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Caspian Oil and Gas: Production & Prospects¹

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Summary

There is a prospect of exceedingly large reserves of crude oil and natural gas in the Caspian Sea region, and a consequent large increase in the production of oil and gas from that area. Because diversity of energy sources is a consideration in Congressional deliberations on energy policy, this prospect could play a role in policy discussions. However, there are notable obstacles to increases in Caspian Sea region production of oil and gas both now and in the future that may slow development.

The Caspian Sea is a 700-mile-long body of water in central Asia, landlocked between Azerbaijan, Iran, Kazakhstan, Russia and Turkmenistan. While not a littoral state,² nearby Uzbekistan is included by some as in the Caspian Sea region in view of its energy resources. Of the six countries, only Iran is a member of the Organization of Petroleum Exporting Countries (OPEC). Azerbaijan, Kazakhstan, Turkmenistan, and Uzbekistan are former members of the Soviet Union, which became independent in 1991. The Caspian Sea region historically has been an oil and gas producer, but many believe that the region contains very large resources of oil and gas capable of much greater output.

Current Production and Proven Reserves

The Caspian Sea region presently is a significant, but not major, supplier of crude oil to world markets, based upon estimates by BP Amoco and the U.S. Energy Information Administration, U.S. Department of Energy. The Caspian region produced an estimated 1.4–1.5 million barrels per day (bbls/day) including natural gas liquids in 2001, or 1.9% of total world output (table 1).³ More than a dozen non-Caspian countries each produce

¹ This report briefly updates parts of CRS Report RL30693, *Caspian Sea Region: Potential Oil and Gas Supply to World Oil Markets*, by Terry Rano Twyman. September 28, 2000. That report contains more extensive presentation and discussion of facts and issues.

² In this context, littoral means “situated on or near a shore,” as per *Merriam-Webster’s Collegiate Dictionary*, on line at www.m-w.com/cgi-bin/dictionary.

³ This report includes Uzbekistan in the Caspian Sea Region. In the cases of Iran and Russia, only output from areas near the Caspian Sea is included.

more than 1.5 million bbls/day. Caspian region production has been higher, but suffered during the collapse of the Soviet Union and the years following. Kazakhstan accounts for 55% and Azerbaijan for about 20% of current regional oil output.

Caspian region oil production emanates from proven (economically recoverable) reserves of 18-34 billion bbls, based upon BP Amoco, EIA, and Wall Street Journal estimates (table 2). This is equal to 1.8%–3.3% of total world proven reserves and comparable to U.S. and North Sea reserves of 22 billion and 17 billion bbls, respectively. The larger proportion of reserves than production could be taken to indicate that, even at present, there is potential for greater output. However, as suggested by analysis later in this report, there are obstacles to increases in production both now and in the future.

The Caspian Sea region's relative contribution to world supplies of natural gas is larger than that for oil. With gas output of about four trillion cubic feet per year (tcf/yr), it accounts for 4.7-4.8% of world production (table 1). As with oil, gas production has been higher, but suffered during the collapse of the Soviet Union and the following years. Uzbekistan and Turkmenistan are the heavily predominant producers; with production of 1.8-2.0 tcf/yr and 1.5-1.7 tcf/yr, respectively, they together account for 85-90% of the region's gas output, depending upon the estimating source.

Table 1. Oil and Gas Production in the Caspian Sea Region

Country	Crude Oil ^a (thousands of barrels per day)			Natural Gas (trillion cubic feet per year)		
	EIA 2001	BP Amoco 2000	EIA 2010 ^b	EIA 2000	BP Amoco 2000	EIA 2010 ^b
Azerbaijan	317	300	1,200	0.212	0.187	1.100
Iran ^c	- 0 -	n.a.	- 0 -	- 0 -	n.a.	- 0 -
Kazakhstan	804	745	2,000	0.170	0.378	1.100
Russia ^c	11	n.a.	300	0.030	n.a.	n.a.
Turkmenistan	148	150	200	1.660	1,547	3,900
Uzbekistan	152	175	n.a.	1.960 ^d	1.843	3.000 ^e
Total Caspian Sea ^f	1,450	1,400	3,900	4.050	4.000	9.100
WORLD	76,821	74,510	118,300	84.690 ^d	85.500	162.000

^a Includes natural gas liquids.

