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# RIS Discussion Papers

## Issue Related to India's Energy Trading with Central Asian Countries

Barnali Nag

RIS-DP # 69/2004



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## Issues Related to India's Energy Trading with Central Asian Countries

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### Abstract

India, with its rapidly increasing energy demand and stagnating domestic oil reserves offers a large potential market for the oil and gas reserves of the Central Asian countries. This paper discusses the various issues, which need to be resolved before India can venture into any long-term energy import agreement with the countries of Central Asia. These include factors related to geopolitical stability, geographical inaccessibility and underdeveloped international as well as domestic gas markets. Additionally, detailed cost benefit comparison of transportation routes is required along with evaluation of transportation options of oil and gas through pipelines vis-à-vis road.

### 1. Introduction

The newly formed economies in the Central Asian region, which were born after the disintegration of the Soviet Union, offer both prospects and challenges for India. Prospects in the form of an evolving economy where India could benefit from investments in the construction and the IT industries, the gas and oil reserves which could help India diversify its energy import alternatives and the huge market that these countries could offer for Indian goods. However, there are challenges in the form of unfriendly market condition with reports of the Talibans regrouping in this region, religious extremism, the presence of USA

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on the one hand as the sole super power in this region and Russia on the other trying to re-assert its influence. Currently, India is not a major trading partner to any of these countries. Hence India needs to look at all the above factors carefully and look for areas where India and the Central Asian countries have a convergence of interests.

The Central Asian countries consisting of Armenia, Azerbaijan, Georgia, the Kyrgyz Republic, Moldova, Tajikistan and Uzbekistan (as the CIS 7), as well as Kazakhstan and Turkmenistan all share similar constraints of international trade and transport, and their foreign trade is characterized by distant export markets dominated by few commodities. They all need to build the institutional and legal foundations of a market economy, attract foreign investment, and make better use of their natural resources. The resolution of these issues is critical for their economic development.

While Central Asia has been endowed with substantial hydrocarbon resources, which is concentrated in the Caspian Sea Basin in Russia, Kazakhstan, Turkmenistan and Azerbaijan, their development has been limited due to lack of access to markets. The region has an estimated 16-18.9 TCM (trillion cubic metre) of gas reserves with Turkmenistan accounting for the bulk of these reserves (7.3-8.9 TCM). Proven and possible oil reserves in this region is expected to be as high as 200 billion barrels. According to the World Bank although most of the countries in the region are particularly well endowed with hydrocarbon resources only some are enjoying the benefits of having made strides towards creating business environments that attract investment while others have not been able to put in place the conditions to encourage such investment. After the disintegration of the former Soviet Union, there is an intense commercial and political struggle for control of the resources.

The key issues facing the oil and gas subsector of this region are:

- Outmoded exploration/production technologies leading to poor production practices in most of these countries.
- Excess refining capacity, with obsolete configuration and poor environmental performance.
- Inadequate legal and regulatory frameworks impeding the inflow of foreign capital and know-how.
- Irregular collection of payments particularly, in the gas sub sector, although prices generally cover costs.

- Underutilization of gas inspite of the large gas reserves and generally well-developed gas transmission network.
- Monopolistic controls on resources, aided by political disinterest in liberalization of the market, particularly for gas.
- Transportation of oil and gas to markets that are at substantial distance from production locations, posing significant political and commercial risk.

## **2. Background: energy scene in India**

India ranks sixth in the world in terms of energy demand accounting for 3.5 per cent (2001) of world commercial energy demand. With 8 per cent GDP growth target for the Tenth Five Year Plan (2002-2007), the energy demand is expected to grow at 4.8 per cent. Although commercial energy consumption in India has grown rapidly over the last two decades, a large part of India's population does not have access to commercial energy. The per capita energy consumption is a low 486 KGOE as compared to the world average of 1659 KGOE in 1998. India accounts for only around 3.4 per cent of total world primary energy consumption.

India has seen an expansion in the total energy use during the last five decades with a shift from non-commercial to commercial forms of energy and from primary to transformed energy sources. In the Tenth Five Year Plan for the Energy Sector, the projected requirement of commercial energy is estimated at about 406 MTOE and 554 MTOE by the 2006-07 (Table 1) and 2011-12 respectively. The commercial energy demand is expected to grow at an average rate of 6 and 6.4 per cent respectively during the Tenth and Eleventh Five Year Plan periods but is likely to be less by 5 per cent and 10 per cent during 2006-07 and 2011-12 due to the increasing share of the IT (information technology) industry. The key energy challenge facing India today is preventing bottlenecks in energy supply from constraining economic growth. Due to rising consumption and higher world oil prices, the Indian government is faced with debilitating oil import costs.

India accounts for about 12.5 per cent of total primary energy consumption in the Asia-pacific region. Coal, which is the most polluting of all fossil fuels, is the most abundant source of commercial energy in India with proven coal reserves of 82396 MT, which constitute around 7 per cent of total world proven reserves. However, the quality of coal produced in India has been declining drastically over the last two decades leading to import requirement of superior grade coal. India has been unable to raise its oil production substantially in the

**Table 1: Energy demand estimated in the Tenth Five Year Plan for energy sector**

Primary Fuel	Unit	Demand	
		2006-07	2011-12
Coal	MT	446.6	620.0
Lignite	MT	57.8	81.6
Oil	MT	134.5	172.5
Natural Gas	BCuM	47.5	64.0
Hydro Power	BKwH	148.08	215.66
Nuclear Power	BKwH	23.2	54.7
Wind Power	BKwH	4.0	11.6
Total Commercial Energy	MTOE	406.2	553.7

MT: Million tonnes; BCuM: Billion Cubic Metre; BKwH: Billion Kilowatt Hour.

*Source:* Tenth Five Year Plan for the Energy Sector, GoI.

1990s. Rising oil demand of almost 10 percent per year has led to sizable oil import bills. Imports of oil and coal have been increasing at the rates of 7 per cent and 16 per cent per annum respectively during the period 1991-99. According to estimates made by TERI (2000), this dependence is likely to increase in the future with 75 per cent of oil and 22 per cent of coal consumption requirements of the country met by imports. This energy import dependence implies vulnerability to external price shocks and supply fluctuations, which threaten the energy security of the country.

India has so far been largely dependent on Iraq and other Middle Eastern countries for oil imports, which have often been unstable. The growing dependence of the country on energy imports has important security implications. India's energy security issue involves on the one hand declining coal quality, international pressure to shift to cleaner fuels, foreign exchange vulnerability from dependence on a single region (Middle East) for oil. It is now well accepted that India needs to diversify both its source of oil imports and its energy consumption portfolio. The choices available to India to strengthen its self sufficiency comprises of:

***Increased oil and gas base in India – to look for new domestic reserves.***

Natural gas is India's most important potential alternative to coal. India is planning to make widespread use of natural gas in power generation and in the industrial and residential sectors. Projected demand will require large volumes

of gas pipeline and liquefied natural gas (LNG) imports. The Reliance Industries has recently discovered gas reserves in the Krishna-Godavari basin, which has a capacity of 7 trillion cubic feet. The ONGC has also discovered gas reserves in Rajasthan. However, it will take at least 3 to 5 years to develop the infrastructure to provide this gas to consumers. With long gestation periods needed for both oil and gas projects before they can become commercially viable, it is clear that large amounts of both oil and NG will have to be imported if the current rate of economic growth has to be maintained.

***Improve efficiency of energy use***

Alternative sources of energy such as coal gasification could improve energy security by utilizing domestic coal reserves and providing a competitive alternative to imported natural gas. The adoption of improved technologies such as IGCC (integrated gasification combined cycle technology) and PFBC (pressurized fluidized bed combustion) would also increase the efficiency of coal utilization,

***Diversify energy import options of the country***

In recent times, the government of India is taking initiatives to establish and extend relations with the emerging oil and gas producing countries in Africa and Central Asia. Around US\$1 billion annually is being earmarked for exploration activities in overseas oilfields.

This paper aims to discuss the major factors related to India's relation with the Central Asian countries and its energy trading options. The paper however focuses mainly on oil and gas trading prospects. The issues that India needs to address while contemplating energy trading with the Central Asian countries are as follows:

1. How much of India's future energy demand could be met by oil and gas?
2. What are the proven and potential oil/gas reserves in the CAR (Central Asian Republics) countries? Are they sufficient for India to make long term investments?
3. What kind of energy trade agreement can India enter into with these countries?
4. What is the investment potential in these countries for India to enter into exploration activities?
5. Is the international as well as domestic market for gas sufficiently developed (vis-à-vis the oil market) for India to venture into gas import in the near future?

6. What should be the chosen mode of transportation between rail, road and sea? What should be the chosen medium between pipeline and tankers?
7. What would be the preferred geographical route of transportation?
8. What should be the duration of oil/gas purchase agreements?
9. How would gas pricing, transit fees and cost sharing for setting up of transmission infrastructure etc. be decided?
10. How would India ensure cooperation from all transit countries?
11. How does the energy import option from CIS countries fare against import from India's neighbouring countries like Bangladesh and Myanmar
12. How does energy import option fare against options of setting up infrastructure to utilize domestic gas reserves and energy efficiency improvement?

