Order Code RS21626
September 29, 2003

Iraq Oil: Reserves, Production, and Potential Revenues

Lawrence Kumins
Specialist in Energy Policy
Resources, Science, and Industry Division

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 recover from the recent war, and many obstacles stand in the way of increasing exports beyond current minimal levels. And refineries are in need of rehabilitation, resulting in shortages of gasoline and cooking fuel within Iraq.

Notwithstanding 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 near-term export revenues that could offset the Bush Administration's $87 billion request for FY2004 supplemental appropriations to fund operations and reconstruction in Iraq. This report will be updated as events warrant.

Iraq Oil Reserves and Production

With 112 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 most recent peak production was realized just before the invasion of Kuwait. In July 1990, output reached 3.5 mbd, before exports were halted by an international boycott. Before the latest war, Iraq's production averaged 2.5 mbd. Current output is reportedly about 1.8 mbd.

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 geological technology 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.[1] Such potential productivity suggests that Iraq offers one of the world's best long-term petroleum prospects, with substantial output from relatively few wells, which suffer from deferred maintenance.

Iraq's July 1990 production peak of 3.5 mbd is a intermediate term production benchmark signifying a return to historic output levels, but it belies long-term potential, since the nation's oilfields are so underdeveloped. In contrast to a mature oil producing province, like the United States, where 521,000 wells produce about 5.8 mbd,[2] Iraqi output comes from only 1,600 wells capable of producing almost 3 mbd. The comparison – U.S. wells average less than 10 barrels per day, while Iraqi wells can average 11,000 – points up the prolific nature of Iraq's hydrocarbon-bearing geology, and point toward easily realized productions increases with the application of current geologic technology and the drilling of additional wells.

The chart of Iraqi oil output after the invasion of Kuwait suggests that the realization of Iraq's ultimate potential will require much work in the oilfields and significant new infrastructure. 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 on a stop-start basis as a result of various disagreements between Iraq and its customers and/or the United Nations. During 1999-2001, production averaged 2.5 mbd.[3]

After the regime change, production – which virtually halted during the fighting – began to increase very slowly. Damage to wells, gathering facilities, refineries, and mainline transport facilities slowed the effort to restart production. Security issues and difficulties with electric power supply were further hindrances. By August 2003, production was estimated at 1 million barrels per day, although some of that oil– about 200,000 to 300,000 barrels per day – was 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 poses a difficulty in determining how much actual production is taking place.

Current Exports and Near-term Potential

A substantial share of Iraq's current oil production is needed to meet domestic requirements, leaving relatively little for export in the immediate future. Domestic consumption in Iraq has historically averaged about 500,000 barrels per day, but current internal oil demand is not entirely clear. The domestic consumption picture is clouded by

---

[1] *Iraq Country Analysis Brief*, August 2003. Page 3.

[2] *International Petroleum Encyclopedia–2003*. Page 219.

[3] *Iraq Country Analysis Brief*, Aug. 2003. Page 4.

the refinery situation and an apparent need to import gasoline and propane from other countries. The Administration's supplemental funding request for Iraqi operations includes $900 million for fuel imports.[4]

Exports are actually flowing from the southern fields near Basra through the terminal at Mina al-Bakr on the Persian Gulf. Exports reportedly ran at 700,000 barrels per day during September, according to *Platts*.[5] No oil is currently being exported from the north because the pipeline to the Mediterranean port of Ceyhan in Turkey was sabotaged after a mid-August startup and is not currently operable.

Speaking in Vienna after the September 24, 2003, meeting of the Organization of Petroleum Exporting Countries (OPEC), Iraqi Oil Minister Ibrahim Bahr al-Ulum outlined the profile of Iraqi export volumes for the next few years. As quoted in *Platts*,[6] al-Ulum indicated that current output was 1.8 mbd, although 200,000 to 250,000 barrels per day were being reinjected. He said production would rise to 2.0 mbd by the end of 2003, and to 2.8 mbd by the end of March 2004. Further ahead, Iraq plans on reaching 3.5 to 4.0 mbd by the end of 2005, and 6.0 mbd by the end of the decade.

Based on known reserves, these plans are fully attainable. But they must be viewed with the understanding that 1 mbd is a very large amount of oil, and the processing facilities, pipelines, terminals, and other handling facilities required to move an amount this large call for considerable investment and construction, which may or may not be achievable in the time frame the Minister describes.

