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Opening the Caspian Gateway

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Introduction

The Caspian basin is predicted by many observers to be one of the major sources of growth for world oil and gas production in the early part of this century. During the last decade, many major international oil companies have committed substantial investment sums to exploration and development of the potential of the area. Three major projects (Tengiz and Karachaganak in Kazakhstan, Azeri-Chirag-Guneshli in Azerbaijan) are currently at the development stage and should provide a first wave of new capacity in excess of 1.5 million barrels per day (mbpd), within the first 15 years of this century.

Further opportunities are likely to arise from the exploration of new structures as well as redevelopment of existing producing fields and undeveloped reserves. As and when these potential developments materialise, they will provide a second wave of growth in production and may well bring the Caspian area's output to levels comparable to that of the North Sea (6.2 million bpd in 1998). The first ripples of this second wave may soon be evident as the Offshore Kazakhstan International Oil Company (OKIOC) awaits the results of the first exploration well on the giant Kashagan structure in the Kazakhstan sector of the north Caspian Sea.

This increase in production will require significant investment in transportation to the international market, as the Caspian has no direct access to international waters. As a result, and despite very competitive development costs per barrel (bbl) compared to other areas, the ?chicken and egg? dilemma arises: develop transportation routes to support potential production or develop production to support transportation routes.

The three major projects currently under development offer a first step to resolve this dilemma. Tengiz and Karachaganak have secured the building of the bulk of their transportation requirements through the Caspian Pipeline Consortium (CPC) project. Azeri-Chirag-Guneshli is expected to select its ?Main Export Pipeline? shortly.

Aside from technical and geopolitical considerations, the ability to pool together production from several projects or even countries may be crucial to the selection and realisation of future export routes.

Historical production

The Caspian basin ranks as one of the major historical oil producing areas in the former Soviet Union. From the first oil discovery in Baku in Azerbaijan in the middle of the 19th century and in Atyrau in Kazakhstan in 1899, the area became the core source of Soviet production in the 1930s.

In 1940, Azerbaijan alone accounted for up to 70% of Soviet oil production. By 1990, production from the Kazakhstan, Azerbaijan, Uzbekistan and Turkmenistan republics had declined in total to 8% of Soviet Union production and 1.5% of world production. The Soviet Union had shifted its exploration and development focus to the ?new Bakus? in the Volga-Ural and, later on, to Western Siberia. In the Caspian area, production continued from existing sources, while potentially

more lucrative fields remained either undeveloped or trapped in an apparently endless process of appraisal.

Source: BP Amoco Statistical Review

In Kazakhstan, until the mid-1990s, production was mainly from the onshore post-salt properties, relatively shallow-depth reservoirs yielding heavy-to-medium crudes. The pre-salt structures, although typically associated with higher upfront costs and technical difficulties, yield very light crudes and are economically more attractive. The major onshore pre-salt structures were discovered in the 1970s, but languished at the stage of appraisal. The offshore structures, pre-salt and post-salt, were unexplored.

Similarly in Azerbaijan, production was focused on highly mature shallow water reservoirs, two of which accounted for 70% of the country's production until 1997. Deepwater fields, including potential giants, were left largely untapped.

Shift in exploration and development strategy underpinned by the new commitment of both the governments and the international oil industry

The region's exploration and development strategy has been fully re-appraised by all interested parties since the establishment of the Commonwealth of Independent States (CIS). Major international oil and gas companies, often working in large consortia, have committed to multi billion-dollar projects, which have either been initiated to rehabilitate existing producing fields or to develop unexploited reserves or explore prospective structures.

First wave of production increase now on track

An examination of the estimated production levels shows that the new projects will make a significant impact on current production levels.

? Kazakhstan: Tengiz and Karachaganak fuel the first wave of growth

Tengiz and Karachaganak have underpinned most of the increase in production in Kazakhstan oil production over recent years, and in mid 1999 accounted for 41% of the country's 640,000 bpd output.