### 3. India's energy import options and recent developments

On the external scene, India imports 65 per cent of its energy sources from the Persian Gulf. But this region is volatile. Besides the Gulf region, India can get energy sources from the Caspian region, South-East Asia, Australia, Africa and Europe. Major South-East Asian countries such as Malaysia and Indonesia are expected to be net oil importers by the end of this decade. Russia is a major source of energy to the Asia Pacific region. However, to transport gas from there, India will need to construct a 3,700-km long pipeline whose commercial feasibility continues to be debated. Compared to other regions, transportation of energy sources from the Gulf continues to be cheaper.

Also, India is not getting the required cooperation from its neighbouring countries like Pakistan and Bangladesh to route its gas import pipelines through these countries. In the past, the Russian company, Gazprom was not able to connect Iranian gas to India due to the unwillingness of Pakistan to let transit of pipelines through its territory. The Turkmenistan pipeline also could not be connected with India and it terminated to Pakistan via Afghanistan.

The Indian government has decided to acquire acreage in other countries to augment domestic supplies. ONGC Videsh Ltd., a subsidiary of the Oil and National Gas Commission (ONGC), has entered into a production sharing agreement with British Petroleum in Vietnam to explore for natural gas, which started production from November, 2002. ONGC Videsh Limited, along with partners British Petroleum (UK) and PetroVietnam (Vietnam), discovered dry gas reserves (estimated at 2 TCF) on the Vietnamese coast. ONGC Videsh Limited signed the Exploration Service Contract with the National Iranian Oil Company

of Iran, for the Farsi offshore Block1. The company has also signed two contracts for oil exploration and production sharing in Iraq, though this is contingent on the UN embargo on Iraq being lifted. ONGC Videsh Limited signed the Farm-out Agreement (FOA) with TPOC (Turkish Petroleum Overseas Corporation) on 22nd August 2002 for acquisition of 49 per cent participating interest in NC-188 and NC-189 onland exploration blocks in Libya. It acquired 20 per cent Participating Interest in offshore Block A-1 of Myanmar from Daewoo International Corporation (DIC).

OVL has 20 per cent stake in developing the Sakhalin I oil and gas project, under a Production Sharing Agreement (PSA) with a consortium comprising Exxon-N (30 per cent), Sodeco (30 per cent), ONGC Videsh Limited (20 per cent), SMNG-S (11.5 per cent) and RN Astra (8.5 per cent). Estimates indicate that Sakhalin-I has 1.15 billion tons of in-place oil and 700 bcm of gas. The recent evaluations of the block by the consortium for the reserve potential and the production indicate that the production could be as high as 350,000 barrels per day, along with further possibilities of upside in the reserves and production.

Parthasarathy and Kurian, (2002) have recommended that the possibility of developing an energy grid linking the Russian Federation, China and India (RCI) through gas pipelines that could carry the natural gas resources from Siberia and Central Asian countries like Kazakhstan to the Indian and Chinese markets needs to be examined.

Both Iran and Pakistan are keen on the 2,670 km long onland pipeline to India as it would provide the former with a cheap route to sell its vast gas reserves and the latter with about \$ 580 million as transit fees from the \$ 3.5 bn gas conduit. India, on the other hand, has been favouring an underwater line to avoid disruption in supplies. Iran has engaged Australian consultant BHP Kinhill to detail the onland gas pipeline passing through Pakistan. It has also appointed Italy's Snamprogetti for working on a feasibility study for the construction of an offshore gas pipeline from Assaluyen gas field in Southern Iran to India.

A trilateral MoU was signed by India, Iran and Turkmenistan in April 1995 to provide road and rail access for Indian goods to Central Asia through Iran. The route would be by sea from the ports of Western India to the port of Bandar Abbas and by surface transport onwards to Sarakhs on Iran-Turkmenistan border.

The agreement also permits Indian companies to open offices and India registered vehicles to ply in Iran and Turkmenistan. (ToI, 1995) More recently, the “North-South International Transportation Corridor” agreement was signed in September 2000 by India, Iran and Russia. Expansion of port handling capacity, completion of rail connections, streamlining of procedures, active promotion of the Corridor among Russian business, special facilities/fiscal incentives to encourage this route would help stimulate the transit of goods on this route.

### *Projects with the Central Asian countries*

Apart from the above, the other projects, which are under negotiations, are for exploration in Russia and Iran. Some projects are also being negotiated with the Central Asian states of Turkmenistan and Uzbekistan for NG, and Kazakhstan and Azerbaijan for oil.

In July 1997, officials from Turkmenistan and Pakistan, and representatives from Unocal and Saudi Arabia’s Delta Oil signed an agreement to build the Turkmenistan-Afghanistan-Pakistan pipeline, with a possible extension to India. The 900-mile pipeline was estimated to cost between \$2 billion and \$2.7 billion. The proposal aimed at setting up a 2-bcfd (Billion cubic feet per day) gas pipeline from Turkmenistan’s Daulatabad gas field to Multan in Pakistan. In October 1997, Unocal set up the Central Asian Gas Pipeline (CentGas) consortium to build the pipeline and construction was scheduled to begin in 1998. However, in early August 1998, Unocal announced that CentGas had not secured the financing necessary to begin the work, and on August 22, 1998, Unocal suspended construction plans due to the continuing civil war in Afghanistan. Transit problems remain and any south-eastward-bound pipeline from the Caspian region would have to pass through Afghanistan, and the political situation in that country has so far prevented any project from being completed. Though Unocal and Delta had signed an agreement with Afghanistan and Pakistan to set up a 2,000-km Turkmen-Afghan-Pakistan NG pipeline to transport 55 mcmd of NG through a 1,400 km pipeline to Multan in Pakistan, with the possibility of extending the line a further 600 km to New Delhi, the ongoing insurgency in Afghanistan prevented the project from going through.

The heads of state of Afghanistan, Pakistan, and Turkmenistan met in Islamabad on 29–30 May 2002 to announce the formation of a coalition for implementing the Project. The possibility of constructing a spur pipeline taking

off from the Pakistan part of the main project pipeline to the Pakistani port of Gawadar for export of liquefied natural gas was also discussed. However, the Project faces significant political and technical challenges, considering the volatility of the relationships between the concerned countries and the initial stage of the political process in Afghanistan through which a major part of the pipeline passes.

To strengthen the business environment of the Project and reduce risks, a Steering Committee of Ministers of oil and gas from the three countries has decided that (i) the pipeline should be constructed and operated by a consortium, inter alia comprising international oil companies and relevant national companies; and (ii) that the pipeline consortium will only transport the gas and not own it. Suitable gas sale and purchase agreements are therefore to be developed between Turkmenistan and buyers of the gas in Afghanistan, Pakistan, and possibly India, as well as a gas transportation agreement between Turkmenistan and the pipeline consortium. Based on the projected annual gas throughput in the pipeline, a prima facie review of the financial viability of the TAP Project indicates that the price of the gas delivered in Pakistan and India would be very competitive compared with the prices of substitute fuels being used at present.

Five issues that have been identified by the Asian Development Bank (2002) as important in the TAP Project are:

- (i) Confirmation of a market for the gas in Pakistan and India and commitment of potential buyers to enter into gas sale and purchase agreements;
- (ii) Certification that the natural gas reserves at Daulatabad field can produce the envisaged quantities of gas over a period of 25–30 years
- (iii) Security concerns of Pakistan and India with regard to possible disruption of gas supplies through the pipeline
- (iv) Techno economic feasibility of the pipeline and preparation of its basic design, considering the terrain conditions and logistical constraints; and
- (v) Required mobilization of international oil and gas companies to take the lead role in the pipeline consortium for timely and cost-efficient construction of the pipeline, and operation and maintenance of the same in accordance with international standards.

At the request of the Steering Committee, ADB is proceeding to develop solutions to issues (i) and (iii) through (v).



#### 4. Energy scenario in Central Asian countries

##### *Oil and gas*

Proven oil reserve estimates in the Central Asian region vary between 15 to 40 billion barrels, representing 1.5 per cent to 4 per cent of the world's proven oil reserves. Estimates of proven gas reserves range from 6.7 to 9.2 trillion cubic meters, with perhaps 8 trillion cubic meters of additional reserves, according to the International Energy Agency. This represents approximately 6-7 per cent of the world gas reserves.

Estimates of potentially recoverable oil reserves range far higher with the US Department of Energy indicating a possible total of 200 billion barrels—close to the 269 billion barrels of proven oil reserves already discovered in Saudi Arabia. Many experts dispute this claim: the International Institute of Strategic Studies sparked a controversy last spring deriding the US Government estimates. Although largely skeptical about the US Energy Department figure, experts differ as to the amount of recoverable energy reserves. Estimates range from 25-35 billion barrels according to some industry forecasts to possible reserves of 70 billion according to a report by Wood Mackenzie consultants. Some US companies use a working estimate of 65 billion barrels. Opinions vary among energy experts as to how fast the area's energy resources can be developed. For example, The International Energy Agency (IEA) expects oil production from Kazakhstan, Turkmenistan, Azerbaijan and Uzbekistan to reach 1.6 million barrels per day by 2000 and 3.5 million barrels per day by 2010 in a "high case" scenario and 1.4 million in 2000 and 2.8 million in 2010 in a low case scenario. While the US Government estimates believe the production could reach as high as 4.5 million b/d by 2010 if political barriers are removed. The Center for Strategic and International Studies expects Kazakhstan, Azerbaijan and Turkmenistan to reach 3.5 million b/d sometime around 2010 and the Oxford Institute for Energy Studies cautions that the production take-off is likely to be slow, although they believe it could reach 3.5 million barrels per day by 2010. Whatever the most likely estimate, there appears to be a consensus emerging that, though the area is unlikely to become a major competitor for the Persian Gulf it could play a "significant role as a marginal supplier" in "arresting a jump in the price of oil" in a high price environment and diversifying supply.