Current Export Revenues

Current oil exports from Basra are priced to sell in end-markets at figures that will allow purchasers to recoup transport costs. For October, the State Oil Marketing Organization (SOMO) has set prices for U.S.-bound crude equal to NYMEX prices for West Texas Intermediate (WTI), minus $5.20 per barrel.[7] For Europe-bound crude, the price is Brent crude minus $2.70 per barrel. This works out to a recent export (fob) price of $22 per barrel, although it is important to note that Iraqi export prices are designed to fluctuate with spot markets in New York and London. At these prices and volumes, Iraqi exports are currently generating about $15 million per day or $6 billion per year at an annualized rate.

The $22 price that Iraq currently receives is within the OPEC target price band of $22 to $28 per barrel. Iraq is a founding member of OPEC but has not participated in its deliberations since the Kuwait invasion. OPEC sets quotas excluding Iraq, although they are formulated with the presumption that Iraq will eventually participate. This may be happening. OPEC met on September 23 and 24, with Iraq in attendance, but not "participating." In a surprise move, OPEC voted to cut the production quota for the 10

---

[4] *Coalition Provisional Authority Request To Rehabilitate and Reconstruct Iraq*. Page 29.

[5] *Platts Oilgram Price Report*, Sept. 17, 2003. Page 4.

[6] *Platts Oilgram Price Report*, Sept. 25 2003. "Iraq to Double Oil Production to 3.5-4 mil b/d by End of 2005." Page 1.

[7] *Platts Oilgram Price Report*, Sept. 10, 2003. "Iraq Set To Release Oct Oil Prices." Page 1.

Cartel members with quotas by 900,000 barrels per day. This amount is seen as accommodating the return of Iraqi crude to international commerce, as well as possibly paving the way for Iraq's full participation in OPEC.

The Development Fund For Iraq

In March 2003, fighting began in Iraq, and the U.N. adjusted the oil-for-food program. On March 28, the U.N. Security Council in Resolution 1472 adjusted (and extended until November 21 under Res. 1483) the program, to facilitate the rebuilding of Iraq. A Development Fund for Iraq, held in the Central Bank, was established to be the repository of future oil revenue, and authority for the administration of ongoing activities was transferred to the Coalition Provisional Authority (CPA). During the oil-for-food program's phase-down period to November 21, 2003, the U.N. continues to identify and ship approved and funded humanitarian goods. Preparing to replace the U.N. program, the CPA has started to prioritize needs and secure the supply of necessary materials.

Export Revenues – Some Hypothetical Calculations

Many anticipate that Iraq's rebuilding and development will eventually be self-financed with oil revenues. Given large proven reserves, Iraq may ultimately achieve prosperity supported by crude exports. While it is tempting to begin anticipating revenue flows, much needs to be accomplished in terms of security and basic civil engineering projects like electric power and water supply. And oil field and infrastructure rehabilitation is needed before old production levels are realized and new production developed. In short, it may be premature to start predicting future oil revenues, even though large proven reserves suggest big revenue flows may be near at hand.

How much might these revenues be? Potentially large, but highly speculative. These estimates are based on assumptions on the amount of production that might actually be attainable, as well as the price that production might sell for. During the past 5 years, prices – ranging as low as $10 and as high as $40 per barrel – have fluctuated as much as Iraqi production. Beyond the normal churning of oil markets, the presence or absence of Iraqi oil is a factor in determining prices. Both prices and amounts exported present moving targets, and add risk to any computation of Iraqi oil revenues.

With this note of caution in mind, some purely hypothetical revenue estimates are shown in Table 1 below, based on assumed export volumes and prices at the upper and lower end of the OPEC price band, the target price range within which OPEC attempts to keep prices.

Table 1. Potential Iraq Crude Oil Annual Revenues
($ billions)

Exports (mbd)	Revenue @ $22/barrel	Revenue @ $28/barrel
1	8	10
2	16	20
3	24	31
4	32	41

Source: Author's calculations.

