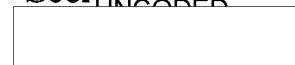


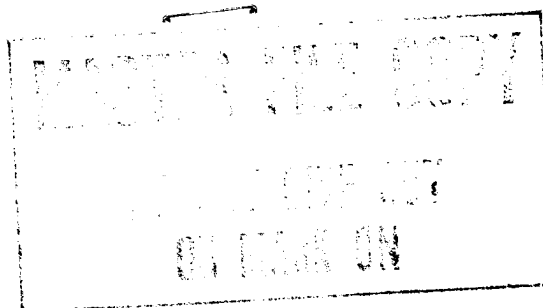


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# Iranian Natural Gas: An East-West Issue



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An Intelligence Assessment

DOE review completed.

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July 1983

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# Iranian Natural Gas: An East-West Issue



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**An Intelligence Assessment**

This paper was prepared by  Office  
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**Iranian Natural Gas:  
An East-West Issue**

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**Key Judgments**

*Information available  
as of 1 June 1983  
was used in this report.*

For a number of years Iran's enormous natural gas reserves—exceeded only by the Soviet Union's—have been viewed as a potential source of supply to Western countries. In particular, some West Europeans recently hoped Iran would be a means of diversifying their gas suppliers and providing opportunities for business by constructing a pipeline through Turkey. To realize its gas export potential, however, Tehran will have to overcome a number of obstacles:

- Competition from other gas suppliers with cost advantages in major markets, such as the USSR and North Africa in Europe and Indonesia in the Japanese market.
- Iran's limited ability to finance a natural gas export pipeline or liquefied natural gas facility.
- Technical limitations on developing high-pressure, deep offshore gas deposits.

The economics of transporting Iranian gas long distances make the Soviet Union the most likely outlet for Iranian gas in the foreseeable future. Any further decline in energy prices over the coming years would make a Soviet deal even more attractive to Tehran because Iranian exports to Western Europe would become less economic. Given present energy prices, we believe only a political commitment by Iran to accept \$1 to \$2 per million Btu less for its gas, or a willingness on the part of West European buyers to subsidize purchases by a similar amount, would result in Iranian gas sales to the West. In the absence of such a commitment, we doubt that an Iran-to-Western Europe gas project would proceed.

For its part, Moscow remains interested in importing Iranian gas, largely because imports potentially could supply the needs of the southwestern region of the USSR more cheaply than domestic gas. Lack of agreement on pricing, method of payment, and the strained relations between the two countries have prevented a deal, although this could change. We believe the Soviets may also be concerned that Iran could become a potential competitor in the West European market, particularly if a political deal can be struck between the two sides. By purchasing Iranian gas and attempting to expand sales of its own gas to potential Iranian customers in Greece and Turkey, Moscow no doubt hopes to minimize the potential threat. If the USSR can preempt a West European-Iranian deal, it would help underpin the growing Soviet hold on the European energy market while simultaneously giving the Soviets a potentially important link with the Iranians.

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Figure 1  
Iran: Major Oil and Gasfields



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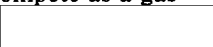
**Iranian Natural Gas:  
An East-West Issue**



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**Introduction**

Iran's vast gas reserves have caused several countries to view Iran as a potential supplier. Before the Shah's ouster, West European governments viewed development of Iranian gas as a means of diversifying gas suppliers and providing business opportunities that might also link Tehran more closely to the West. Japan has also long viewed Iran as a possible source of liquefied natural gas (LNG) and a business opportunity for Japanese firms. During the past 18 months, press reporting indicates that several West European purchasers have considered discussions with Tehran on the issue of a gas pipeline, but the temporary gas glut, pricing issues, and financing questions have prevented any concrete movement on the project. Nonetheless, we believe the publicity surrounding the project has caused the Soviet Union to become concerned about Iran's potential to compete as a gas supplier in the European market.