In terms of distribution, the overwhelming bulk of the oil lies in Azerbaijan and Kazakhstan and, to a far lesser extent, Uzbekistan. Kazakhstan has over half of the possible oil resources and, according to some analysts, has the best

potential for new discoveries. Kazakhstan is actually a net importer of gas and any increased production is likely to be used to meet domestic demand. Without the development of other routes, potential gas exports would currently have to traverse Russia and would likely encounter the same resistance plaguing Turkmen exports.

At the beginning of the twentieth century, Azerbaijan accounted for almost one half of the world's crude oil production, but lost its leading position even within the Soviet Union as investment turned to other promising sites. Its oil production lags behind Kazakhstan, but investment has risen strongly in past years.

In terms of natural gas supply, Turkmenistan has the world's fourth largest reserves, but Kazakhstan and Uzbekistan also have appreciable amounts. Turkmenistan's longer term prospects will depend on development of export markets such as Turkey, Iran and the Far East. Uzbekistan is the largest gas producer in Central Asia since the falloff in Turkmen production, but most of it is for domestic consumption. Other than modest exports to its neighbors, its landlocked position means its gas would have to go through more countries than its Turkmen and Kazakhstan competitors.

Proven and possible reserves of oil and gas as estimated by the EIA are given in Table 2. Future projections of production export potential of oil and gas as calculated by the EIA is shown in Tables 3 and 4.

##### *Other energy resources in the Caspian region*

In Central Asia, Tajikistan and the Kyrgyz Republic with surplus hydropower potential, Uzbekistan with large natural gas reserves, and Kazakhstan with large proven coal deposits, complement each others' energy resource requirements. Tajikistan and the Kyrgyz Republic, with rivers fed by Himalayan glaciers, export surplus hydropower in summer to Uzbekistan and Kazakhstan, and import power during winter from the fossil fuel-based power plants in Uzbekistan and Kazakhstan. The power grid in these countries is interconnected by a 500-kilovolt (kV) transmission system, and its integrated operation gives rise to other benefits, such as reduced reserve margin (and consequently, lower capacity addition need) and lower overall system operating costs. (ADB, 2000)

The power sectors of these countries need considerable rehabilitation and upgrading if the country is to improve the efficiency of energy production and

**Table 2. Caspian Sea Region Oil and Natural Gas Reserves**

Country	Oil reserves (in BBL)		Natural gas reserves (in Tcf)			
	Proven*	Possible**	Total Oil	Proven*	Possible**	Total
Azerbaijan	1.2	32	33.2	4.4	35	39.4
Iran***	0.1	15	15.1	0	11	11
Kazakhstan	5.4	92	97.4	65	88	153
Russia***	2.7	14	16.7	N/A	N/A	N/A
Turkmenistan	0.6	80	80.6	101	159	260
<b>Total</b>	<b>10</b>	<b>233</b>	<b>243</b>	<b>170.4</b>	<b>293</b>	<b>463.4</b>

*Sources: Oil and Gas Journal, Energy Information Administration.*

\* Proven reserves are defined as oil and natural gas deposits that are considered 90 per cent probable.

\*\* Possible reserves are defined as oil and natural gas deposits that are considered 50 per cent probable.

\*\*\* only the regions near the Caspian are included.

BBL = billion barrels, Tcf = trillion cubic feet.

**Table 3: Caspian Sea Region Oil Production and Exports**  
(thousand barrels per day)

Country	Production		Net Exports		Possible Net Exports	
	(1990)	(2001)	(1990)	(2001)	(2001)	(2010)
Azerbaijan	259	311.2	77	175.2	1,000	1,000
Kazakhstan	602	811	109	631	1,700	1,700
Iran*	0	0	0	0	0	0
Russia**	144	11	0	7	300	300
Turkmenistan	125	159	69	107	150	150
<b>Total</b>	<b>1,130</b>	<b>1,292.2</b>	<b>255</b>	<b>920.2</b>	<b>3,150</b>	<b>3,150</b>

*Source: Energy Information Administration.*

\* Only the regions near the Caspian are included.

\*\* Includes Astrakhan, Dagestan, and the North Caucasus region bordering the Caspian Sea.

**Table 4: Caspian Sea Region Natural Gas Production and Exports**  
(billion cubic feet per year)

Country	Production		Possible Production		Net Exports (1990)	Est. Net Exports (2000)	Possible Net Exports (2010)
	(1990)	(2000)	(2000)	(2010)			
Azerbaijan	350	200	1,100	1,100	-272	0	500
Kazakhstan	251	314.3	1,100	1,100	-257	-176.6	350
Iran*	0	0	0	0	0	0	0
Russia**	219	30	N/A	N/A	N/A	N/A	N/A
Turkmenistan	3,100	1,642	3,900	3,900	2,539	1,381	3,300
<b>Total</b>	<b>3,920</b>	<b>2,072</b>	<b>6,100</b>	<b>6,100</b>	<b>2,010</b>	<b>1,204.4</b>	<b>4,150</b>

*Source: Energy Information Administration.*

\* Only the regions near the Caspian are included.

\*\* Includes Astrakhan, Dagestan, and the North Caucasus region bordering the Caspian Sea.

use. The Government of Kazakhstan has recently initiated measures for (i) improving the reliability and quality of power supply by rehabilitating and modernizing the transmission and dispatch control systems, and (ii) establishing a competitive wholesale market in the power sector. Over the past decade Kazakhstan has initiated a number of energy sector reforms aimed at establishing a competitive power market that would encourage private sector participation.

International organizations like United States Agency for International Development (USAID), the World Bank and the Asian Development Bank have been providing technical assistance for (i) legal and regulatory reform, (ii) restructuring and privatization, (iii) creation and development of competitive markets, and (iv) strengthening of regional trade relationships in the power sector. Such assistance included (i) developing and implementing electricity and energy laws, (ii) creating independent regulatory commissions, (iii) setting up wholesale and retail tariff mechanism, and (iv) establishing regional contracting and wholesale pricing mechanisms. (ADB, 2001).

Tajikistan has vast hydropower potential and less than 10 per cent of its potential of 40,000 megawatt (MW) is currently used. More than 90 per cent of the electricity produced in Tajikistan comes from hydropower that uses water from melted snow in summer around the Pamir and Fan mountain regions as key input. However, due to lack of proper storage facility and less demand, during the summers excess water is wasted through spillage, while in the winters, Tajikistan needs to import electricity from Uzbekistan. There is scope of investment in hydropower development in this country to address the electricity deficit in winter and export potential for surplus hydropower in summer and since export prices are higher than the domestic prices revenue from a sustainable level of export to the neighbouring countries is the key for investments in new hydropower resources. In November, 2002, a project proposal was submitted to the Asian Development Bank for developing the Central Asian Power transmission system, enhancing inter country power trading and setting a foundation for future wholesale regional power market. (ADB, 2002a)

## 5. Issues related to energy cooperation with India

In spite of their vast energy reserves and prospects that the CIS countries offer in terms of their potential to export energy to India, various issues need to be resolved before India can enter into long term trade relations with these countries. Some of these issues are discussed below.

### ***Geopolitical***

All of the CIS member-states have experienced substantial drops in GDP, industrial output, and real incomes since 1989, owing to the disintegration of the highly integrated economy of the former USSR and the severance of trading links with COMECON,<sup>2</sup> together with the disruption of civil wars, armed hostilities, and mass movement of refugees in, *inter alia*, Chechnya, Moldova, Georgia, Azerbaijan, Armenia, and Tajikistan.

All the five Central Asian states are yet to fully recover from the economic disruptions created by the break-up of the former Soviet Union compounded by diverse shocks, including armed conflicts and massive changes in terms of trade. The states lack both resources and competent bureaucracies to tackle the problems like the widening social and economic disparities between the rural and the urban populace.

The disintegration of the Soviet Union adversely affected international trade as the number of borders to be crossed and “facilitated” has increased, the earlier unified transit rules has become different for each country (and often not transparent enough for shippers to safely plan their transactions) and, finally, access to markets and transit rights is cumbersome and costly. Overall, the high cost of transport diminishes international competitiveness of goods from the CIS 7 countries and makes their imports often prohibitively expensive. Caspian gas exporters face stiff competition from a host of other suppliers in the European gas market while the difficulties of building pipelines eastward through Afghanistan is not minimized. Gas prices are also linked to oil in most markets adding an additional constraint if oil prices remain flat.

