

# **An Evaluation of the USGS World Petroleum Assessment 2000—Supporting Data**

Open-File Report 2007–1021

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By T. R. Klett, D.L. Gautier, and T.S. Ahlbrandt

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By T. R. Klett<sup>1</sup>, D.L. Gautier<sup>2</sup>, and T.S. Ahlbrandt<sup>1,3</sup>

## Introduction

In June 2000, the U.S. Geological Survey (USGS) published the results of a world petroleum assessment (exclusive of the United States), based on data current through 1995 (U.S. Geological Survey World Energy Assessment Team, 2000). The assessment included the volumes of undiscovered crude oil and natural gas estimated to have the potential to be added to reserves in a 30-year time frame (to 2025). Klett and others (2005) compared the actual additions to reserves as reported from January 1996 to December 2003 (IHS Energy, 2003) with those estimates, apportioned to the 1996–2003 period (27 percent of the 30-year time frame). The present report (1) provides tabular data, not included in the 2005 report by Klett and others, that support the graphical displays and (2) briefly summarizes the interpretations and conclusions presented in the 2005 report.

Approximately 28 percent of the additions to oil reserves by reserve growth and approximately 11 percent of the estimated undiscovered oil volumes that were estimated for the World Petroleum Assessment 2000 (U.S. Geological Survey World Energy Assessment Team, 2000) were realized in the 8 years since that assessment. Slightly more than half of the estimated additions to gas reserves by reserve growth and approximately 10 percent of the estimated undiscovered gas volumes were realized (fig. 1). Between 1995 and 2003, growth of oil reserves in previously discovered fields exceeded new-field discoveries as a source of global additions to reserves of conventional oil by a factor of about 3 to 1. The greatest amount of reserve growth for crude oil was in the Middle East and North Africa, whereas the greatest contribution from new-field discoveries was in Sub-Saharan

Africa (fig. 2). The greatest amount of reserve growth for natural gas was in the Middle East and North Africa, whereas the greatest contribution from new-field discoveries was in the Asia Pacific region (fig. 3). On an energy-equivalent basis, volumes of new gas field discoveries exceeded new oil field discoveries. The graphs are based on the data listed in tables 1 and 2.

## Data Sources

Field sizes, or recoverable oil and gas volumes, are the sum of cumulative production and remaining reserves. Field sizes used for the reserve-growth assessment in the USGS World Petroleum Assessment 2000 were from IHS Energy (1996). Although this database was released in the second quarter of 1996, only fields discovered before 1996 were analyzed. Recent field sizes used in the analysis of additions to reserves are reported by IHS Energy (2003). Most fields used in the World Petroleum Assessment 2000 are reported in the 2003 database, from which the contribution of reserve growth is calculated (see table 1).

Sizes of Canadian fields used in the USGS World Petroleum Assessment 2000 from NRG Associates (1995), which contained data for fields discovered through 1993. Additions to reserves from newly discovered fields and reserve growth are not included in our study because recent (2003) size data for these fields are unavailable. This exclusion, however, does not significantly affect the final results.

Oil and gas resources of the United States were not reassessed in the 2000 USGS World Petroleum Assessment and analysis of those resources is not included in our study.

