Congressional Research Service

Report RS21626

Iraq Oil: Reserves, Production, and Potential Revenues

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April 24, 2006

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Order Code RS21626
Updated April 24, 2006

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Summary

Iraq's potential oil wealth remains largely unrealized. Substantial proven reserves exist, and there are likely more resources awaiting discovery. But oil production has been slow to fully recover during the post-Saddam period, and many obstacles stand in the way of achieving a stable export flow. Moreover, refineries are in need of rehabilitation, necessitating imports of gasoline and cooking fuel within Iraq.

Despite these difficulties, the existence of vast resources suggests easy exploitation and lucrative export earnings that could help fund Iraq's redevelopment. But the sheer resource size masks the difficulty, described in this paper, of generating export revenues that could fund reconstruction and development and offset several appropriations approved by Congress. This report will be updated as events warrant.

Iraq Oil Reserves and Production History. With 115 billion barrels of proven crude oil reserves, Iraq has the world's second-largest endowment of oil, amounting to 11% of the global total. Only 17 of 80 oil fields have been developed; the most significant are Kirkuk in the north and Rumaila in the south. There has been virtually no exploration for many years, suggesting that Iraq may have much more oil than currently estimated. Iraq also has significant proven natural gas reserves; virtually all are undeveloped. As a point of reference, Saudi Arabia, at 260 billion barrels of proven oil reserves, has the largest reserve base and can produce as much as 10.5 million barrels per day (mbd).

Iraq's peak production was realized just before its invasion of Kuwait. In July 1990, output reached 3.5 mbd, before exports were halted by an international boycott. After the first Gulf Crisis, oil production fell to about 500,000 barrels per day, an amount sufficient for domestic consumption. With the start of the U.N. Oil-for-Food program under Resolution 986 — first implemented in December 1996 — oil exports increased, although

oil flowed sporadically as a result of various disagreements between Iraq and its customers and/or the United Nations. During 1999-2001, production averaged 2.5 mbd.[1]

With the current situation, production virtually halted during the hostilities but began to recover after the fighting stopped. During 2005, stated output varied between 1.9 and 2.4 mbd; exports were as high as 1.6 mbd but averaged considerably less, as year-end difficulties reduced the flow to just over 1.0 mbd. Security issues periodically disrupted the flow of crude to the export terminal in the Persian Gulf; and exports via Turkey were virtually closed (and remain so) by repeated attacks on the pipeline from Kirkuk to Ceyhan.

Iraqi reserves, were they more intensively developed, could easily support much greater production. Amounts three times greater than Iraq's highest output — rivaling Saudi Arabia's production — could potentially be achieved with the application of up-to-date geophysics and substantial investment in field development and infrastructure. The Department of Energy (DOE) estimates that the cost of bringing oil production on line in Iraq is among the world's lowest, about $3-$5 billion per mbd of output.[2] Such potential productivity — reiterated by DOE in subsequent Country Reports — suggests that Iraq offers one of the world's best long-term petroleum prospects, with substantial output potentially flowing from relatively few, high-yield wells.

In contrast to a mature oil-producing province such as the United States, where 521,000 wells produce about 5.8 mbd,[3] Iraqi output comes from only 1,600 wells potentially able to produce almost 3 mbd. The comparison (U.S. wells average about 10 barrels per day, while Iraqi wells can average several thousand) points up the prolific nature of Iraq's hydrocarbon-bearing geology, and points toward easily realized production increases with the application of current reservoir management techniques, the drilling of additional wells, and infrastructure improvements.

Recent Production in Iraq. After the regime change, production — which virtually halted during the fighting — began to increase. Deferred maintenance and damage to wells, gathering facilities, refineries, and mainline transport facilities slowed the effort to restart production. Security issues and difficulties with electric power supply have proven to be hindrances. Some oil — about 200,000 to 300,000 barrels per day — is being re-injected into wells because of local refining and transport constraints in the northern fields around Kirkuk. In some instances refineries were stripping gasoline and propane fractions from crude and re-injecting the leftover petroleum. Among other considerations, this unusual measure poses a difficulty in determining how much net production is taking place.

There are several sources of data on Iraq's oil output and exports, which are discussed below. They show somewhat differing amounts, suggesting some uncertainty about exactly how much is being produced and how much is being sold internationally for cash earnings.

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[1] *Iraq Country Analysis Brief*, Aug. 2003, p. 4.

[2] *Iraq Country Analysis Brief*, Dec. 2005, p. 3.

[3] *International Petroleum Encyclopedia — 2003*, p. 219.