The Caspian Sea is currently surrounded by five littoral countries, viz. Russia, Kazakhstan, Turkmenistan, Azerbaijan and Iran and a major hurdle facing the countries in this region is the legal status of the Caspian Sea. Prior to 1991, the Soviet Union and Iran operated on the coasts of the Caspian Sea on the basis of treaties signed between the two countries in 1920 and 1942. A new legal framework needs to be negotiated in the current situation. There are diverse views on this reflecting each country’s national interest. Although there is still no overarching agreement between the five Caspian littoral states on division of the Sea’s resources in May 2003, Russia, Azerbaijan, and Kazakhstan divided the northern 64 per cent of the Caspian Sea into three unequal parts along a median line principle, giving Kazakhstan 27 per cent, Russia 19 per cent, and Azerbaijan 18 per cent. Accordingly, development of the northern Caspian

Sea’s hydrocarbon potential, where most of the region’s oil reserves and largest international projects are found, will likely move forward despite the lack of a comprehensive regional consensus. Meanwhile, offshore development in Turkmenistan and Iran, which were present at these negotiations but refused to sign on, could fall even further behind. Turkmenistan and Kazakhstan have natural resources and trade potential that far exceeds that of the CIS 7 countries. Despite the relative advantages, Kazakhstan and Turkmenistan also suffer from many unnecessary barriers to trade because of the high transport costs. At the same time, Kazakhstan and Turkmenistan are critical transit routes for the rest of Central Asia, as are other countries, like Russia, China, Iran, Pakistan and Afghanistan.

### ***Geographical***

The Central Asian states are prisoners of geography in the sense that they are physically isolated from the western oil and natural gas markets. Russia to the north, Iran and Iraq to the south and southwest, Afghanistan to the southeast—all effectively block the way. Which means that, given limited domestic requirements, construction of export pipelines must precede any expansion in production.

The fact that these states are landlocked makes transportation costs prohibitive in the absence of agreed-upon transit routes and the unstable situation in the region. Also, the harsh climate and difficult terrain of the region make any kind of operation expensive and given the current low price of oil, the seismic data received does not make any of the projects seem attractive. The big oil consortia have already taken up most of the big projects there, and the small to medium projects would not be cost-effective from India’s point of view, especially since India would most likely have to share the cost of developing infrastructure for transportation of the oil and gas to India.

### ***Major players in the region - “The Great Game”***

The newly formed Caspian littoral countries have been vulnerable to the interventions of several interested country parties from outside the region. Countries like Russia, Turkey, UK and Iran are the major players in the “Great game” of controlling these areas and exploiting their vast natural endowments. With dissolution of the Soviet Union, although these countries have achieved independence of their energy resources their ability to export continues to be dependent on the cooperation of their neighbours.

Since the early 1990s, three countries around the Caspian Sea - Azerbaijan, Kazakhstan and Turkmenistan - have yielded a vast reserve of oil and gas. These states are essentially landlocked and pipelines are the key element in exploiting the oil and gas reserves throughout the Central Asian States (CAS) and control over the billions of dollars worth of oil and gas depends on the security and economic influence of the pipelines. Hence the Caspian Sea region with its strategic ports and rich oil reserves opened up a unique economic potential waiting to be exploited by the various countries.

#### *Russia*

Russia continues to be the major trading partner for most CIS 7+2 countries. Trade with other CIS countries is also important practically for all CIS 7 +2 countries. This indicates that the Russian corridor continues to be important both for bilateral trade and for transit. There has been a rivalry for control and influence between Russia on the one hand and the West particularly the United States of America and Turkey on the other. Geopolitical change, competition for influence and other strategic factors have come to occupy the center stage in Russian thinking. Of the major powers involved in Central Asia, Russian presence is inevitable - the elite in the Central Asian countries are Russian, the language is Russian and most of the countries (except Uzbekistan) are dependent on Russia for their security. Russian policies also have become more assertive. Russia is also in favour of building a OPEC like group in this region. However some of the countries like Turkmenistan are against it.

#### *USA*

The USA is currently a major player in the “Great Game” in the Central Asian region, with its troops stationed in Afghanistan and Pakistan. Under the present global political scenario India is counting on the USA to be the guarantor for any gas pipeline traversing Pakistan and Afghanistan.

US is also looking for strategic options for diversifying energy supplies in ways that will reduce US vulnerabilities to a disruption in global oil supplies from the Middle East. Hence the US has turned its attention to new suppliers like the Caucasus and Central Asia in and around the Caspian Sea basin. In fact the US intervention of Afghanistan has been seen by various global observers as a means of gaining access to and domination of the oil and gas in the Caspian Basin. Afghanistan has the strategic geographic location positioned between the Middle East, Central Asia and South Asia, between Turkmenistan and the avid markets of the Indian subcontinent, China and Japan that places it at the

core of the pipeline route. This region is quite often referred to by critics as “Pipelinestan” (Kumar, 2003).

The USA supports its own commercial involvement in the area. Currently around 91 US oil companies are operating in the Central Asian region. The position of the USA in the Caspian and Central Asia consists in laying of multiple pipelines, oil supply diversification, supporting construction of a large-diameter pipeline from Baku to Turkey, saying “no” to Iran as a transit country, and minimizing oil flows across Russia.

#### *Iran*

Iran has a major advantage in that it offers the shortest route to the sea for the southern Central Asian states, and has a long contiguous border with them (Dannreuther 1994). Iran with gas reserves of 23 TCM has the second largest gas reserves in the world. In 1995, Pakistan and Iran had signed a preliminary agreement to construct a pipeline from South Pars gas field in Iran to Karachi in Pakistan and a probable extension to India. However, on account of the tension between Pakistan and India, the proposal for a joint gas pipeline has been in limbo for quite some time. The Indian Government expressed its reservations in investing in downstream industries based on Iranian gas coming via Pakistan in light of the ongoing tension between the two countries. The Indian Government, on the other hand, is more keen on an offshore pipeline to bring Iranian gas to the Indian West Coast, bypassing Pakistan. The Indian Government has held discussions with the National Iranian Gas Company to that effect. The 1000-km 2-BCM deep-sea pipeline between India and Iran is expected to cost about \$3 billion. Russian state-owned gas company Gazprom is likely to join hands with Gas Authority of India Ltd (GAIL) in laying the pipeline. Both Pakistan and Iran, however, are keen on the onshore option, which is the cheapest of the three options under consideration. (Singh, TERI)

Although India is looking up to the USA as a guarantor in case of gas transportation through Pakistan, USA is opposing India’s intention of importing gas from Iran.

#### *China*

China is similar to India in terms of its economic status as a developing country, its fast accelerating domestic demand for energy, vast resources of coal and increasing pressure to substitute coal by cleaner and more efficient energy sources and the need to diversify its energy import options. China established diplomatic relations with all the CAR states soon after their independence, in

January 1992. China views Central Asia as a major energy source and a market for its consumer goods, as well as a link between China and the Persian Gulf through Iran. China has accordingly opened Xinjiang to cross-border trade and traffic with the Central Asian Republics.

China was successful in outbidding American oil companies in 1997 and won a major 9.5 billion dollars of oil deals with Kazakhstan. Also the Sino-Kazakh accords included the rehabilitation of the large Uzen oil field in western Kazakhstan and the construction of two oil pipelines, a 3000 kms line from western Kazakhstan to China and about 250 kms pipeline to Iran through Turkmenistan.

China has emerged as a major trading partner with most CAR states. In 1992 it reactivated its rail link with Kazakhstan and similar rail links are planned with Kyrgyz Republic and Uzbekistan (TRACECA, 2001). It is involved in various oil exploration and pipeline projects in the region. It has linked itself Central Asia by a network of roads. Although there are mountainous terrains, a future transport or pipeline route between India and China cannot be ruled out.

Taking into account the above factors and the struggle for dominance of all the countries, Indian efforts need to be at multi-lateral level with developing diplomatic relations not only with the CAR countries but also the current major players of this region to be able to exploit the economic benefits of trading with these countries.

#### ***Choice of routes for energy trading***

The lack of direct road, rail or sea link is one of the biggest practical problems in India's economic interaction with Central Asia. Two delegations of experts were sent by the Ministry of Commerce, GoI, in 1993 and 1994 to Iran and Central Asian countries respectively to study the infrastructure and transit facilities in the two areas. The Study Report referred to the transit routes through Central Russia and Europe, the Russian Far East, the Baltic Republics, Trans-Caucasian Republics and through China, Afghanistan and Iran. During the Soviet regime, most of India's trade was routed through the Black Sea ports. However, after the break up of the USSR, usage of these ports involve a lot of logistic and financial problems, like lack of adequate container handling and warehousing facilities, absence of link to railway network, or simply because of the distance and cost involved. European ports also prove uneconomical due to the distance. (Pandey, 2000)

#### ***Proposed routes***

Various alternative routes for export of oil and gas are operational and suggested for development. However, the question is, what would drive the pipeline route selection? Pipeline route selection is important because of the major political implications. However, final route selection would need to be based on long-term foresight rather than short-term political instability. Construction of pipelines across their lands would be beneficial to countries due to three reasons viz.:

- transit fees, which can be considerable over time,
- economic stimulus to the transit regions, and
- political and economic leverage conferred.