**The Resource Base**

Iran's natural gas reserves exceed those of all other Middle Eastern countries combined and place Iran second only to the USSR in total proved reserves. According to the most recently available industry estimates, Iran's proved reserves are more than 10,000 billion cubic meters (bcm) and have helped stimulate worldwide interest in Iranian gas export potential for the past several years (see table 1). More than 50 percent of the reserves are found in association with oil in the Khuzestan fields in southwestern Iran. Huge deposits of nonassociated gas are located in the southeast near Kangan (see figure 1). The onshore fields of Kangan and Nar contain some 700 bcm in reserves; the offshore Pars field and adjacent fields contain more than 2,600 bcm of gas. Smaller gasfields are located in two other areas of the country—in the northeast at Sarakhs and Khangiran and around Qeshm Island and Bandar Abbas, near Iran's southwest coast. Industry analysts believe additional exploratory drilling could substantially boost estimates of Iran's natural gas reserves, potentially doubling reserves of nonassociated gas.



**Table 1**  
**Iran: Estimated Natural Gas Reserves by Field <sup>a</sup>**

*Billion cubic meters*

	Proved	Ultimately Recoverable
<b>Total</b>	<b>10,400</b>	<b>16,573</b>
Associated		
Khuzestan oilfields	5,728	5,728
Nonassociated		
Pars (C structure)	1,529	2,123
B, F, G structures	1,161	5,493
Nar	396	595
Kangan	311	595
Khangiran	510	510
Sarakhs	85	595
Qeshm (Gavarzim and Salakm)	113	226
Sarkhun	142	283
Others	425	425

<sup>a</sup> Based on 1977 official reserve estimates of the National Iranian Gas Company. Subsequent depletion of 218 bcm has been taken into account.



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**Production Options**

Because of the heavy dependence on gas production in association with oil, Iranian gas output in recent years has fluctuated widely in line with wide swings in oil production. During 1976-78, gas production—nearly all in association with oil production—averaged almost 54 bcm per year and nearly half of this gas output was flared or vented (see table 2). Disruptions in the oil sector beginning with a workers' strike in 1979, the onset of the Islamic revolution, and Iran's war with Iraq caused a major decline in both oil and gas output by yearend 1980. As oil production slipped from 3.2 million barrels per day (b/d) in 1979 to under 1 million b/d by yearend 1980, associated gas

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**Table 2**  
**Iran: Estimated Gas Production and Use <sup>a</sup>**

*Billion meters per year*

	1976	1977	1978	1979	1980	1981	1982 <sup>b</sup>	Current <sup>c</sup>	1990 <sup>d</sup>
<b>Gas production</b>	<b>50</b>	<b>57</b>	<b>55</b>	<b>40</b>	<b>20</b>	<b>17</b>	<b>28</b>	<b>35</b>	<b>100+</b>
Flared	28	26	26	16	9	8	16	20	10
Reinjected	1	9	10	4	2	2	2	2	30-42
Marketed production	21	22	19	20	9	7	9	13	60-48
Domestic	11	12	12	15	8	7	9	13	39
Oil industry	4	4	4	3	2	1	1	3	4
Petrochemical	2	3	3	3	2	1	1	1	12
Domestic/commercial industrial	2	3	4	5	3	4	6	7	18
Shrinkage and loss	2	2	2	2	1	1	1	2	5
Exports	9	9	7	5	NEGL <sup>e</sup>	0	0	0	21-9

<sup>a</sup> Due to rounding, components may not add to totals shown.

<sup>b</sup> Associated gas production estimated at oil-production levels of 2.5 million b/d.

<sup>c</sup> Associated gas production estimated at oil-production levels of 3.0 million b/d.

<sup>d</sup> Associated gas production estimated at oil-production levels of 3.5 million b/d. Assumes all associated gas production reinjected or flared and gas reinjection plans for nonassociated gas are implemented.

<sup>e</sup> Negligible—less than 1 bcm per year.

