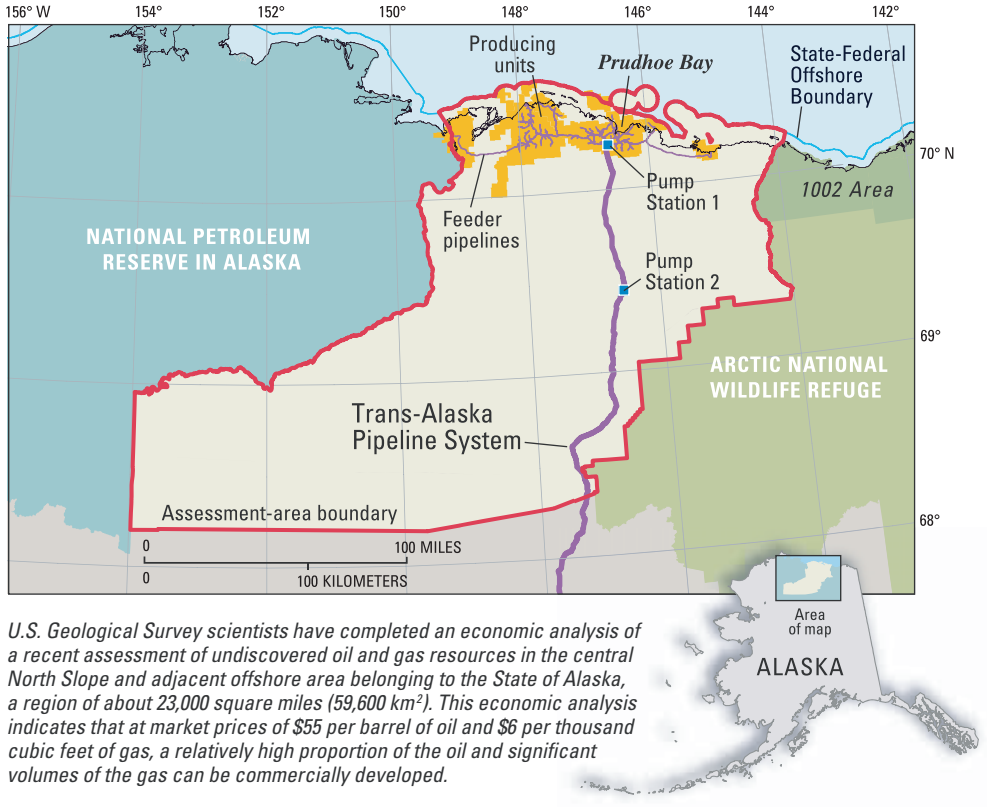
National Assessment of Oil and Gas Fact Sheet

Economic Analysis of Undiscovered Oil and Gas of the Central North Slope of Alaska, 2005

The U.S. Geological Survey (USGS) has completed an economic analysis of a recent assessment of undiscovered oil and gas resources of the central North Slope of Alaska. This economic analysis indicates that at market prices of $55 per barrel of oil and $6 per thousand cubic feet of gas, a relatively high proportion of the oil and significant volumes of the gas can be commercially developed.

Introduction

In 2005, the U.S. Geological Survey (USGS) completed a new assessment of undiscovered, technically recoverable oil and gas resources of the central North Slope of Alaska. The assessment area, which lies east of the National Petroleum Reserve in Alaska and west of the Arctic National Wildlife Refuge, extends from the State-Federal offshore boundary southward to the Brooks Range and includes all onshore lands and lands underlying adjacent Alaska State waters. Past petroleum discoveries in this area have already yielded a production of about 15 billion barrels of hydrocarbon liquids, and a recoverable resource of more than 35 trillion cubic feet (TCF) of gas has been identified to date.



U.S. Geological Survey scientists have completed an economic analysis of a recent assessment of undiscovered oil and gas resources in the central North Slope and adjacent offshore area belonging to the State of Alaska, a region of about 23,000 square miles (59,600 km²). This economic analysis indicates that at market prices of $55 per barrel of oil and $6 per thousand cubic feet of gas, a relatively high proportion of the oil and significant volumes of the gas can be commercially developed.