A major aspect of the international competition over the exploitation of energy resources in the Caspian region is the struggle over which route to take to the sea and from there to global markets. In the struggle for control over routes for oil from the FSU to the world market, the successful countries will receive not only billions of dollars annually in the form of transit fees but also control over pipelines. This will be a very important factor of geopolitical influence in the Trans-Caucasus and in Central Asia during the course of this century.

The only existing pipeline currently passes through Russia. This route is complicated by the disturbances in Russian republic of Chechnya through which it passes. The pipeline route favoured by the United States will go under the Caspian via Caucasus to Turkish ports. These routes however will be uneconomical for India, leaving only the options of the Afghanistan-Pakistan route and the Chinese route.

#### ***Relevant transport corridors***

*Transiting through Russia:* Transit through Russia is close to being the lifeline for the CAR shippers. Therefore any impediments and their abolishment can have a huge impact on the CAR businesses. As most of the route goes on flat land via Russia where infrastructure is considered to be acceptable, impediments are nearly exclusively institutional. The continued high share of foreign trade of some Central Asian countries suggests that access to routes to Russia and the barriers to trade on these routes are an important element in any strategy attempting to improve inter-regional trade from this region.

Although it was the only route prior to the Soviet collapse, the route via Russia is now long and expensive, rendering it unviable for trade.

*The Russia-China-India (RCI) pipeline:* India has sought the construction of an energy pipeline from Russia across Central Asia and China. India's ONGC (Oil and Natural Gas Corporation-Overseas) announced a proposal for an "Energy Highway", to construct a Russia-China-India (RCI) pipeline. The RCI is supposed to stretch from Russia through Turkmenistan, Uzbekistan, Kazakhstan, to Kashgar in Chinese Xinjiang. It will enter Kashmir via Ladakh, crossing the Siachen glaciers through Hamachal Pardesh to supply gas to Northern India. The proposed pipeline would extend over an extremely long stretch of extremely varied terrain and may cost up to \$15 Billion to build, or slightly less if connected through already operating pipelines. It is highly unlikely that the Chinese government would grant India a pipeline corridor across the line of control on the China-India border for security reasons. Since 1992, China has consistently denied Indian requests for a corridor to construct an India- Central Asia railway line through Western China, chiefly for these security reasons. Therefore, Indian requests for the construction of the RCI pipeline through Xinjiang are likely to be rejected.

*North-South corridor:* This establishes a more direct route between Russia-Iran and India. An Inter-governmental Agreement on an International North-South Transport Corridor signed in Saint Petersburg in September 2000 encompasses the common desire of the four signatories – India, Islamic Republic of Iran, Sultanate of Oman and Russian Federation – to develop transport linkages and services. However, the agreement only covers the route from India and Oman by sea to and through the Islamic Republic of Iran and further on through the Caspian Sea and the Russian Federation.

*Trans-Asian Railway North-South Corridor:* In recent years there has been an upsurge of interest in the feasibility of rail container transport as a possible alternative to shipping between Northern Europe and the Persian Gulf with shipping connections to South and South-East Asia. This corridor initiative is an expanded version of the North-South link discussed above. In order to assess this corridor, ESCAP (2001) conducted a study to identify (i) all feasible rail and land-cum-sea routes connecting Northern Europe with the Persian Gulf through the Caucasus region, Central Asia and/or the Caspian Sea; (ii) The characteristics of these routes in terms of their lengths and the transit times they can offer (iii) the possible presence of operational impediments. The ESCAP

estimates showed a distinct transit time advantage for rail over shipping, reflecting the actual differences in distances. However, these estimates have been calculated on a series of optimistic assumptions. e.g. as regards rail, the times indicated consider unimpeded movements between countries, especially between the Islamic Republic of Iran and Pakistan, and between Pakistan and India.<sup>3</sup>

*China:* China has been showing keen interest in reviving the Silk-route by extending the Urumchi-Almaty rail upto Iran. It has opened 10 border points in Xinjiang for trade and traffic with Central Asia. More than six million tons of goods are estimated to be traded between Xinjiang and the CARs, especially Kazakhstan and Kyrgyz Republic. (Warikoo, 2000).

Potentially, China could offer an effective route for the CAR countries to reach the Chinese market, and to offer a transit route to ports and shipping connections available in East Asia. The China corridor is in competition with the Trans-Siberian rail corridor. The costs at the Russian port are considered by shippers higher and services along the Northern corridor less reliable than what the Chinese route can offer. Discussions have been held with the Kyrgyz Republic, China and Uzbekistan for a rail connection through the Fergana Valley. According to a study by the ADB (2000a), development of a "Multi-Modal South Kyrgyzstan Transport Corridor" would have a considerably lower cost and greater development benefits.

*Pakistan:* Geographically, Pakistan is difficult to reach from the CAR or Caucasus countries, since practically all routes need to pass either through Afghanistan or Iran. The quality of transport infrastructure in Iran is modest to poor, and that of Afghanistan is practically not in use. The distances are also an issue: a straight line from Tbilisi (Georgia) to Karachi is about 2,800 kilometers mainly over Iran and that from Dushanbe (Tajikistan) is about 1,500 kilometers mainly over Afghanistan.

In 1998-1999, Kazakhstan, Kyrgyzstan, China and Pakistan concluded an agreement to develop the road corridor to the ports in Pakistan. The road is good but entails various mountain passes of 4,500 meter. So far the agreement has not been implemented. Land based connections from Kyrgyzstan and Kazakhstan (as well as those from Uzbekistan and Tajikistan) require a transit through Afghanistan, which has a number of problems.

*Afghanistan:* The development of the route towards Afghanistan is important for the CARs. The southern city of Termez is one of the few entry points into Afghanistan together with a few other ones in Turkmenistan. ADB supports the improvement of the road between Turkmenistan and Afghanistan. Once the infrastructure on the Afghanistan territory is available again, the route Termez-Mazaar i Sharif (Afghanistan)-Herat-Qandahar-Karachi (Pakistan) becomes a very attractive alternative for Uzbekistan, and potentially also for transit traffic through Kazakhstan and Russia.

*Iran:* In terms of logistics the ports of Iran are a promising option for shipments to South- East Asia. Experience in Iran varies from country to country, depending on the underlying political bilateral relationships. The corridor has serious capacity constraints, both in the Caspian and Persian Gulf ports and in the cross border operations by rail. Under the current conditions, shippers from Kazakhstan and Kyrgyz Republic tend to send their cargoes through China because they consider the south corridor route unreliable, both in terms of expected costs and transit times. Especially Uzbekistan, Tajikistan and Turkmenistan face fewer problems on this route and use Iranian ports, such as Bandar Abbas.

The route via Iran will be the shortest route southward. Close to the Persian Gulf, and from there to the world market this could be a practical route for the future to connect Afghanistan, Pakistan and India with a network of international oil pipelines. The USA, however prefers a Turkish pipeline to an Iranian one. (Dash, 2000)

In spite of the initial reluctance of the Central Asian countries to route its gas through Iran, primarily due to American opposition and apprehensions about the Islamic regime, countries like Kazakhstan and Turkmenistan are now favouring Iran as a transit country after Iran set up the 200KM pipeline for transferring Turkmen gas to Iran for domestic consumption of the latter. Iran is planning an extension of this network to Europe. There is also proposal of gas pipeline from Iran to India through Indian Ocean.

Tables A1 and A2 in the Appendix give details of some existing and proposed routes of trade in the Caspian region for oil and gas export respectively.

In 1996, Iran started a 295 KM railway network (Mashhad-Sarakhs-Tajan) linking Central Asia and China to the Persian Gulf. This would be one of India's most favoured routes not only because it is shorter and economical, but also because it passes through Iran, a country with which India has warm relations.

(Pandey, 2000). Another railway link that is in the pipeline, would link Mashhad and Chah Bahar, a port on Iran's Indian Ocean coast. It would transport Turkmen oil for delivery to Asian customers. (Puri, 1997)

Russia has maintained that India's Oil and Natural Gas Corporation (ONGC) Videsh would get preferential treatment in an oil exploration block only if the Russian firm, Gazprom, was considered by New Delhi for bringing piped gas from Iran. However, India has been unable to make any commitment, aware that the Gazprom route for the Iran-India pipeline crossed Pakistan's economic boundary, either onland or through shallow waters, a route that New Delhi opposes for security reasons. Gazprom has Iran's approval to prepare the feasibility study of a shallow water gas pipeline within territorial waters of Pakistan. Gazprom also signed a memorandum of understanding with Islamabad on November 11, 2002 for a pipeline crossing through Pakistan. (AGOC, 2003)

## 6. Some other issues

### *Domestic reserves vis-à-vis import*

According to estimates of the Government of India, demand for natural gas is expected to rise to 7 bn cu feet per day by 2007 and the options for gas supply most widely considered are the TAP (Turkmenistan-Afghanistan-Pakistan) project, the Iran-Pakistan-India pipeline and development of a pipeline to various sites in India from Bay of Bengal, where there has been a recent discovery of gas made by Reliance. The Krishna Godavari basin in India is estimated to have a reserve of at least 14 trillion cubic feet of producible gas.