The Department of State's *Iraq Weekly Status Report* for March 23, 2005, reports mid-month production of 2.05 mbd, slightly below earlier months; the illustration containing this figure suggests that production averaged about 2.1 mbd during early 2005. State also notes that the Ministry of Oil's production goal is 2.5 mbd and that the recent pre-war peak output was 2.67 mbd.[4] State has export figures — accompanied by export revenues — that appear very precise; they are shown in **Table 1**, below.

Table 1. Iraq Crude Output and Revenues — Early 2006

Month	Exports (mbd)	Revenues (billions)
January	1.05	$1.84
February	1.47	$2.16
March	1.41	$1.82

Source: Department of State, *Iraq Weekly Status Report*, p. 21. Note that revenues are reduced by 5%, reflecting war reparations to Kuwait.

According to the DOE Energy Information Administration's December 2005 *Iraq Country Analysis Brief*, Iraqi gross crude oil production averaged about 1.9 mbd during 2005. But *Platts Oilgram News* reported that output began to decline after reaching 2.2 mbd during October, falling to 1.8 mbd in February 2005.[5] *Platts* currently estimates output at 1.85 mbd.[6] Among other factors, the decline in output reflects pipeline security issues in the Kirkuk area (northern Iraq), which have halted exports via Turkey. This crude would ordinarily be exported via the Mediterranean port of Ceyhan, or used in local refineries. Pipeline infrastructure has been off-line since December 2004,[7] with the exception of a few very small shipments. Thus, exports are limited to the output of southern oilfields around Basra, shipped by way of ports on the Arab Gulf.

The *Platts* article also cites challenging operational conditions at these facilities, noting that "Iraq's southern loadings have experienced repeated delays because of rough weather conditions, electricity outages, and pipeline problems, leading to a build-up of vessels waiting to lift Basra Light."

The Department of State reports March 2006 output of 2.05 mbd, but exports of 1.41 mbd. That is a difference of over 600,000 barrels per day, and appears difficult to substantiate. The State Department production figure is higher than the 1.800 to 1.850 mbd reported in *Platts* for November 2005 through February 2006.

Iraq's Domestic Fuel Needs. Domestic consumption in Iraq averaged about 500,000 barrels per day (b/d) before the most recent conflict, but current internal demand may be at least 100,000 b/d less. The domestic consumption picture is clouded by

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[4] *Iraq Weekly Status Report*, Mar. 23, 2005. See Figure 4, p. 18.

[5] "Country-by-Country Breakdown of Production," *Platts Oilgram News*, Mar. 9, 2005, p. 4.

[6] op cite, Mar. 9, 2006, p. 4.

[7] *"Iraq Loadings Hold Steady," Platts Oilgram News*, Mar. 22, 2005, p. 3.

refineries' inability to produce needed fuels, making it necessary to import gasoline and propane from other countries.

Iraq reportedly has nearly 600,000 b/d of refining capacity at eight facilities.[8] But because of looting, sabotage, deferred maintenance, and unreliable electric power supplies, refinery operations are insufficient for domestic needs. EIA notes that Iraqi refined product imports are costing the country $200-$250 million per month, not including government subsidies that result in a 10-cent-per-gallon pump price. DOE estimates that direct and indirect fuel subsidies cost Iraq $8 billion per year, "with no indication as to when this problem might be resolved."[9]

Despite Iraq's costly efforts to supply the civilian population through domestic refining and imports, the Department of State[10] reports a snapshot of the fuel supply situation in March 2006 showing shortfalls of some critical supplies, and surpluses of others. By late March, an increased flow of imports resulted in target supply levels being reached for each of the four key fuels (diesel, kerosene, gasoline, and LPG). While this is a positive indication, national stock levels — targeted at 15 days of supply for each fuel to minimize shortfalls — have not increased and remain well below the amounts called for.[11] With the exception of kerosene and diesel, more than half the fuel consumed was imported.

Long lines at gas stations are common, compounded by subsidized prices. Prices at government-owned stations are set at about 10 cents per gallon. Prices this low result in higher gasoline demand than would be seen were prices to be unregulated. And the combination of politically unpopular long lines and low "official" prices results in a thriving black market. Since much of this fuel is imported by the government, the cost of subsidizing fuel prices may well be a genuine, out-of-pocket cost to the Iraqi government.