^b "Possible production," as estimated by the Energy Information Administration.

^c Only regions near the Caspian Sea are included. ^d 1999 data.

^e CRS projection assuming same rate of growth between 1999 and 2010 as between 1992 and 1999.

^f Rounded; in some cases, includes small quantities, estimated by author, for countries for which data are not available from the cited sources.

Sources: BP Amoco. *BP Statistical Review of World Energy, 2001*, June 2001; U.S. Department of Energy, Energy Information Administration (EIA). *Caspian Sea Region Country Analysis Brief*, February 2002; EIA. *Caspian Sea Region: Tables and Graphs*, February 2002; EIA. *International Energy Annual 1999*, February 2001; EIA. *International Energy Outlook 2002*, March 2002; EIA. *Uzbekistan Country Analysis Brief*, March 2001; EIA. [<http://www.eia.doe.gov>].

Also as with oil, the region's proven reserves of natural gas are a higher proportion of the world total than is its natural gas production. In some important instances, exploration efforts hoping to find oil have found almost entirely gas instead. Proven reserves of natural gas in the Caspian Sea Region total about 240-260 tcf, or 4.7%–4.9% of the world total. However, increases in Caspian Region gas production face obstacles somewhat similar to those that challenge further oil development and production.

Table 2. Estimates of Oil and Gas Reserves and Resources, 2000
(oil in billions of barrels; gas in trillions of cubic feet)

Region	Country	Proven Reserves ^a Oil/Natural Gas		Possible Reserves ^b Oil/Natural Gas
		EIA	BP Amoco	EIA
Caspian Sea Region	Azerbaijan	4-13/11	7/30	32/35
	Iran ^c	0.1 /- 0	n.a./n.a.	15/11
	Kazakhstan	10-18/65-70	8/65	92/88
	Russia ^c	2.7/n.a.	n.a./n.a.	14/n.a.
	Turkmenistan	0.6/101	0.5/101	80/159
	Uzbekistan	0.6/66	0.6/66	n.a.
	TOTAL	18-34/243-248	16/262	293/300
Reference Areas	United States	22/177	30/295	177/1,430 ^d
	North Sea ^e	17/68	n.a.	n.a..
	Saudi Arabia	264/220	262/214	n.a.
	OPEC	800/2,175	814/2,344	n.a.
	WORLD	1,017/5,150 ^f	1,046/5,304	n.a.

n.a. - Not available from sources listed below.

^a For Caspian Sea Region countries; defined by EIA as 90% probable.

^b Excludes proven reserves. For Caspian Sea Region countries, defined by EIA as 50% probable.

^c Only regions near the Caspian Sea are included.

^d For both oil and gas, technically recoverable resources.

^e Includes Denmark, Germany, Netherlands, Norway, and United Kingdom; data are as of January 1, 2002.

^f Data from *Oil & Gas Journal* (see citation below) as published in *EIA Annual Energy Review*.

Sources: BP. *BP Statistical Review of World Energy 2001*. June 2001; Penwell Publishing Company. *Oil & Gas Journal*. December 20, 1999; U.S. Department of Energy, Energy Information Administration (EIA). *Annual Energy Review 2000*, August 2001; *Caspian Sea Region: Tables and Graphs*, February 2002; EIA. *U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves, 2000 Annual Report*. December 2001; EIA. *North Sea Fact Sheet*, February 2002; EIA, *Saudi Arabia Country Analysis Brief*, January 2002; EIA. *Uzbekistan Country Analysis Brief*, March 2001;

Resource and Production Prospects

There is a likelihood of much greater additional reserves of crude oil and natural gas being found in the Caspian Sea Region. Much of the known reserves have not been developed yet, and development usually leads to discovery that prospects are larger than

originally believed. Moreover, many areas remain unexplored. The EIA estimates that there is a 50% chance that an *additional* 293 billion barrels in proven crude oil reserves are ascertainable,⁴ which would increase the present Regional total by 9 to 16 times. Proven reserves of this additional quantity would rival the amount now held by Saudi Arabia (table 2) and could come to 20-25% of total world proven reserves. Of course, there would be some depletion of reserves in the meantime; EIA estimates that Caspian Sea region oil production will more than double by 2010 – to about 3.9 million bbls/day.