Recently, USGS scientists prepared an economic analysis of this new resource assessment, based on the general location, size-frequency distribution, and estimated volume and depth of undiscovered but technically recoverable oil and nonassociated gas accumulations. The assessment predicted that most undiscovered oil would occur in the northern and central parts of the assessment area in accumulations smaller than 128 million barrels—smaller than most current standalone oil fields on the North Slope. Commercial development of such small fields will almost certainly require strategies that include sharing of processing facilities with existing oil fields. The assessment further predicted that most undiscovered gas would occur in the central and southern parts of the assessment area in accumulations smaller than about 1.5 TCF, located at some distance from existing infrastructure.

In the economic analysis, calculations of the probable cost of gas production were based on an industry evaluation of the proposed route for the Alaska Natural Gas Transportation System (ANGTS) pipeline. Starting at a gas-processing

Summary of the 2005 U.S. Geological Survey assessment of undiscovered oil and gas resources of the central North Slope of Alaska, showing volumes of technically recoverable oil, associated gas, and natural-gas liquids (NGLs) in undiscovered oil accumulations and technically recoverable nonassociated gas and natural-gas liquids in undiscovered gas accumulations at 95% (95th fractile) probability, mean (expected value), and 5% (5th fractile) probability of occurrence of at least that amount. BBO, billion barrels of oil; TCF, trillion cubic feet; BBL, billion barrels of liquids.

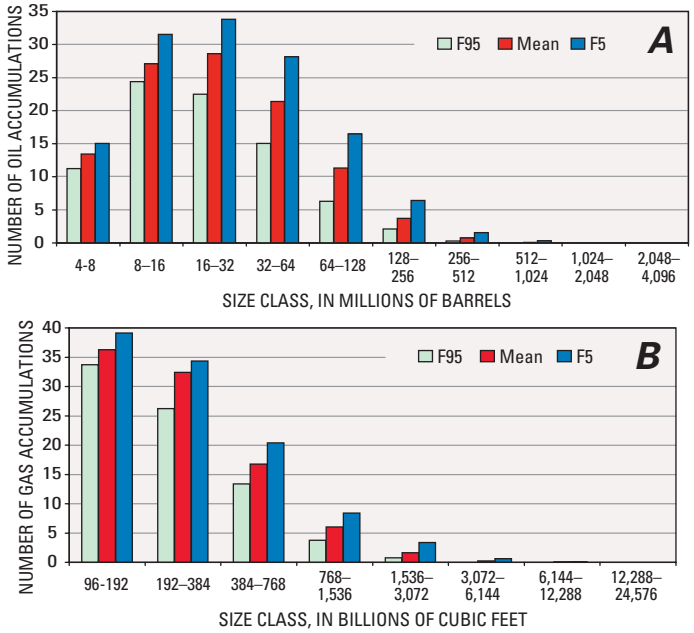
Resources	95th fractile	Mean	5th fractile
Oil accumulations:			
Oil (BBO)	2.57	3.98	5.85
Associated gas (TCF)	2.68	4.20	6.09
NGLs (BBL)	0.05	0.09	0.14
Gas accumulations:			
Nonassociated gas (TCF)	23.9	33.3	44.9
NGLs (BBL)	0.28	0.39	0.52

plant near Pump Station 1 in the Trans-Alaska Pipeline System (TAPS), this route would follow the TAPS right-of-way southward to Fairbanks and then trend southeastward to Caroline, Alberta, Canada. The ANGTS pipeline is expected to take 10 years to construct. Because of uncertainties in the timing, development cost, and transportation of newly discovered gas, the analysis was based on two scenarios which assume that pipeline access will be obtained either 10 or 20 years after initial discovery. The net present value of commercial gas discoveries was discounted for the timelag between discovery and startup in each of these scenarios.

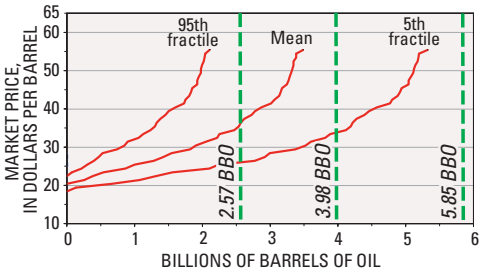
Economic Analysis

The USGS economic analysis estimated the amounts of undiscovered oil and nonassociated gas that could be commercially developed at particular market prices based on the incremental costs of finding, developing, and transporting the oil and gas to market, including an aftertax 12% rate of return. All calculations and costs were in constant 2003 U.S. dollars.

