

USGS World Petroleum Assessment 2000

New estimates of undiscovered oil and natural gas, natural gas liquids, including reserve growth, outside the United States

Oil and Gas Assessments of the World

Oil and natural gas account for approximately 63 percent of the world's total energy consumption. The U.S. Geological Survey periodically estimates the amount of oil and gas remaining to be found in the world. Since 1981, each of the last four of these assessments has shown a slight increase in the combined volume of identified reserves and undiscovered resources. The latest assessment estimates the volume of technically recoverable conventional oil and gas that may be added to the world's reserves, exclusive of the United States, in the next 30 years. The USGS World Petroleum Assessment 2000 reports an increase in global petroleum resources, including a 20-percent increase in undiscovered oil and a 14-percent decrease in undiscovered natural gas compared to the previous assessment (*table 1*). These results have important implications for energy prices, policy, security, and the global resource balance.

Table 1. Volumes of undiscovered world petroleum, by commodity, from this assessment and the previous USGS assessment.

[Values are mean estimates and are exclusive of the United States]

Commodity	USGS 1994 Assessment ¹	USGS 2000 Assessment
Oil	539 billion barrels	649 billion barrels
Natural gas	915 BBOE ²	778 BBOE
Natural gas liquids	90 BBOE	207 BBOE
Total	1544 BBOE	1634 BBOE

¹Masters, C.D., Root, D.H., and Turner, R.M., 1997, World of resource statistics geared for electronic access: *Oil & Gas Journal*, v. 95, no. 41, October 13, p. 98-104.

²BBOE = billion barrels of oil equivalent

Table 2. Potential reserve growth by commodity, for the world.

[Values are mean estimates and are exclusive of the United States]

Commodity	Volume
Oil	612 billion barrels
Natural gas	551 BBOE (3,305 trillion cubic feet)
Natural gas liquids	42 BBOE

Assessment Results

Since oil became a major energy source about 100 years ago, about 539 billion barrels of oil has been produced outside the United States. The USGS estimates the total amount of undiscovered, technically recoverable, conventional petroleum—oil, gas, and natural gas liquids combined—outside the United States, to be about 1634 billion barrels of oil equivalent (BBOE) (*table 1*). Of this total, conventional oil is 649 billion barrels, natural gas is 778 BBOE, and natural gas liquids (NGL) is 207 BBOE. This is the first USGS world petroleum assessment to include estimates of reserve growth. Reserve growth estimates nearly equal those of undiscovered resources. Reserve growth results from a variety of sources, including technological advancement in exploration and production, increases over initially conservative estimates of reserves, and economic changes. In addition to the undiscovered resources, approximately 612 billion barrels of oil, 551 BBOE of natural gas, and 42 BBOE of NGL are anticipated from reserve growth (*table 2*).

Methods Used in This Assessment

The USGS World Petroleum Assessment 2000 is the first of its kind to rigorously document the geologic foundation for estimating undiscovered petroleum resources for the world. For the USGS World Petroleum Assessment 2000, the world was divided into approximately 1,000 petroleum provinces, based primarily on geologic factors. (These provinces were grouped into eight regions roughly comparable to the eight economic regions defined by the U.S. Department of State and used in *table 3*.) Significant petroleum resources are known to exist in 406 of these provinces. Geologists analyzed 159 total petroleum systems (TPS) containing 270 assessment units (AU) and formally assessed 149 TPS and 246 AU, located in parts of 128 provinces. The assessed provinces account for 95 percent of the world's historic production and include both significant established (priority) and prospective (boutique) provinces. The methodology was thoroughly reviewed by partners in industry, government, and professional associations.

Regional Distribution of Undiscovered Conventional Oil and Gas Resources

Although the total volume of undiscovered petroleum for the world shows a modest 5-percent increase over the previous assessment, the resource volumes by commodity and their regional distribution have shifted significantly (*table 3*). The assessment results (exclusive of the United States) indicate that the Middle East and North Africa region contains 35.4 percent of the world's undiscovered conventional oil; the former Soviet Union contains 17.9 percent; and the Central and South America region contains 16.2 percent. For undiscovered conventional natural gas (exclusive of the United States), the former Soviet Union holds 34.5 percent of the world's total; the Middle East and North Africa region holds 29.3 percent. For both oil and natural gas, a significant part of the undiscovered resources outside the Middle East lie offshore in water as deep as 4000 m.

Products

The final report (USGS Digital Data Series 60) was released at the World Petroleum Congress in Calgary, Canada, in June 2000. Supporting geological data have already been released for the former Soviet Union, Africa, the Arabian Peninsula, South Asia, the Asia-Pacific region, South America, and Iran.

Additional information and contacts may be found at: <http://energy.cr.usgs.gov/oilgas/wep/>

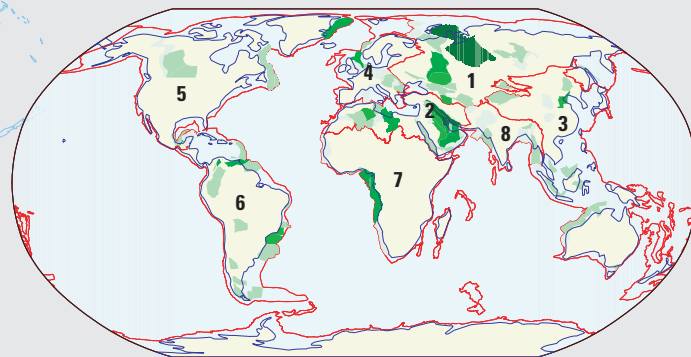


Figure 1. Oil endowment (cumulative production plus remaining reserves and undiscovered resources) for provinces assessed. Darker green indicates more resources.

Contacts

Thomas S. Ahlbrandt, Project Chief
World Energy Project, Denver, CO
(303) 236-5776 ahlbrandt@usgs.gov

Brenda S. Pierce, Program Coordinator,
Energy Resources Program, Reston, VA
(703) 648-6421 bpierce@usgs.gov

Vito Nuccio, Chief Scientist,
Energy Resources Team, Denver, CO
(303) 236-1654 vnuccio@usgs.gov

Table 3. Volumes of undiscovered oil and natural gas for assessed areas, by region, including percentages of world totals.

[Values are mean estimates and are exclusive of the United States]

Region	Oil (billion barrels)	Percent of world total	Natural gas (billion barrels of oil equivalent)	Natural gas (trillion cubic feet)	Percent of world total
1: Former Soviet Union	116	17.9	269	1611	34.5
2: Middle East and North Africa	230	35.4	228	1370	29.3
3: Asia-Pacific	30	4.6	63	379	8.1
4: Europe	22	3.4	52	312	6.7
5: North America	70	10.9	26	155	3.3
6: Central and South America	105	16.2	81	487	10.4
7: Sub-Saharan Africa and Antarctica	72	11.0	39	235	5.0
8: South Asia	4	0.6	20	120	2.6
Total	649		778	4669	