[Redacted]

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output slipped to about 20 bcm per year, remaining slightly below that level during 1981. As oil production began to climb once again—reaching nearly 3 million b/d in late 1982—associated gas production also rose. Iran is presently producing about 35 bcm per year, more than half of which is flared. [Redacted]

The amount of gas available for export at this level of production will depend in part on Iran's plans for domestic consumption. [Redacted]

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[Redacted] Iran has the potential to produce more than 100 bcm per year of gas by 1990, a rate that could be sustained for at least a decade. [Redacted]

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[Redacted] Iran's ability to reach this level will depend on the country's oil production and development of nonassociated gasfields. If oil production stabilizes at 3.5 million b/d, Iran would probably have to produce more than 50 bcm from nonassociated gasfields. Nonassociated gas production at this level would eventually force Iran to develop the giant offshore Pars field. [Redacted]

[Redacted] we believe Tehran will have roughly 50 to 60 bcm of gas per year for other domestic needs or export by 1990. Whether Tehran would make any of this gas available for export will depend on its ability to find customers. [Redacted]

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<sup>1</sup> Gas reinjection is used to enhance oil recovery by maintaining oil reservoir pressures. [Redacted]

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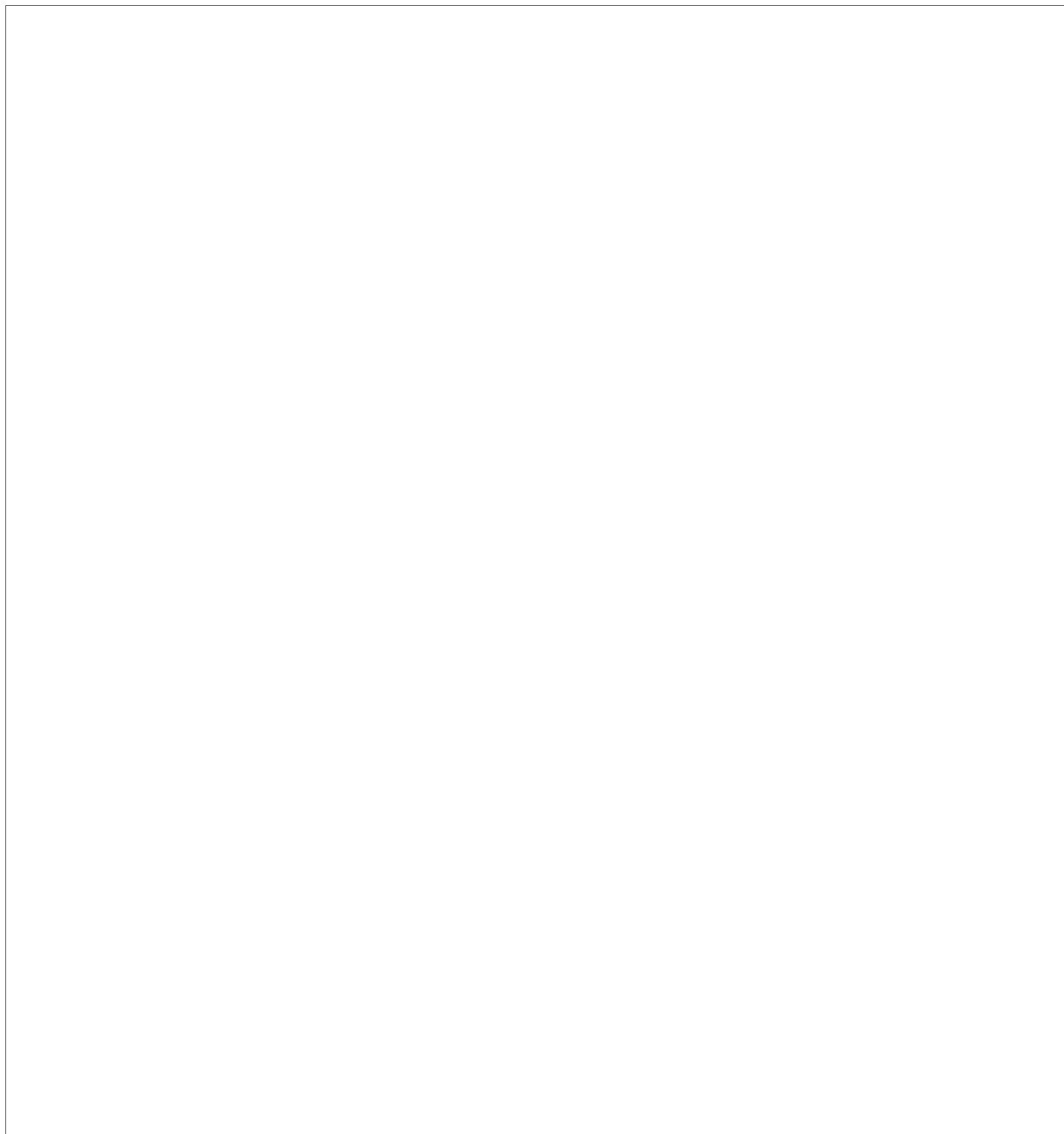
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**Finding Western Outlets—The 1980s**