A Joint Venture (JV) between Chevron, Kazakhoil, Mobil and Lukarco, Tengizchevroil has operated Tengiz since 1993. Tengizchevroil has increased the capacity from 30,000 bpd to the current 200,000 bpd and is now close to completing its Train 5 project, which will further increase production capacity to 240,000 bpd. On the basis of conservative market forecasts, the joint venture is expected to produce more than 700,000 bpd by the end of the decade. Significant upside factors, beyond this level, may include new appraisals and potential gas re-injection.

The Karachaganak Integrated Organisation (KIO) consortium formed by BG, ENI, Texaco and Lukoil, operates Karachaganak under a PSA signed in November 1997. Karachaganak differs from Tengiz, in that it is primarily a gas condensate reservoir, currently developed mainly on the merits of its liquid production. It is reported that the current phase of development will bring the capacity from the current 60,000 bpd to 200,000 bpd by late 2001. The next phase should then increase the capacity by a further 100,000 bpd to the planned 300,000 bpd plateau rate, presumably contingent on the availability of suitable gas outlets.

? Azerbaijan: Azeri-Chirag-Guneshli (ACG) and potentially Shakh Deniz to lead the first wave of growth in production in Azerbaijan.

Since 1997 Azeri-Chirag-Guneshli deep offshore has achieved its so-called ?early production?, now 110,000 bpd, accounting for 50% of Azerbaijan's total 1998 production.

ACG is operated under a PSA signed in 1993 by the AIOC consortium that includes the operator BP-Amoco, Unocal, Statoil, Exxon, and national oil company SOCAR. Phase 1, a $2.1 billion development, is currently underway and should begin to bring an additional 300,000 bpd capacity on-stream around 2004. The full ?field? development plan incorporates a $10 billion total capital expenditure program resulting in a final plateau rate of 800,000 bpd by 2010, based on estimated reserves of 4.4 billion bbls

The new Shakh Deniz discovery (a PSA involving BP, Statoil,

Elf, Lukoil, OIEC, Turkish Petroleum Corporation, SOCAR), another deep-water structure in Azerbaijan, is primarily a gas condensate reservoir. This may result in a 200,000 bpd condensate development, contingent on an appropriate gas export solution.

? The flagship projects, key to breaking the ?chicken and egg? dilemma

With quality sponsors committed, development underway and large reserves available, the above four flagship projects will provide long-term future production, predictable enough to support the development of major new pipelines. In a conservative scenario, IHS predicts a combined 1.8-2 million bpd plateau production rate by 2010-2015. Significant potential upsides may materialise in the near future, which would increase the IHS forecast above 2.5 million bpd for these four projects.

Another significant factor that will affect transportation is the quality of crude and quality banks. The oil produced from the new projects, particularly in Kazakhstan, command a premium to other crudes in the area or in Russia. The quality banks, when they exist, allocate the sales proceeds between different users of a pipeline, depending on the quality of the individual crudes.

Other potential additional productions ?

?Second wave? output

There is significant potential for further growth in production over and above these four flagship projects. It relates to new exploration ventures as well as to development or rehabilitation of known reserves (other than the four above-mentioned projects). OKIOC, the main new potential development may materialise soon and should be large enough to justify a transportation solution in its own right. Many others will benefit from the general development of export transportation routes and bring collective support to it.

? The OKIOC consortium

The 1997 PSA with the OKIOC consortium (Mobil, BP, Statoil, BG, Shell, Total, ENI, Phillips and Inpex) covers the exploration, development and production of five major prospective structures in the Kazakhstan sector of the North Caspian, with projections of prospective recoverable reserves which vary between 12 billion bbls and 32 billion bbls. The major structure is Kashagan, a potential super giant with pre-salt characteristics that potentially amount to two-thirds of the total reserves. Assuming success of the Kashagan exploration in early spring 2000, first oil may be achievable by the middle of this decade followed by sustained world-scale production. Based on a conservative recoverable reserve estimate of 8 billion bbls, Kashagan alone may produce a 1 million bpd plateau, while more aggressive scenarios would see plateau rates of up to 3 m illion bpd.