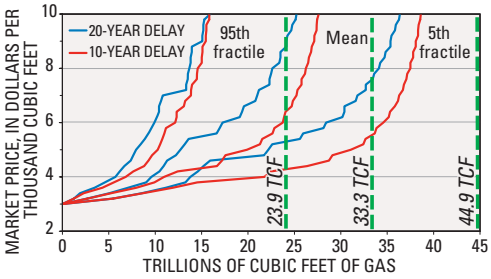
The plot for economically recoverable oil shown here considers that at relatively high market prices, an increase in the commercial value of natural gas has a small but positive effect on the volume of economically recoverable oil. Note that if gas is assigned no commercial value, above a market price for oil of $40 per barrel the curves are shifted by about 2% to 4% to lower volumes. This plot assumes sharing of processing facilities with adjacent oil fields, thus permitting development of smaller oil accumulations. At a market price for oil of $55 per barrel, economically recoverable oil thus represents 79% to 88% of technically recoverable oil.



Size-frequency distributions of the estimated number of accumulations of undiscovered oil (A) and gas (B) associated with 95% (F95, 95th fractile), mean, and 5% (F5, 5th fractile) probabilities of occurrence of at least that amount in the central North Slope assessment area of Alaska.



Summary of undiscovered economic oil resources in the central North Slope assessment area of Alaska. Each red curve relates the market price (in 2003 U.S. dollars) to the estimated volume of economic resources, while the green dashed vertical bars represent the volumes of technically recoverable oil, providing upper limits to the volume of economically recoverable oil. Thus, at a market price of $40 per barrel, at the 95th-fractile resource estimate representing a 95% occurrence probability of at least 2.57 billion barrels of oil (BBO), 1.6 BBO is economic. Similarly, at the 5th-fractile estimate representing a 5% occurrence probability of at least 5.85 BBO, 4.6 BBO is economic; and at the mean estimate of 3.98 BBO, 2.9 BBO is economic.



Summary of undiscovered economic nonassociated gas resources in the central North Slope assessment area of Alaska. The economic analysis assumed that gas is valued (in 2003 U.S. dollars) at two-thirds that of oil, and the present value of gas was discounted for delays in pipeline availability of 10 years (red curves) and 20 years (blue curves), while the green dashed vertical bars represent volumes of technically recoverable gas, providing upper limits to the volume of economically recoverable gas. Thus, at a market price of $6 per thousand cubic feet with a 10-year delay in pipeline availability, at the 95th-fractile resource estimate representing a 95% occurrence probability of at least 23.9 trillion cubic feet (TCF) of gas, 12 TCF is economic. Similarly, at the 5th-fractile estimate representing a 5% occurrence probability of at least 44.9 TCF of gas, 34.5 TCF is economic; and at the mean estimate of 33.3 TCF of gas, 24 TCF is economic.

The plot for economically recoverable gas reflects the results of analyzing the two scenarios of pipeline access and discounting to net present value. Even though the proportion of economically to technically recoverable gas is low, significant amounts of economically recoverable gas would still be present. However, more than 25 TCF of stranded gas is currently ready to market from existing oil fields on the North Slope at much lower cost than what it would take to discover and develop new gas accumulations.

Summary

An economic analysis of the new USGS assessment of undiscovered, technically recoverable oil and non-associated gas resources of the central North Slope of Alaska indicates that with modern production techniques (for example, horizontal development wells and sharing of processing facilities), a relatively high proportion of the undiscovered oil can be commercially developed. The gas analysis showed that significant volumes of the undiscovered gas are likely to be economic, in spite of moderate accumulation sizes, distance from infrastructure, and uncertainties about transportation.

This research reflects ongoing efforts by USGS scientists to provide the Nation and its decisionmakers with reliable data as a basis for formulating future energy policy.

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For Further Information

Supporting geologic studies of total petroleum systems, assessment units, and the methodology used in the central North Slope resource assessment are in progress. Assessment results, including economic analysis, are posted on the USGS Energy Resource Program's Web site at URL
http://energy.usgs.gov/

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