Northern Oil Exports. Iraq's oil fields lie in both the northern and southern part of the country; the northern fields are located in the Kurdish-populated part of the nation. The Iraqi National Oil Company has historically been divided into northern and southern operating entities. Southern oil has been exported via Basra, and northern oil has been shipped to the Mediterranean port of Ceyhan, if and when the connecting pipeline is operational. The 600-mile Kirkuk-Ceyhan pipeline is actually two pipes — a 40-inch diameter pipe with a nominal capacity of 1.1 mbd (although DOE reports that 900,000 barrels per day was its practical maximum), and a parallel 46-inch pipe, with a nominal capacity of 500,000 barrels per day. It does not appear that the second line was ever used on a commercial basis. But, taken together, the theoretical capability of transporting 1.6 mbd of Iraqi crude to west-of-Suez oil markets exists.

The pipeline to Ceyhan was an important export route during the oil-for-food program. Sabotage and looting after the most recent fighting took this facility out of

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[8] *Iraq Country Analysis Brief*, Nov. 2004, p. 18-19.

[9] *Iraq Country Analysis Brief*, Dec. 2005. See section entitled Refining.

[10] *Iraq Weekly Status Report*, Mar. 23, 2005, p. 18.

[11] *Iraq Weekly Status Report*, Mar. 29, 2006, p. 23.

service in early 2003. It was at least partially repaired in 2004, and DOE notes that the pipeline was operating during late 2004 at a 300,000 to 500,000 barrels per day rate, "with significant repairs still required." Subsequent events caused shipments to stop during December 2004, and the pipeline still remains out of service. *Platts* noted that:

> Iraq has had to rely on its southern terminals for exports because crude flows from the northern Kirkuk fields have remained off line for three months. "There is still no security in the north," an Iraqi oil ministry official said. "We are unable to protect the northern pipeline network. Until the pipeline is secured, there will be no steady northern exports."[12]

As the new Iraqi government organizes, Parliament has elected a Kurdish political leader, Jalal Talabani, as President. Some analysts see this as a step toward establishing security in the region's oil fields and for the export pipeline. Were some of the revenues from the northern fields to be allocated to the local population — which is reportedly under negotiation — incentives to keep the oil flowing might be sufficiently focused to elicit pipeline protection from the Kurds. The oil pipeline mainly flows through Kurdistan Democratic Party (KDP) territory; The Barzani clan controls the KDP and most of the territory the pipeline crosses. Talabani is leader of the Patriotic Union of Kurdistan (PUK), a different Kurdish faction.

With the new government being formed, numerous issues may be headed toward resolution, including who will be minister of oil, and how oil export revenues might be allocated.

If the export pipeline to the Mediterranean were to be repaired and kept operational — and the oil fields around Kirkuk to produce as they have in the past — substantial revenues would likely result. At current world oil prices, now over $60 per barrel (bbl) for oil of this type located in the eastern Mediterranean, monthly revenues of up to $1.8 billion could result.

Iraqi Oil Production Potential. With 115 billion barrels of proven oil reserves, Iraq could potentially produce far more oil than has been realized in its history. Given a stable security situation, very large amounts of capital investment, and the involvement of one or more large oil companies, it would be realistic to suggest potential output ramping up to 5 or 6 million barrels per day over a period of several years. But, given current difficulties, it would seem that this sort of eventuality is far off.

Within the context of what might be achievable in a nearer time frame, we have calculated potential oil revenues under a variety of production and price scenarios that might be realized if the oil field and infrastructure security situation were to improve. Increased production is still dependent on resolution of security issues, improvement in oil production facilities, and infrastructure upgrades. **Table 2**, below, shows the results of these hypothetical calculations.

[12] "Iraq Loadings Hold Steady," *Platts Oilgram News*, Mar. 22, 2005, p. 3.

Table 2. Range of Possible Future Iraqi Annual Oil Export Revenues
($ billions)

Exports (mbd)	Rev. @ $40/bbl	Rev. @ $50/bbl	Rev. @ $60/bbl
1.0	$15	$18	$22
1.5	$22	$27	$33
2.0	$29	$37	$44
2.5	$37	$46	$55
3.0	$44	$55	$66
3.5	$51	$64	$77

Source: Author's calculations.

A wide range of possibilities is shown in Table 2, reflecting such unknowns as how quickly and to what extent Iraqi oil exports could be ramped up, and what the world price of oil might be at that time. While the potential to earn substantial export revenues is real, big revenue increases might be hard to achieve.

Northern Oil in the World Oil Market: A Concluding Note. World crude oil prices have been extremely high since the first months of 2005; at one point they reached $70 per barrel. The pricing situation reflects — among other factors — the balance between robust global oil demand and a tight supply situation, with little spare capacity. The addition of an incremental 800,000 barrels per day into this overheated market could have a substantial price impact, even though it would represent only about a 1% increase in total world output. This increment, were it to become available under current circumstances, might result in a noticeable decline in crude prices.