A success on the OKIOC prospects would provide an enormous impetus to the development of transportation. In a wider context, it would create a positive signal for the future development of the whole North Caspian area.

? A diversity of other potential sources of growth from Kazakhstan

Prior to signing the PSA, the OKIOC consortium had undertaken on behalf of the government a $200 million seismic study of the Kazakhstan sector of the North Caspian, a foundation stone for the future exploration and development of the Kazakhstan offshore. The onshore sector in Kazakhstan also offers a significant potential for growth from known and undeveloped reserves as well as from the rehabilitation of existing reserves (in Kazakhstan, as opposed to Azerbaijan, existing production is from reserves that are far from mature). The table below summarises additional potential in Kazakhstan (excluding Tengiz, Karachaganak and OKIOC), as estimated by IHS. Note that the Offshore prospect numbers are based on major identified structures only.

Source: IHS

? Other Azeri and Turkmen sources of growth:

HIS' review of the main identified structures in Azerbaijan and Turkmenistan shows the following further potential, (excluding AIOC).

Source: IHS

With the Caspian basin such a remote area, any developments in production will require the transportation system to keep pace and develop a multi-vector and diversified network to the world market.

Historical and existing export facilities ?

coping with current production

? Historic Situation

Until recently, Kazakhstan was only a marginal net exporter of its oil production, with an internal consumption ratio (consumption/ production) between 55% and 75% over the 1990-95 period, with the country exporting its increasing production. As a result, the internal consumption ratio had fallen below 40% in 1997.

Azerbaijan, which traditionally concentrated on exporting refined products, is shifting to export of crude. Its internal consumption ratio has decreased from more than 90% in 1995 to about 50% in 1998.

The bulk of the Caspian's crude exports had until recently been transported via the Transneft Russian pipeline system. It reached the international market as Ural blend, i.e. blended with heavy Russian crudes. Impediments associated with exports through the Russian system have included quotas on exports outside the CIS (Kazakhstan's current allocation is 150,000 bpd), arbitrary tariffs and absence of a quality bank. With no quality bank, the quality loss for a Tengiz type crude may include a $1 to $2 per bbl loss for the price differential on a bbl per bbl basis plus $1.5 per bbl loss for the bbl to tonne conversion.

Historic reliance on a restricted pool of transportation providers had until recently frustrated the pace of development of even such major projects as Tengiz, Karachaganak and ACG.

? Recent developments

Existing solutions in Azerbaijan, provide for the country's short to medium-term needs.

Both SOCAR's and AIOC's new transportation needs have been met by two new pipelines from Baku to the Black Sea: the northern route to Novorossiysk on the Russian shore, and the western route to Batumi, on the Georgian shore.

The northern route is primarily a commercial asset for Transneft and it receives $15.67 per tonne (approx. $2.15 per bbl). Oil is blended with Russian crude in its final section. Currently there is no quality bank.

Since the war in Chechnya, Transneft has maintained short-term oil throughput by a rail bypass of the Grozny section. In the long run, Transneft claims it will build a new $160 million pipeline section to bypass this area, also doubling the capacity to 300,000 bpd. Transneft would recover this cost through a 28% increase in the tariff to approximately $2.75 per bbl. This investment may however be contingent on securing sufficient committed volumes.

SOCAR is exporting volumes through the northern route, currently relying on trains around the Chechen area, although transported volumes are made on an irregular basis.

The western route $560 million investment was financed by AIOC, which in return benefits from low tariffs for 25 years and consequently channels its early oil through this route in preference to others.

Despite the apparent split in the transportation routes between AIOC and SOCAR, Transneft is willing to compete for the transportation of both companies' future crude production, as highlighted by the Chechen bypass. Further efforts from Transneft to keep pace with competition, include adapting tariffs, as well as initiating the process to solve the quality bank problem. Practical efforts to remove the burden of quality loss may involve either building the necessary pipelines to segregate the Azeri and Russian crude flows or alternatively to negotiate a quality compensation bank between the Russian and Azeri producers. As far as we know, this would be the first case of solving the quality problem on the Transneft system.