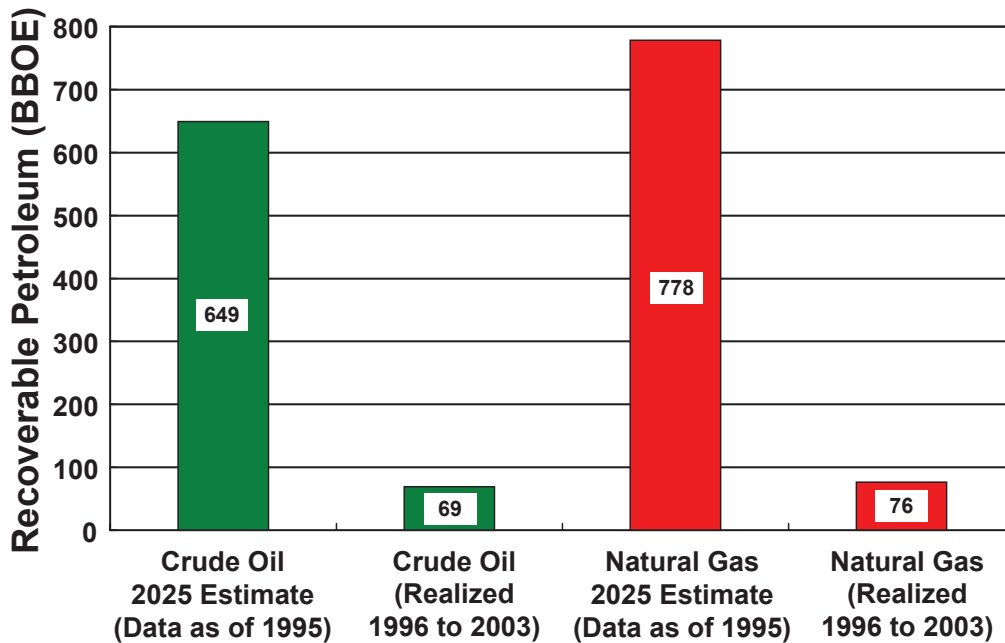
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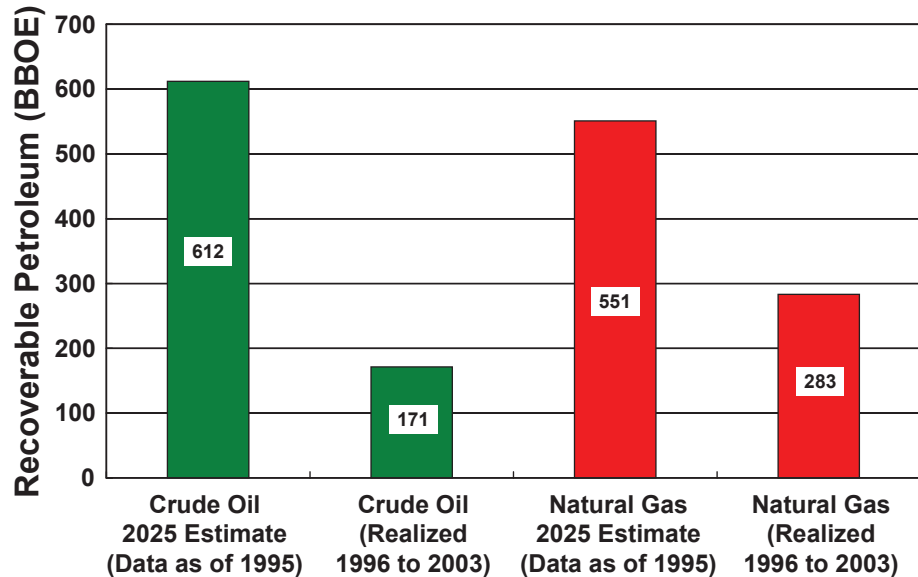
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## A. New-Field Discoveries