Reliance expects to produce around 1.8 billion cubic feet a day from its Krishna Godavari deepwater offshore field. Although exact cost of production is not yet available, but the production cost is likely to be high as the production operation would have to take place offshore in the deep waters. Since most of the industries are in Western India, Reliance would also have to build pipeline from the East to the West of India. It would be from Yanam through Vizag to Goa, with a spur line to Bombay and Mangalore, through to the Hazira trunk line.

Hence although Reliance earlier worked for the Turkmenistan project, it would currently compete with the Turkmenistan and Iran pipelines. However, given the fact that Reliance's gas would be quite expensive, the proposed pipelines through Pakistan could continue to be economically more attractive.



### *Pre conditions to trade*

Energy trade initiative with the Central Asian region would require detailed cost benefit analysis of the impact of trade and the impact of setting up of infrastructure and market conducive to trade. This would require socio-economic as well as environmental impact assessment of setting up of pipelines or construction of roads, identification of barriers to trade and assessment of the cost of removal of these barriers and designing of appropriate pricing mechanism for international gas market.

### *Impact Assessment*

In comparison with other energy infrastructure projects, pipeline systems do not create major impacts on the natural environment. The greatest impacts occur during construction. This involves clearing the pipeline right-of-way and crossing watercourses along the route.<sup>4</sup> During the operating life of the pipeline it is necessary to patrol the system for potential leaks and encroachment from other land uses. Gas leaks are a threat to public safety. The effects of puncturing a high-pressure pipeline due to agricultural activities or construction can be catastrophic for the pipeline and any people who are in the vicinity.

During construction, pipelines are most susceptible to disruption from terrorism and sabotage. It is important that all governments provide security for construction crews. Once in service, history demonstrates that pipeline operations are only disrupted for short terms by sabotage. Compressor stations can be designed to withstand attack or constructed in safer locations.

In the case of emergencies, pipeline inspection and repair personnel would be needed to access the pipeline without unnecessary restrictions on passage when crossing national borders. Each country that the pipeline transits should be prepared to provide protection for personnel and facilities as required.

### *Assessment of transportation cost*

In the CIS 7 + 2 transport costs are at least three times higher than in the developed countries. Unofficial payments further exacerbate this situation and deteriorate their international competitiveness (For example, truckers that transit Caucasus or Central Asian countries typically have to pay up to USD 1,500-2,000 in unofficial payments or for semi-compulsory guard services.) Depending on the world market prices of the commodities, total transportation costs (official and informal) in these countries may amount up to 50 percent of the value of the goods, which far exceeds the comparable costs of the main competitors

outside the CIS 7+2. (Molnar and Ojala, 2003). The costs on the different transport corridors show a great variation, e.g. the USD per km costs from Almaty to Moscow, Baku, Tehran or Urumqi routes can be between 0.76-1.90 for road and 0.27-0.76 for rail transportation. Small and medium sized enterprises (SMEs) with little international experience suffer the most. The transportation cost disparities need to be resolved before trade can be initiated.

### *Barriers to international trade and transport*

Despite the many benefits of energy trade a number of factors have constrained it in the CAR countries including the following.

1. National policies generally favor self-sufficiency and import substitution at the expense of trade and rationalization of energy use. In the Central Asian region, each country tends to encourage energy exports and discourage energy imports. These policies inhibit the rationalization of energy use, limit market size, and raise the real resource cost of energy for all the countries.
2. Physical infrastructure—such as new transmission pipelines and power generation and transmission lines, as well as improved railway capacity and storage facilities—are needed to expand energy trade. The high capital cost of these infrastructure projects and the long investment recovery period present considerable risks to the private sector. To mitigate the risk, most private infrastructure projects are financed through a combination of private and public funds. Consistency and transparency in government policies in these countries would become crucial in attracting and retaining private financing for infrastructure development.
3. While the neighboring countries are willing to assume a greater share of the ownership for future activities to promote regional cooperation, the limited financial resources available to participating governments often impede the process.

The list of direct and indirect barriers to trade and transport is very long. The indicated barriers include (Molnar and Ojala, 2003):

1. Corruption
2. Transparency and access to information
3. Role of the state and international agreements: regional cooperation, multilateral conventions and bilateral arrangements
4. Customs and other border agencies
5. Efficiency of transport operators

6. Under-developed logistics services
7. Multi-modal transport still to be developed
8. Physical infrastructure impediments.

While the first seven categories of trade and transport barriers, which are mostly of an institutional nature determine the basis for trade and transport facilitation, the physical shortcomings of the transport infrastructure are not negligible.

#### *Impediments to developing an international gas market*

So far most of the gas trade has been localized because of the costly infrastructure and high cost of delivery. To develop this sector as a reliable and consistent energy provider of the economy, huge investments would be required not only at the upstream level of gas exploration and development but also at the downstream level of construction of transportation infrastructure to facilitate trade in gas and its use domestically. Absence of market based pricing mechanism in the energy sector in the CIS countries as well as some of the importing and transit countries like India and Pakistan would discourage private investments in the gas sector. The costs associated with development of a full fledged gas market would include marketing cost to attract consumers as well as financiers and the initial huge capital requirement for exploration, development, liquefaction, pipeline and shipping. Even at the domestic level pipeline network form the gas gathering centers to the utilities need to be set up and final users need to be connected through a national or municipal grid. ‘

#### *Gas vis-a-vis oil for trading*

When considered in the context of a national fuel strategy, imported natural gas usually ranks behind the use of indigenous sources of energy. Around 20 percent of world gas production is traded across borders, compared to 50 percent of crude oil. Three quarters of the cross-border gas trade is delivered by pipeline of which a third originates in the former Soviet Union (BP Statistical Review of World Energy, 2001). The additional risk and expense in transporting the gas long distance to the importing market make imported gas less attractive in price to domestic alternatives. In order to compete with indigenous fuels, the price must be based on thermal equivalence rather than parity with imported crude oil. Otherwise, gas users are subject to the same volatility that has dominated the market for crude oil.

Trans-national trade in natural gas is conducted in the context of bilateral or multilateral long-term gas sales and purchase agreements (GSPA) that link discrete sources of production to specific markets. As a result, markets for natural gas imports are segmented and defined by transportation systems with limited capacity in comparison to crude oil that is traded on the basis of individual cargoes at internationally quoted prices.

#### *Mode of transportation: LNG or pipeline?*

Gas transported by pipeline is usually cheaper than that as LNG over shorter distances. A typical rule of thumb is that pipeline gas is cheaper for distances upto 3000 to 4000 KM for an on shore pipeline and 1000-2000 KM for an offshore pipeline. However, factors like gas quantities, type of terrain, water depths etc also need to be taken into account. Although pipelines give more security of supply, the life of LNG trade depends on the reserve life and market demand. The pipeline project also has limited scope for increasing flow, particularly on a long distance line. Although the use of pipelines is a relatively well-established technology, its usage across international borders calls for detailed multilateral negotiations and settlements, which in the case of import from the Caspian region would become increasingly complicated with increase in the number of borders to be crossed. The key issues, which need to be solved, are security of supply in terms of economic and political cooperation between the supplier, transit and buyer countries and settlement of tariff charges for the transit countries.

*Pricing in case of pipeline transportation:* Imported gas is transported as either pipeline quality natural gas or liquefied natural gas (LNG). The issue of whether a high-pressure pipeline or LNG carrier will deliver imported gas is primarily a function of the capital costs involved in transporting natural gas over long distances. Presently, the cross-over point where it is more economical for LNG to be delivered than natural gas is 2000 Km by submarine pipeline and 4500 Km by on-shore pipeline.

The GoI signed an MoU in 1993 to develop a project to transport 50.75 MMcm/day of gas via a pipeline on an offshore route outside the territorial waters of Pakistan landing in Kutch in India. However, permission was not granted for a feasibility study in the Pakistan EEZ (extended economic zone). A pipeline route avoiding the Pakistan EEZ would have to have a deep water routing, which would have a very high capital cost. Also it would be difficult to estimate a meaningful capital cost Information on routing, water depth, sea bed

condition etc are necessary and calculation of the long run marginal tariff would subsequently become difficult. The shallow water option would require the cooperation of the Government of Pakistan

*Pricing in case of LNG import:* Natural gas can be transported through special cryogenic tankers after it is converted to liquid form at  $-160^{\circ}\text{C}$ , when its volume gets reduced by 600 times. However, special port facilities need to be created to receive the LNG tanks in importing countries for sending it to the regassification plant. The regassified natural gas can then be transported to the end consumers through pipelines. The entire chain is highly capital intensive and hence strict 'take or pay' conditions need to be built-in the contracts. This also entails prior tie-ups with the end consumers before the investments are made, for which the price of LNG needs to be competitive.

#### ***Commercial issues related to gas projects***

Natural gas suppliers and purchasers must deal with a variety of commercial issues. The approach to gas marketing depends upon whether the constraints are due to supply or market demand and the level of investment required for development.

Before India commits itself into any long term purchase agreements with any country, detailed analyses of the projected demand for gas in the country, optimal import alternatives, possible expansion of the gas infrastructure in the country and the economic cost of developing this infrastructure and the key economic, regulatory, and legal issues related to gas imports need to be undertaken.

The demand projections for gas from all the key industrial sectors, in particular the power and fertilizer sectors need to be reviewed and new demand projections developed under various pricing scenarios. Supply projections can be compiled after taking feedbacks from producers, ministry officials, and industry organizations. Supply and demand projections can then be synthesized to determine alternative gas import requirements under various scenarios.