In the future, both Transneft and AIOC claim that the northern route and the western route respectively have the flexibility to be extended, so that they may compete for the role as a potential ?main export pipeline?, as is discussed in following sections.

Part of the Kazakhstan crude is barged across the Caspian to Baku. Subsequent transportation from Baku to Black Sea may use Azeri pipelines. In its strategy to secure a trans-Caucasian route, Chevron has refurbished a 80,000 bpd Kashuri ? Batumi pipeline (the ?KBP?), at a cost of $100 million. The KBP covers the last section of transportation to the Black Sea in Georgia. The next step would be either to complete a pipeline from Ali-Bairamli to the KBP at Kashuri or connect the KBP to the AIOC Baku ? Supsa line. The KBP connection would reportedly increase the AIOC line capacity by 100,000 bpd.

Ability to overcome short-term transportation problems

Over recent years, Kazakhstan oil producers have mitigated the constraint imposed by the Transneft quotas by creating alternative transportation means including direct railing from Tengiz to Odessa; railing from Tengiz to Aktau; Trans-Caspian barging to Baku; and then further railing to Georgian ports.

The new Aktau port facilities on the Kazakhstan shore were completed in September 1999 and have a current capacity of eight million tonnes per year, with possible expansion in the future. Tengizchevroil recently reported a reduction in both railway tariffs and port fees, in exchange for increased committed volumes.

Projects under way ? Routes for the first wave of production increase

? Under construction:

CPC

After years of delay, CPC is now on track, primarily driven by the need to match the development of the Tengiz and

Karachaganak projects, as well as the needs of the other shareholders: Chevron, Exxon-Mobil, Oryx, BG, Agip, Kazakhoil and the Oman and Russian governments. CPC will run from Tengiz to Novorossiysk, around the northern shore of the Caspian Sea and through Russian territory to the Black Sea. Phase 1 is due to bring in 30 million tonnes capacity by end 2001. Subsequent phases are planned to eventually increase the total capacity to over 67 million tonnes (approximately 15 million tonnes of which are expected to be filled by Russian crude from Siberia, in the Russian section of the pipeline).

CPC will provide for the bulk of transportation for Karachaganak and Tengiz. However, both projects could also provide volumes for other transportation projects, as under certain assumptions their output might significantly exceed the CPC planned capacity.

? Under negotiation/feasibility study

Azerbaijan Oil to Black Sea/Mediterranean

With the first production of phase 1 due between 2003 and 2005, AIOC will need to soon select a Main Export Pipeline (MEP).

The main options that have been contemplated for considerable time include:

? the highly publicised 1,730 km Baku-Ceyhan route to the Mediterranean Market through Azerbaijan, Georgia and Turkey. AIOC estimates that the economics of the scheme require as much as 1 million bpd committed volumes and that an additional 2 billion bbl reserves may be needed on the top of the current 4 billion bbl estimate for ACG to justify the Baku-Ceyhan route in its own right.

? an increase in the existing trans-Caucasian routes to the Black Sea, namely the western route to Supsa and/or the northern route to Novorossiysk.

The Baku-Ceyhan route had met with scepticism from the AIOC partners on the basis of high estimated costs and a lack of committed volumes. However, over the past months this route has been viewed more favourably. BP-Amoco was said to be more supportive of the project while at the November 1999 OSCE Summit in Istanbul, a set of intergovernmental agreements seemed to pave the way for further developments. The two key critical outcomes were:

? The project cost estimate was lowered to $2.4 billion from the previous $3.6 billion as the Turkish government offered a financial guarantee that caps the cost of the Turkish section of the facility (to be undertaken by the state owned company BOTAS) at $1.4 million.

? In Kazakhstan's November 19, 1999 agreement with Azerbaijan, Georgia and Turkey, the country re-affirmed its willingness to contribute volumes to this project, conditional on three factors: actual additional volumes, over and above those committed to the dedicated Kazakhstan transportation routes are available; the scheme is economically viable; and it provides a solution for Kazakhstan gas.