By virtue of geographic location, countries in southern Europe—particularly Turkey, Italy, and Greece—would be the most natural markets for Iranian gas. Italy already receives ample supplies of imported gas from three sources, however, and gas demand in

Greece and Turkey is relatively small because of the lack of an extensive gas infrastructure. Still, the markets in Turkey and Greece are key steppingstones for Iranian entry to the larger West European market because Tehran will need to sell gas in transit to minimize the cost of delivery. All the other major

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West European gas purchasers, however, already have contracts in hand for sufficient gas supplies to meet projected needs in the 1980s, leaving virtually no room for Iranian sales. [redacted]

Iran's potential to supply countries in the Far East in this decade—particularly Japan, South Korea, and Taiwan—also is limited by competition from other suppliers, especially Indonesia. Japan already has contractual obligations with six countries for LNG supplies that should meet all of its gas requirements well into the 1990s and will rely on Indonesia alone for nearly half of its LNG imports. We believe the market for gas in South Korea is relatively small and is likely to be met by other suppliers in the region.

[redacted]

[redacted] Taiwan faces declining indigenous gas production but does not intend to enter the LNG market in the 1980s. In any event, [redacted] Taipei probably would turn to southeast Asian suppliers to meet any incremental gas needs. [redacted]

We believe there also is little opportunity for Iranian gas to penetrate the US gas market in this decade. According to Department of Energy estimates, 90 percent of US gas consumption needs—540 bcm in 1990 and 517 bcm in the year 2000—will be met by domestic production. Canada has licenses to supply another 6 percent and has shown willingness to supply incremental volumes at competitive prices. Mexico is also in a favorable position to supply the US market, and Algeria has contracts for delivery of small volumes of LNG to the United States. Although no consideration has been given to the US market under the Khomeini regime, several projects were actively considered while the Shah was in power. [redacted]

**Iran-Turkey Gas Pipeline Proposal**

A recent scheme to export Iranian gas to the West was a proposal by Turkey last year that Iran supply up to 35 bcm of gas per year for 25 years through a pipeline network crossing Turkey into Greece and

southern Europe. While meeting all of Turkey's natural gas needs of 6.5 bcm per year, Iran would also provide more than 25 bcm to West European markets.

[redacted] several buyers in France, West Germany, and Italy had expressed interest in this project with a view toward filling gas needs in the 1990s. [redacted]

Moscow apparently has decided to challenge an Iran-to-Western Europe gas pipeline scheme by competing directly for the southern European gas markets in Turkey, Greece, and Italy. Although Soviet interest in expanding gas sales for hard currency has been keen in recent years, we believe the timing of recent overtures to Greece and Turkey suggest Moscow may be attempting to preempt the Iranian market. In particular, the Soviets recently signed a joint protocol in Istanbul setting up a pipeline feasibility study on the export of gas from the USSR to Turkey. This move came on the heels of extensive press reporting of the potential Iran-Turkey gas deal. Discussions are also under way between Moscow and Athens on extension of the Soyuz pipeline from Bulgaria into Greece. According to official Greek press releases, a definitive agreement is in its final stage. In addition, the Soviets continue to negotiate with the Italians on deliveries of Siberian gas. These efforts could effectively block Iranian access to the larger European market by limiting the amount of gas that Tehran could sell in transit. [redacted]

**Looking to the 1990s**

Unless some sort of political decision is made on the gas pricing front, the high cost of Iranian gas is likely to keep Tehran out of Western markets in the 1990s when forecasts indicate that import requirements will grow. Cost estimates for an Iranian pipeline to European markets vary greatly because of differences in right-of-way costs, transit fees, and distances. The most reliable industry estimates we have seen, however, indicate that the cost to produce Iranian gas and deliver it by pipeline to Western Europe would be about \$4 per million Btu. Assuming Tehran continues

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**Previous Export Projects**