Additional proven reserves of natural gas also are in prospect – a smaller gain in relative terms than in oil but still very large. EIA estimates that there is a 50% chance of an *additional* 300 tcf of natural gas reserves in the region – more than the present amount of regional proven reserves. Should this be the case, total Caspian region proven reserves of natural gas would double, and at least equal present U.S. and Saudi Arabian reserves combined even after accounting for depletion from likely production in the interim. EIA estimates that Caspian Region natural gas output will exceed nine 9 tcf by 2010.

Present and Prospective Markets

In view of the above, Caspian region countries potentially are large exporters of oil and gas. Caspian Sea region oil and gas has several markets now and a wider variety of potential markets. These include nations trying to meet their economies' demand for energy and those that also wish to reduce their dependence on Persian Gulf energy.

Now, nearly all Caspian crude oil goes west, largely via pipeline to and/or through Russia to European markets; some also goes by tanker through the Bosphorus straits to Western European markets via the Mediterranean sea. Caspian natural gas also mainly goes west through Russia. Russia collects transit fees on Caspian energy shipped through its transportation network, and sells its own oil and gas output to harder currency West European countries while sending Caspian product to countries with currencies in less demand (e.g., Eastern Europe). Also, because energy competes on a delivered-cost basis, reflecting transit fees, Caspian energy wellhead prices suffer. Caspian countries thus have incentives to avoid long transits through Russia in reaching European, and other, markets.

Caspian energy sources are attractive to Turkey: they are close and they offer an opportunity for Turkey to offset part of its energy import bill through transit fees it could charge for oil and gas shipments across its territory. Turkey's energy consumption is growing much faster than its production, making it a rapidly growing importer of both oil and gas; it already is a substantial market for Russian natural gas. Also, Turkey has very good relations with Caspian and Central Asian countries.

East Asian countries also are potentially attractive markets. Japan already imports a significant quantity of gas; China's proven oil and gas reserves are small compared with the potential size of its economy; and energy consumption in India and Pakistan is increasing rapidly.

⁴ *Caspian Sea Region: Tables and Graphs*, February 2002.

Challenges to Further Development

There are, however, inter-related geographical, political, economic, technological, legal, and psychological obstacles to the further exploration for and development of Caspian Sea region energy resources.

The Caspian Sea is landlocked and the surrounding nations are distant from the largest energy markets. Transportation must at least begin by pipeline, followed in many cases by tanker travel through the shallow and already congested Bosphorus straits. All pipelines from the Caspian region completed before 1997, except those in northern Iran, were routed to Russia and designed to link the former Soviet Union internally. The several pipelines now operating have sufficient capacity to handle present production, but very little more, as may be concluded from table 3.⁵ The completion of the CPC pipeline⁶ in 2001 from Kazakhstan's Tengiz oilfield to Novorossiisk (Russia) on the Black Sea is notable. The operating pipelines listed in table 3 have a total current capacity of about 1.2 million bbls/day, and there are plans to double that by 2015. However, *effective* current and future planned capacity of the CPC line, and that of others, may be constrained by limits on tanker passage through the Bosphorus.⁷ New pipelines to serve east Asian markets have economic potential but could be lengthy and entail transit through Afghanistan, Iran, and/or Pakistan. Routes to east Asian markets via Iran would include shipping via the Persian Gulf.

It is deducible from the above that deciding upon pipeline routes that have a reasonable assurance of security and are politically acceptable to parties with influence in the region are hurdles in the development of Caspian Sea region energy resources.