All of the potential import options, both pipeline and LNG, need to be considered from a technical, economic, and political perspective. The underlying economics of gas supply from the various exporting countries need to be analyzed, and each project needs to be ranked according to both techno

economic feasibility and risk. The financing requirements and the capacity of the local markets to raise project financing also need to be investigated.

From the above discussions, it is apparent that although the Central Asian region offers a potential alternative to energy supply through import to India, various factors related to geopolitical stability, geographical inaccessibility, underdeveloped international as well as domestic gas markets and cost benefit comparison of routes of transportation on the one hand and comparison of pipelines vis-à-vis road on the other need to be resolved before India can venture into any long term energy import agreement. In this context the industries, as representatives of end users as well as investors, research organizations and the governments of the stake holding countries have major role to play (Stickley, 2002).

#### **7. Role of industries**

The role of the industries would be to establish and strengthen ties with their counterparts in the Central Asian region and ensure that there is more frequent exchange of delegations. They would also disseminate information widely amongst Indian businessmen through their publications, bulletins and other periodicals regarding potential Indian exports to countries of the CIS Region. They could organize seminars and workshops at regular intervals to create awareness regarding the untapped potential that exists in the region for exporting goods. These seminars/workshops could be held in industrial centers for wider coverage.

#### **8. Role of think tanks**

Detailed studies are required to determine the financial and economic viability of a coordinated program for rehabilitating, upgrading, and operating the existing gas infrastructure, including constructing new branch pipelines and completing the parallel gas transmission pipelines. Detailed research and analysis is required on the following areas:

1. Gas sector: Identify the main factors influencing development of the gas sector like interfuel substitution and pricing structure of gas and to identify barriers to efficiency of production, transmission and distribution of gas
2. Transmission and distribution: Review of technical specifications and present capacity of the existing transmission pipeline and study the scope for rehabilitation and upgradation; to identify the main obstacles to construction and implementation of parallel gas transmission pipelines.

3. Gas trade: Identify financial and commercial barriers to gas trade; estimate economic costs of gas production, transmission, and distribution; review of pricing principles for sale, transportation and purchase of natural gas among the participating countries; identification of institutional barriers to gas trade; identify intercountry agreements on institutional, contractual and gas pricing arrangements for efficient operation.
4. Analyze the technical feasibility of rehabilitating and upgrading the existing pipeline system and completing the parallel gas transmission pipeline; estimate the required investment for this, identify possible private and public sector sources of funding for this.
5. Conduct environmental and socio-economic impact assessment of pipeline construction, demolition of existing facilities, and transportation of oil and gas; estimate cost of compensation and rehabilitation of displaced/affected inhabitants along the route of the pipeline.

## 9. Role of government

In respect of traded commodities such as oil, coal, and petroleum products, governments need to be encouraged to remove all tariff and nontariff trade barriers, so that indigenous production, if any, becomes rationalized and efficient as a result of international competition. In respect of traditionally nontraded commodities such as natural gas and electricity, policies should support construction of power transmission lines and gas transmission pipelines to enable cross-border trade. Hydropower and geothermal resources are best traded in the form of electricity, while natural gas can be competitively traded only if transnational gas transmission pipelines are in place. Natural gas can also be supplied from one country to another in liquefied form under long-term take-or-pay contracts between a dedicated supplier and a dedicated consumer. All the major stakeholders in gas projects viz. the gas producer, pipeline purchaser, industrial end user taking direct delivery, local distribution company, commercial and residential users and the transporter need to be involved while designing the contracts.

Political instability is often translated into disputes over economic issues that have the potential result in disruption of supply. Commonly, these disputes are over transit fees.<sup>5</sup> Other economic disputes have concerned the allocation of gas deliveries among countries that are along the pipeline's route. Both categories of risk would be of concern in the promotion of Pipeline from the Central Asian countries to India.

## *Pipeline Agreements*

In addition to the international conventions, India would have to enter into bilateral gas importation and pipeline agreements with the individual nations. These agreements would have to contain specific details regarding consents, environmental protection, inspections, security arrangements, pipeline access, and abandonment. Provisions would also have to be included for the settlement of disputes by negotiation between the governments or a hearing before a Commission or Arbitration Tribunal whose decision is final and binding on the parties. It is important that the treaty contain provisions for the parties to continue to perform their respective obligations for supply, transit and payment during the dispute resolution process. In particular, the right and obligation of the supplier to terminate delivery to any purchaser who disrupts deliveries to other buyers could be incorporated. In the event the exporting or transit nation disrupts delivery to the end-user, the funds are paid to the injured party under a right of offset.

## *Guarantees and Credit Enhancement*

Project sponsors and lenders may require that national governments provide commitments to support a gas import project to reduce the perception of risk in order to make the project financeable. International lenders (commercial and development banks) and export credit agencies need the comfort of knowing the government is fully behind the project. It might seem unjustifiable on the part of the government to guarantee the performance of a project once the gas and power sectors are opened to private investment. However, some partial risk guarantees and some partial credit guarantees might be required in the beginning for the process to take off successfully.

## 10. Conclusion

There is a long list of barriers to trade and transport that drive the costs high and make them unpredictable. The CIS - 7 countries have small and fragmented transport markets (this is not the case for Kazakhstan or Turkmenistan) that seldom can enjoy scale economies in their operations. When a country is landlocked the problem is even worse, as it is detached from the major transport and trade flows. Therefore closer regional cooperation could lead to better utilization of the scale economies also in transport. The serious regional issues that currently constrain trade and economic growth in CIS 7+2 countries can only be effectively addressed through improved cooperation among the countries. The business community needs better access to reliable information with regard to international trade and transport.

## Endnotes

- <sup>1</sup> It is an exclusive Indian consortium, the partners and their participating interest in this exploration project are: OVL 40 per cent (Operator), IOC 40 per cent and OIL 20 per cent.
- <sup>2</sup> Council for Mutual Economic Cooperation. The Council arranged trade between the former Communist countries. In practice it benefited the Soviet Union more than the other countries. Oil was traded at an artificially low price but so were the products of the other members. The organization has been dissolved and the former members are attempting to trade using dollars, which they don't have, or by barter. Trade has shrunk.
- <sup>3</sup> In the field of railways, an important feasibility study was completed in 1996 on the development of the Trans-Asian Railway in the Indo-China and ASEAN sub-region. Additionally, in 1999, a study on the development of the Trans-Asian Railway in the Southern Corridor of Asia-Europe routes was completed with a view to connecting Thailand and Yunan province of China with Turkey as well as Europe and Central Asia through Myanmar, Bangladesh, India, Pakistan and the Islamic Republic of Iran. Nepal and Sri Lanka also took part in the study.
- <sup>4</sup> Once the pipeline is buried, the area disturbed can be revegetated so long as it does not become a problem to inspect and access the pipeline.
- <sup>5</sup> Transit fee disputes have resulted in the 1971 closure of the Tapline Pipeline, and Iraq-Syria Pipeline in 1979.

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## Appendix

### **Kazakhstan**

Kazakhstan has the Caspian Sea region's largest recoverable crude oil reserves, and accounts for approximately two-thirds of the production in the region. As foreign investment pours into the country's oil and natural gas sectors, the country is beginning to realize its enormous production potential. Kazakhstan exports its natural gas production from the west to Russia while importing around 40 per cent of its gas requirements in the southeastern part of the country from Turkmenistan and Uzbekistan (ADB, 2002). Six gas pipelines connect Kazakhstan to other countries in the Central Asian region and the Russian Federation.

Kazakhstan's combined onshore and offshore proven hydrocarbon reserves have been estimated to be between 9 and 17.6 billion barrels. It is expected to become a significant player in world oil markets over the next decade. It produced approximately 939,000 barrels of oil per day (bbl/d) in 2002 and consumed only 140,000 bbl/d, resulting in net exports of 799,000 bbl/d. Kazakhstan has so far exported oil northward (via the Russian pipeline system and rail network), westward (via the Caspian Pipeline Consortium Project and barge to Azerbaijan); and southward (via swaps with Iran). Markets for exported Kazakhstani oil are growing rapidly, with oil being delivered to world markets through the Black Sea (via Russia) and the Persian Gulf (via swaps with Iran), as well as some additional traffic northward to Russia via pipeline and rail.

International projects have taken the form of joint ventures with Kazmunaigaz (formerly Kazakhoil), the national oil company, as well as production-sharing agreements (PSAs), and exploration/field concessions. In June 2003, the government of Kazakhstan announced a new Caspian Sea development program, which calls for new offshore blocks to be auctioned beginning in 2004. According to the plan, the first offers will be made to Kazmunaigaz, which will then conduct tenders for partnerships. Most of the growth in oil production is expected to come from three enormous fields viz. Tengiz, Karachaganak, and Kashagan. Till new markets for Kazakh natural gas are opened up Kazakhstan serves as an important natural gas transit center for Turkmen and Uzbek natural gas that is piped to Russia and beyond. (EIA, 2003)

### **Turkmenistan**

Turkmenistan stands third in the world in terms of natural gas reserves but has not been able to successfully trade this resource apart from in moderate amounts to Iran. The 1994 decision by Gazprom to stop Turkmen gas exports through its pipelines to European markets had a disastrous impact on the Turkmen economy,

its budget, and on the real incomes of the population. The economic future and political viability of this country largely depends on securing access for its natural gas to international markets, a whole variety of options is being explored to bypass the Russian dominance. The country has expressed its desire to welcome any pipeline proposal that offers an outlet for Turkmen natural gas. Plans to build a pipeline to carry Turkmen gas through Afghanistan to Pakistan and beyond to India were stalled by the continuing civil war in Afghanistan. Attention now centers on a trans Caspian gas pipeline, which would pass through Azerbaijan and Georgia to markets in Turkey and possibly beyond in Europe.