Since the late 1960s Iran has envisioned a number of schemes to export its gas. Several countries—including the United States—have been involved in joint projects with Tehran or signed supply agreements to exploit Iranian gas reserves. In 1975 Tehran drew up an official gas export program aimed at exporting 33 bcm of gas per year during the 1980s. With the exception of limited exports to the Soviet Union in the 1970s, none of these projects has come to fruition or is presently under active consideration:

- In 1966 the USSR and Iran signed a contract for delivery of 6 bcm of gas per year beginning in 1970 to be increased to 10 bcm by the mid-1970s. Associated natural gas was collected from Iran's large Khuzestan oilfields and shipped via an 1,100-kilometer pipeline to several major Iranian cities and on to the Soviet Union.
- The National Iranian Gas Company (NIGC) and a consortium of West European, Japanese, and American companies established a joint venture (Kalingas) in 1972 to produce and export 13 bcm per year of LNG from Iran's Kangan gasfield.
- A memorandum of intent signed in 1974 by the NIGC, El Paso Natural Gas Company of the United States, and Distrigaz of Belgium called for Iran to ship up to 31 bcm per year of LNG to the United States and Western Europe. The consortium planned to transport gas via pipeline to the Turkish Mediterranean port of Iskenderun where the gas was to be liquefied and shipped to European and American markets.
- A 20-year trilateral gas swap agreement between Iran, the USSR, and Western Europe was concluded in 1975. Iran was to export 17 bcm of gas per year to the gas-deficient southwest region of the Soviet Union by way of a new pipeline system (IGAT II) beginning in 1981. In exchange, the USSR would export an equal volume of Siberian gas to Western Europe.
- A preliminary agreement between the NIGC and Columbia Gas Systems of the United States in 1978 called for the United States to import 3 bcm of LNG annually. [redacted]

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to demand a wellhead price of more than \$2 per million Btu, as it has in recent negotiations, the delivered price of gas to Western Europe would exceed \$6 per million Btu. As things now stand, Iran does not seem prepared to accept the low return on its resources that would be required to deliver gas to Western Europe at a price competitive with Soviet supplies or competing oil products—about \$4.60 per million Btu. [redacted]

LNG delivery costs also would be quite high for Iran because of long distances from potential markets. We estimate that LNG transported from the Mediterranean port of Iskenderun to southern Europe would cost at least \$5 to \$5.50 per million Btu to produce, deliver, and meet Iranian wellhead pricing demands. Shipment to Western Europe around the Cape of Good Hope from the Persian Gulf would increase costs by about \$1 per million Btu. The delivered price

of Iranian gas to the Far East would probably exceed \$5 per million Btu, and Iranian LNG to North American markets would easily exceed \$6 per million Btu. In all these markets, the cost of Iranian LNG would exceed the price of most alternative gas supplies and other competing fuels. [redacted]

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Even if Tehran were willing to match competitors' prices, other factors would probably preclude Iran's ability to export gas to Western markets. Long lead-times of five to seven years for a pipeline or LNG project would require Iran to move quickly to deliver gas by the early 1990s. Because of its war with Iraq and the prevailing soft oil market, however, Iran will face limitations on the amount of funds available for investing in an export project. [redacted]

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**Capital Costs and Leadtimes**

*Tehran probably will move cautiously before committing resources to a gas export project. Iran would face multibillion-dollar costs for field development, gas export facilities, and operation as well as encounter long development leadtimes before it could realize its gas export potential. In particular:*

- *Based on preliminary engineering studies, development of nonassociated gas reserves at Pars—where most of Iran's gas export potential exists—probably would require investment on the order of \$2 billion.*

[Redacted]

- *Based on industry cost assessments, LNG exports would require capital outlays of at least \$10 billion for liquefaction facilities, cryogenic carriers, receiving terminals, and LNG tankers.*
- *Long development leadtimes—which we estimate at between five to seven years at a minimum—would be required for shipment of Iranian gas by way of pipeline or as LNG.*

*Given these pervasive circumstances, Tehran is likely to remain reticent about embarking on a major gas export project. The uncertain market outlook for gas would make spending large sums on gas export projects economically risky for Iran.* [Redacted]

[Redacted]

Iran also lacks the technical ability to develop the large offshore nonassociated gasfields that must be brought on stream to support a major export project.