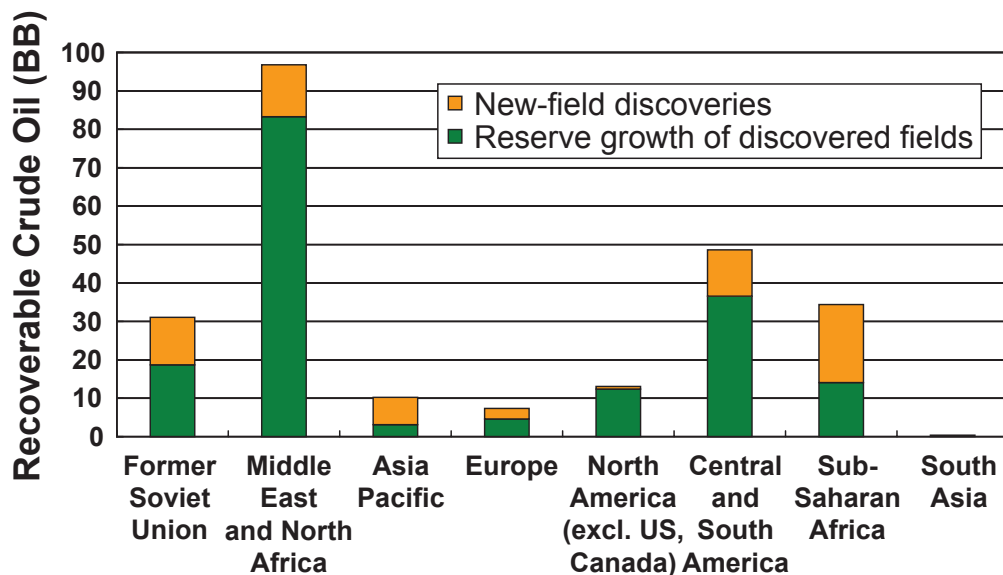


## B. Reserve Growth of Discovered Fields



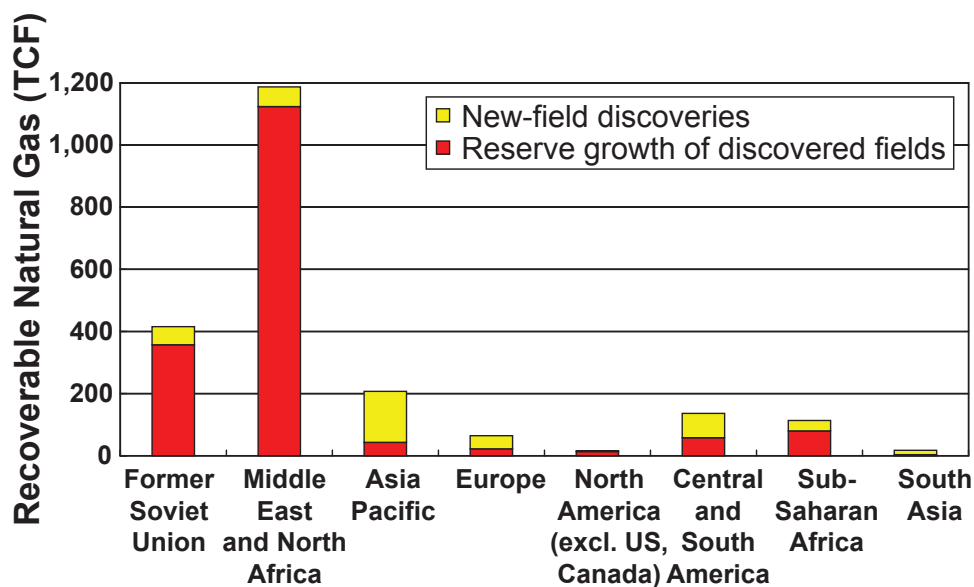
**Figure 1.** Realized additions to crude oil and natural gas reserves compared to volumes assessed in the World Petroleum Assessment 2000 (U. S. Geological Survey World Energy Assessment Team, 2000). Reserve additions are from January 1996 through December 2003 for the 128 provinces assessed. (A) realized volumes added by the discoveries of new fields and volumes assessed through 1995. (B) Realized and assessed volumes added by reserve growth. Approximately 28 percent of the assessed estimated volume additions to oil reserves by reserve growth and 11 percent of the assessed estimated undiscovered oil volumes were realized in the 8 years since the assessment (27 percent of the 30-year time frame for the assessment). Approximately 51 percent of the assessed estimated volume additions to gas reserves by reserve growth and 10 percent of the assessed estimated undiscovered gas volumes were realized. Volumes are shown in billion barrels of oil equivalent (BBOE). The volume of gas in trillion cubic feet (TCF) was converted to BBOE by dividing with an energy-equivalent factor of 6. Data for graphs are provided in table 1.

## Additions to Crude Oil Reserves



**Figure 2.** Additions to crude oil reserves, in billions of barrels (BB), from January 1996 through December 2003 by regions as identified by the World Petroleum Assessment 2000 (U. S. Geological Survey World Energy Assessment Team, 2000). The greatest amount of reserve growth was in the Middle East and North Africa, whereas the greatest contribution from new-field discoveries was in Sub-Saharan Africa. Data for graph are provided in table 2.

## Additions to Natural Gas Reserves



**Figure 3.** Additions to natural gas reserves, in trillions of cubic feet (TCF), from January 1996 through December 2003 by regions as identified by the World Petroleum Assessment 2000 (U.S. Geological Survey World Energy Assessment Team, 2000). The greatest amount of reserve growth was in the Middle East and North Africa, whereas the greatest contribution from new-field discoveries was in the Asia Pacific region. Data for graph are provided in table 2.

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**Table 1.** Assessed and realized crude oil, in billions of barrels (BB), and natural gas, in trillions of cubic feet (TCF), for the 128 provinces assessed in World Energy Assessment 2000 (U. S. Geological Survey World Energy Assessment Team, 2000). BBOE, billion barrels of oil equivalent.

Commodity	Reserve growth	New-field discoveries
Assessed natural gas (to 2025) BB	612	649
Crude oil realized, 1996 to 2003, BB	171	69
Assessed natural gas (to 2025) TCF	3305	4669
BBOE	551	778
Natural gas realized, 1996 to 2003 TCF	1699	458
BBOE	283	76

**Table 2.** Additions to crude oil reserves, in billions of barrels (BB), and to natural gas reserves, in trillions of cubic feet (TCF), from January 1996 through December 2003 (8 years, 27 percent of the 30-year time frame for the assessment) for the 128 provinces assessed in World Petroleum Assessment 2000 (U. S. Geological Survey World Energy Assessment Team, 2000). Numbers may not precisely add to totals due to rounding.

USGS region*	Reserve growth	New-field discoveries
	<b>Crude oil (BB)</b>	
Former Soviet Union	18.68	12.40
Middle East and North Africa	83.27	13.54
Asia Pacific	3.09	7.14
Europe	4.57	2.78
North America (excl. U.S. and Canada)	12.37	0.70
Central and South America	36.54	12.07
Sub-Saharan Africa	14.12	20.33
South Asia	-1.37	0.37
Total	171.28	69.33
	<b>Natural gas (TCF)</b>	
Former Soviet Union	357.14	58.54
Middle East and North Africa	1123.56	63.58
Asia Pacific	42.85	164.30
Europe	21.62	42.51
North America (excl. U.S. and Canada)	13.25	2.79
Central and South America	57.59	78.49
Sub-Saharan Africa	79.67	33.81
South Asia	2.99	14.33
Total	1698.66	458.35

\*Represents only those geologic provinces assessed in each region



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