On the economic side, the longer the pipeline route, the less attractive it is to producers, other things being equal, inasmuch as energy competes on a delivered-cost basis and transit fees (based upon distance) effectively lower the wellhead price received by producers. Because transit fees are a source of revenue to governments, politics as well as economics come into play in pipeline route selection.

In addition, much of Caspian energy resources are offshore, requiring special large drilling rigs for offshore operations. Very limited rig production capacity in the relatively isolated region makes the acquisition of rigs expensive and logistically difficult, hampering development of Caspian energy resources.

⁵ Table 3 does not purport to be a complete list, but the locations and total capacity of other pipelines and means of transit are unsuitable and/or too small to adequately access target markets.

⁶ Caspian Pipeline Consortium.

⁷ Depth limitations, environmental considerations, and an already large amount of traffic have resulted in restrictions by Turkish authorities on ship travel through the Bosphorus straits. A planned pipeline from Baku (Azerbaijan) to Ceyhan (a Turkish Mediterranean Sea port) would be advantageous in that Ceyhan can handle very large carriers, while the ports of Supsa (Georgia) and Novorossiisk (Russia) are restricted to smaller tankers (which can transit the Bosphorus). Also, Ceyhan can remain open all year, whereas Novorossiisk is closed up to 2 months per year.

Full realization of the energy potential of the region also is impeded by the unresolved legal status of the Caspian Sea. Despite a number of efforts, there is no agreement among the littoral states that delineates ownership of the Sea's resources or their rights of development. Potential wealth from development heightens the stakes for each country, leading to conflicts over claims to promising regions.

Investment enthusiasm has slackened somewhat after the surge of production-sharing agreements during the early and mid 1990s. Some recent exploration efforts have had disappointing results, particularly with respect to oil. Somewhat reduced activity, from less investment, has reduced the rate of discovery, with a further psychological effect.

Despite the obstacles discussed above, energy development in the Caspian Sea region is proceeding and is likely to proceed further given the widely perceived prospect of very large energy resources in the Caspian Sea region. The pace of development, however, may be less rapid than might be the case with fewer hurdles.

Table 3. Capacities of Selected Oil Pipelines from Caspian Sea Region, 2001-2015

Pipeline	Route	Length (Miles)	Capacity (bbls/day)	
			2001/2002	2010/2015
Operating				
Atyrau-Samara	Atyrau, Kazakhstan, to Samara, Russia	432	310,000	310,000
Baku-Novorossiisk	Baku, Azerbaijan, to Novorossiisk, Russia/Black Sea (northern route)	868	100,000	300,000 (planned)
Baku-Novorossiisk	Baku to Novorossiisk via Dagestan, Russia	204	120,000	360,000 (planned)
Baku-Supsa	Baku to Supsa, Georgia/Black Sea	515	100,000	100,000
Caspian Pipeline Consortium	Tengiz oil field, Kazakhstan, to Novorossiisk Russia/Black Sea	990	565,000	1,340,000 (planned)
Under Construction, Planned, or Proposed				
Iran Oil Swap (under construction)	Neka, Iran, to Tehran, Iran, where oil will be swapped for equivalent amount at Persian Gulf coast.	208	105,000	150,000
Baku-Ceyhan (planned)	Baku to Tbilisi, Georgia, to Ceyhan, Turkey/Black Sea	1,040	1,000,000	1,000,000
Kazakhstan-Turkmenistan-Iran (proposed)	Kazakhstan to Kharg Island, Iran, on Persian Gulf, via Turkmenistan	930	1,000,000	1,000,000

Sources: Pennwell Publishing Company. *Oil & Gas Journal*, February 4, 2002; U.S. Department of Energy, Energy Information Administration (EIA), *Caspian Sea Region Country Analysis Brief*, February 2002; EIA. *Caspian Sea Region: Tables and Graphs*, February 2002; EIA. *Russia: Oil and Gas Export Pipelines*, October 2001.