[Redacted]

Tehran lacks the specialized equipment and skilled

crews to handle the high-pressure gas in Pars, and development would almost certainly entail extensive Western assistance. We doubt that the Iranian Government would be willing to accept the magnitude of foreign involvement that would be needed to overcome the technical constraints. [Redacted]

**The Soviet Option**

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Given the limited opportunity that Western markets are expected to provide in the foreseeable future, Tehran's most attractive gas export option from an economic standpoint is to renew its gas delivery agreement with the Soviet Union. We estimate that it would cost Iran only about \$1.50 per million Btu to deliver gas to the Soviet Union through an existing pipeline. Although the USSR has the largest natural gas reserves in the world, Moscow found it economically advantageous to import Iranian gas rather than build the infrastructure necessary to ship domestic supplies to the gas-deficient republics of Armenia and Georgia near the Iranian border. [Redacted]

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The Soviets first struck a deal with Tehran in the late 1960s. Iran—with Soviet technical assistance—completed a pipeline link (IGAT I) from its gasfields in the southwest to the Soviet border for delivery of about 10 bcm of gas per year. Tehran delivered about 9 bcm per year to the Soviet Union through IGAT I until a price dispute—spurred in part by allegations that Moscow was selling gas on the West European market at prices higher than the Iranian purchase price—caused all gas deliveries to be terminated in 1979. [Redacted]

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Iranian gas still has considerable appeal to Moscow as evidenced by the Soviet approach to Tehran to resume exports late last year. Although [Redacted] the Soviets have begun to build the infrastructure necessary to supply gas users in the southern Caucasus, gas imports of about 10 bcm per year from Iran could provide Moscow with a relatively inexpensive means to supply the region by eliminating the high cost of shipping domestic supplies. Iranian gas

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imports to the southwest would then allow Moscow to divert gas for use elsewhere in the country or for export to Western Europe. [redacted]

In our view, another motivation for finalizing a deal would be Soviet desires to establish a closer commercial link with Iran and preempt the possibility of an Iranian deal with any West European government for the 1990s. Although the economics for a West European-Iranian deal are not favorable, Moscow almost certainly recognizes that a political decision could be made that would overcome the economic and financial constraints. We believe the recent Soviet push for gas sales to Greece and Turkey was motivated in part by a desire to preclude Iranian penetration of the European market. By importing Iranian gas, Moscow would also siphon off some of the most readily accessible gas that Tehran would have available for export to Western Europe. Moreover, if the Soviets could negotiate payment for gas in rubles—as was the case with Iranian gas deliveries in the 1970s—the deal would effectively be limited to a barter arrangement. At the extreme, Tehran could opt to barter its gas for Soviet arms. [redacted]

Some obstacles must be overcome before exports are resumed. Tehran and Moscow still need to reach an agreement on the price of gas deliveries and method of payment, issues that have gone unresolved for the past four years. Trade journals indicate that the Soviets have offered Iran \$3.50 per million Btu; Tehran so far has balked at the offer, demanding a minimum of \$3.80 per million Btu. We believe Moscow also would probably have to assure Tehran that it would not swap Siberian gas in Western Europe at a price above the level Iran receives for its gas. Negotiations remain deadlocked, and the recent expulsion of Soviet diplomats and banning of the Communist Tudeh Party by Tehran have further strained relations between the countries. The political situation could change, however, particularly if Tehran decides to place stronger emphasis on developing its gas reserves. [redacted]

### Western Options

Over the next several years, falling international gas prices could make the Soviet option more attractive because a major Western gas export pipeline would become even more uneconomic for Iran. The high cost of delivering Iranian gas to the West would result in prices that are probably too high to attract large customers or too low to provide acceptable profits to Tehran. In the absence of Iranian willingness to accept lower gas prices, we believe the only likely manner in which West European purchasers could obtain Iranian gas is to make a political commitment to subsidize a project. Indeed, recent press reporting indicates that some West European governments endorse strengthening business and political ties with Tehran by responding positively to recent Iranian overtures for Western assistance. Such a commitment would entail considerable costs because Iranian gas is likely to cost about \$1 to \$2 per million Btu more than alternative supplies. [redacted]

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