### **Kyrgyz Republic and Tajikistan**

Both Kyrgyz Republic and Tajikistan are heavily dependent on Turkmenistan and Uzbekistan for natural gas imports although the latter has been a significant producer of natural gas in recent times. The main constraints identified by the ADB for interregional trade are national policies of the regional countries that favor self sufficiency and import substitution at the expense of trade and rationalization of energy use, poor infrastructure, absence of institutional and regulatory framework for cross border supply of energy, inadequate legal frameworks for ensuring payment for energy supplies and settlement of disputes and absence of appropriate energy policies in the countries.

**Table A1. Oil export routes and options in the Caspian Sea region**

Name/Location	Route	Crude Capacity	Length	Estimated Cost/Investment	Status
Atyrau-Samara Pipeline	Atyrau (Kazakhstan) to Samara (Russia), linking to Russian pipeline system	Recently increased to 310,000 bbl/d	432 miles	Increase in capacity cost approximately \$37.5 million	Existing pipeline recently upgraded by adding pumping and heating stations to increase capacity.
Baku-Ceyhan ("Main Export Pipeline")	Baku (Azerbaijan) via Tbilisi (Georgia) to Ceyhan (Turkey), terminating at the Ceyhan Mediterranean Sea port	Planned: 1 million bbl/d	Approximately 1,038 miles	\$2.9 billion	One-year detailed engineering study completed in June 2002. Construction on Turkish section of pipeline began in June 2002. Completion of entire pipeline targeted for 2004, exports by Feb. 2005.
Baku-Supsa Pipeline (AIOC "Early Oil" Western Route)	Baku to Supsa (Georgia), terminating at Supsa Black Sea port	Recently upgraded from 115,000 to 145,000 bbl/d; proposed upgrades to between 300,000 bbl/d to 600,000 bbl/d	515 miles	\$600 million	Exports began in April 1999; approximately 115,000 bbl/d exported via this route in 2001.
Baku-Novorossiisk Pipeline (Northern Route)	Baku via Chechnya (Russia) to Novorossiisk (Russia), terminating at Novorossiisk Black Sea oil terminal	100,000 bbl/d capacity; possible upgrade to 300,000 bbl/d	868 miles; 90 miles are in Chechnya	\$600 million to upgrade to 300,000 bbl/d	Exports began late 1997; exports in 2001 averaged 50,000 bbl/d

*Table A1 continued*

*Table A1 continued*

Name/Location	Route	Crude Capacity	Length	Estimated Cost/Investment	Status
Baku-Novorossiisk Pipeline (Chechnya bypass, with link to Makhachkala)	Baku via Dagestan to Tikhoretsk (Russia) and terminating Novorossiisk Black Sea oil terminal	Currently: 120,000 bbl/d (rail and pipeline); 160,000 bbl/d; Planned: 360,000 bbl/d (by 2005)	204 miles	\$140 million	Completed April 2000. Eleven-mile spur connects bypass with Russia's Caspian Sea port of Makhachkala.
Caspian Pipeline Consortium (CPC) Pipeline	Tengiz oil field (Kazakhstan) to Novorossiisk Black Sea oil terminal	Currently: 565,000-bbl/d; Planned: 1.34-million bbl/d (by 2015)	990 miles	\$2.5 billion for Phase 1 capacity; \$4.2 billion total when completed	First tanker loaded in Novorossiisk (10/01); exports rising to 400,000 bbl/d by end-2002
Central Asia Oil Pipeline	Kazakhstan via Turkmenistan and Afghanistan to Gwadar (Pakistan)	Proposed 1 million bbl/d	1,040 miles	\$2.5 billion	Memorandum of Understanding signed by the countries; project stalled by regional instability and lack of financing.
Iran-Azerbaijan Pipeline	Baku to Tabriz (Iran)	Proposed 200,000 bbl/d to 400,000 bbl/d	N/A	\$500 million	Proposed by Total FinaElf.
Iran Oil Swap Pipeline	Neka (Iran) to Tehran (Iran)	175,000 bbl/d, rising to 370,000 bbl/d	208 miles	\$400 million to \$500 million	Under construction; oil will be delivered to Neka and swapped for an equivalent amount at the Iranian Persian Gulf coast.

*Table A1 continued*

Table A1 continued

Name/Location	Route	Crude Capacity	Length	Estimated Cost/Investment	Status
Kazakhstan-China Pipeline	Akt'yubinsk (Kazakhstan) to Xinjiang (China)	Proposed 400,000 bbl/d to 800,000 bbl/d	1,800 miles	\$3 billion to \$3.5 billion	Agreement 1997; feasibility study halted in September 1999 because Kazakhstan could not commit sufficient oil flows for the next 10 years.
Kazakhstan-Turkmenistan-Iran Pipeline	Kazakhstan via Turkmenistan to Kharg Island (Iran) on Persian Gulf	Proposed 1million bbl/d	930 miles	\$1.2 billion	Feasibility study by Total/FinaElf; proposed completion date by 2005.
Khashuri-Batumi Pipeline	Dubendi (Azerbaijan) via Khashuri (Georgia) to Batumi	Initial 70,000 bbl/d, rising to 140,000 bbl/d-160,000 bbl/d	Rail system from Dubendi to Khashuri, then 105-mile pipeline from Khashuri to Batumi	\$70 million for pipeline renovation	Chevron/Texaco has canceled plans to rebuild and expand the existing pipeline.
Trans-Caspian (Kazakhstan-Twin Pipelines)	Aqtau (western Kazakhstan, on Caspian coast) to Baku; could extend to Ceyhan	N/A	370 miles to Baku	\$2 billion to \$4 billion (if to Ceyhan)	Feasibility study agreement signed in December 1998 by Royal/Dutch Shell, Chevron/Texaco, Exxon/Mobil, and Kazakhstan; project stalled by lack of Caspian Sea legal agreement.

Source: Report of Energy Information Administration, EIA, 2002

Table A2. Natural gas export routes and options in the Caspian Sea region

Name/Location	Route	Capacity	Length	Estimated Cost/Investment	Status
<b>Baku-Erzurum</b>	Baku (Azerbaijan) via Tbilisi (Georgia) to Erzurum (Turkey), linking with Turkish natural gas pipeline system	Planned 254 Bcf capacity	540 miles	\$1 billion (includes up to \$500 million to construct new Azeri section)	Financing being arranged, construction originally scheduled to start in summer 2002.
<b>"Centgas" (Central Asia Gas)</b>	Daulatabad (Turkmenistan) via Herat (Afghanistan) to Multan (Pakistan). Could extend to India.	700 Bcf/year	870 miles to Multan (additional 400 miles to India)	\$2 billion to Pakistan (additional \$500 million to India)	Memorandum of Understanding signed by Turkmenistan, Pakistan, Afghanistan, and Uzbekistan. Presidents of Pakistan, Afghanistan, and Turkmenistan met in May 2002 to discuss reviving this pipeline idea.
<b>Central Asia-Center Pipeline</b>	Turkmenistan and Uzbekistan via Kazakhstan to Saratov (Russia), linking to Russian natural gas pipeline system	3.5 Tcf/year	Existing route	N/A	Operational. Turkmenistan is using this pipeline to export a total of 8.83 Tcf to Ukraine (via Russia) from 2002 to 2006, as well as smaller amounts to Russia.



Table A2 continued

Name/Location	Route	Capacity	Length	Estimated Cost/Investment	Status
<b>China Gas Pipeline</b>	Turkmenistan to Xinjiang (China). Could extend to Japan.	1 Tcf/year	4,161 miles; more if to Japan	\$10 billion to China; more if to Japan	Preliminary feasibility study done by ExxonMobil, Mitsubishi, and CNPC
<b>Trans-Caspian Gas Pipeline (TCGP)</b>	Turkmenbashi (Turkmenistan) via Baku and Tbilisi to Erzurum, linking with Turkish natural gas pipeline system	565 Bcf in first stage, eventually rising to 1.1 Tcf/year	1,020 miles	\$2 billion to \$3 billion	Project stalled; negotiations between Turkmenistan and Azerbaijan over pipeline volumes restarted in October 2001.
<b>Korpezhe-Kurt-Kui</b>	Korpezhe (Turkmenistan) to Kurt-Kui (Iran)	283-350 Bcf/year; expansion proposed to 459 Bcf/year by 2005	124 miles	\$190 million; 2005 expansion: \$300 million to \$400 million	Operational since December 1997.

Source: Report of Energy Information Administration, EIA, 2002

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