On this basis, a Baku-Ceyhan plan was presented with a 1 million bpd peak throughput and a $2.58 per bbl tariff.

Major concerns still to be addressed before the Baku-Ceyhan route can be firmly considered as the Main Export Pipeline are twofold: controlling costs on the non Turkish section (currently estimated to be $1 billion and benefiting from no guarantee) and identifying the additional dedicated volumes. The results of the OKIOC exploration may be a significant event in this respect as a success would bring large volumes to the transportation market. Other sources of volume may include larger reserves discovered in the ACG fields themselves; production from Shakh Deniz; increase in the production from the onshore Kazakhstan fields or new offshore discoveries in Kazakhstan or Azerbaijan.

Other Pipeline Projects

The infrastructures described above should provide capacity for the bulk of the ?first wave? increase in production from the Caspian area. In addition, these facilities will provide some capacity for transportation of oil from other projects, noting that the ?flagship? projects forming this ?first wave? are likely to continue to contribute to other routes as well.

Many other pipeline projects are under study, some are at an advanced stage. Certain projects have at some point been considered as candidates for the MEP, and should not be excluded from such a role. More importantly, these projects will continue to be assessed as further production increases are firmed up.

A brief description of selected ?other projects? is found below.

Trans-Caspian Transportation System

The Kazakhstan Government has commissioned Chevron, Exxon-Mobil and Royal Dutch/Shell to prepare a feasibility study on Trans-Caspian oil pipeline routes. The study is due to cover a range of possible solutions available to export Kazakhstan oil and gas to the Mediterranean and Turkish markets. This may include possible connection with other existing projects.

Kazakhstan to China

Despite many delays, the oil pipeline linking west Kazakhstan to China (via the Xinjiang province) remains on the agenda, highlighted by Nursultan Nazarbayev, the Kazakhstan President in his recent visit to China. However the project may be contingent on availability of Chinese oil for the Chinese section of the pipeline.

Crude Oil Swaps and corridor to the Persian Gulf

Kazakhstan and Iran have a swap deal by which Kazakhstan crude is to be delivered to Neka in Iran, in exchange for Iranian exports of equal value from Kharg Island in the Persian Gulf. However, implementation remains subject to upgrading the Iranian refineries to the Kazakhstan crude specification. Recently, Iran's Oil minister commented that Iranian swap deals would be pursued with a 30% discount (from $3.30 per barrel to $2.30 per barrel). Dragon Oil and Monument Oil (LASMO) have similar arrangements with Iran for Turkmenistan oil.

NIOC is reviewing the options for building the Neka-Tehran pipeline plus associated refurbishment of Tehran and Tabriz refineries. This project would basically optimise the full-scale implementation of the swap agreements. In the longer term, further developments may include a reversal of the crude flows in the existing Iranian pipelines between the Persian Gulf Coast and Tehran and establish a complete North-South transportation route in Iran.

Bosphorus Bypass

Several potential projects have been identified as alternative options to the traditional transportation route through the Bosphorus Straits, four of which are frequently quoted as Bosphorus ? relief options. These are: a 270km, 700,000 bpd pipeline from Burgas (Bulgaria) to Alexandroupolis (Greece); a 913km, 750,000 bpd line from Burgas to Vlore (Albania) (crossing politically troubled Macedonia and Albania); a 1,200km, 600,000 bpd line from Constanta (Romania) to Trieste (Italy); and a 180,000 bpd pipeline from Odessa to the Baltic Sea ? Poland.

Antoine Majnoni d'Intignano is an Assistant Director in the Credit Agricole Indosuez Oil and Gas Team, based in London. He has been involved for the past three years and is currently leading the CAI team that has acted as Financial Adviser to the Government of the Republic of Kazakhstan in relation to certain oil and gas assets. CAI works as part of an advisory team that includes inter alia the IHS Energy Group, the economics and consultancy group and IKODA, as technical

advisers,

Shearman & Sterling, as legal advisers and Ernst &Young

as accounting adviser.