Iraqi Export Facilities

Export infrastructure issues are an important factor bearing on the amount of crude that can be exported. They are discussed extensively in the DOE Country Analysis Brief for Iraq, which is the source of much of the information discussed in this section. The export flow described above can be accommodated through the Mina al-Bar loading facility on the Persian Gulf, although further repairs might be needed to handle more oil. Primarily, exports have been via Mina al-Bar and the Kirkuk-Ceyhan pipeline crossing Turkey to the Mediterranean. Mina al-Bar was heavily damaged during the first Gulf War. It had an original nominal capacity of 1.6 mbd and is now capable of about 1 mbd of throughput. Given current export circumstances – it is effectively Iraq's only export facility – Mina al-Bar capacity places a cap on how much oil can be exported.

Another Persian Gulf export facility is located at Khor al-Amaya. But this facility was destroyed during the first Gulf War and has not operated since. The extent of restoration needed to make it operational is not known, but it appears that substantial repairs to one or both terminals must be accomplished if Iraqi Persian Gulf exports are to rise beyond 1 mbd.

Opening the pipeline to the Mediterranean is a key near-term export capacity consideration. The 600-mile Kirkuk-Ceyhan pipeline supported much of Iraq's oil-for-food exports. It actually consists of a pair of parallel pipes, although only the 40-inch diameter pipe – having a nominal capacity of 1.1 mbd – was used. The second pipe – with a diameter of 48 inches and a nominal capacity of 500,000 barrels per day – is reportedly inoperable. It may have never been in continuous service.

There were several attempts to operate the 40-inch diameter pipeline during August 2003, but the pipe was repeatedly sabotaged. It is not currently operable. Apparently, challenging security issues continue to keep the facility out of service, and there is no projected in-service date. Inability to successfully operate the Kirkuk-Ceyhan pipeline has effectively precluded export of crude from the important northern fields near Kirkuk, and stands as a barrier to increasing exports.

Iraq also has four other pipelines that have not been used for many years; little is known about their condition or what role – if any – they might play in increasing exports. Given the possibility of greater crude production, they represent substantial capacity to enhance exports, if they can be made operational. They are:

- The Strategic Pipeline, which consists of two 700,000 barrel per day capacity pipes to facilitate northern crude moving south to export terminals on the Persian Gulf, and for southern crude to move north to the Kirkuk-Ceyhan pipeline and onward to the Mediterranean. The system is in need of extensive repairs and modernization.

- During the Iran-Iraq war, a pipeline was built across Saudi Arabia to the Red Sea. With a nominal capacity of 1.65 mbd, the so-called IPSA line was closed during the first Gulf War and subsequently expropriated by Saudi Arabia.

- Iraq and Syria operated the 50-year-old Banias pipeline during 2001 and early 2003, between Kirkuk and the Mediterranean port at Banias. Reportedly, as much as 200,000 barrels per day was shipped. The current status of this facility is not known.

- Another old facility connects fields in Mosul in the north with Haifa, Israel. This pipe carried 100,000 barrels per day at one time, but it is not clear if it is still operable.

Iraqi Oil Industry Organization

Technocrats in the Iraqi National Oil Company and SOMO report to Thamer Gadban, Chief Executive of the Ministry of Oil, and Oil Minister al-Ulum. The National Oil Company manages production and refining, while SOMO handles export transactions. Monies received from these deals are deposited in the Development Fund for Iraq, described below.

Gadban and al-Ulum were appointed by the Iraqi Governing Council. Philip Carrol, a retired Shell executive, has served as the Coalition Provisional Authority's senior advisor to the Oil Ministry, and is now stepping down. His replacement, Robert McKee, a former ConocoPhillips executive, was announced September 22, 2003. Carrol was originally intended to head a global board of advisors that would ultimately be in charge of the Iraqi oil industry, but it was subsequently decided that Iraqi technocrats could carry on without extensive foreign input.

The Los Angeles Times reports:

> The decision was prompted in part by the reluctance of foreign oil company experts and prominent Iraqi expatriates to join the board. The expatriates expressed concern they would be perceived by Iraqis as agents of a U.S.-orchestrated takeover of the Iraqi industry. Some oil companies reportedly were reluctant to assign key personnel to the effort, fearing that their participation might sour future business deals in Iraq.[8]

[8] *Los Angeles Times*, "U.S. to Let Iraq Manage Its Oil," August 18, 2003. Page 1.