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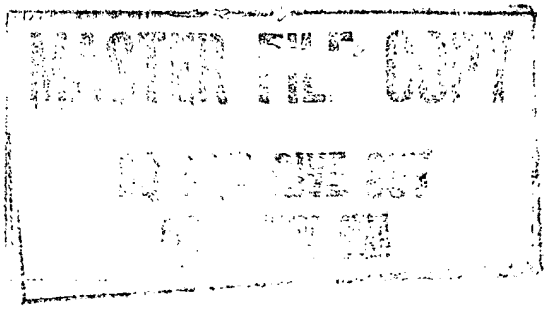

Natural Gas Markets: Growing Soviet Opportunities

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An Intelligence Assessment

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GI 84-10084
May 1984

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Natural Gas Markets: Growing Soviet Opportunities

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An Intelligence Assessment

This paper was prepared by Office of Global Issues. Comments and queries are welcome and may be directed to the Chief, Strategic Resources Division,

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Natural Gas Markets: Growing Soviet Opportunities

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Key Judgments

Information available as of 1 April 1984 was used in this report.

Western Europe and the United States are likely to become increasingly dependent on imported natural gas supplies over the next two decades if gas supply and demand trends develop as we envision:

- By the year 2000, Western Europe could be importing about 50 percent of its gas if the large untapped Norwegian reserves are not exploited by then. Even if some of the new Norwegian gas begins to flow by the end of the century and gas demand in Western Europe grows slowly, gas imports could still approach 40 percent of consumption by 2000, up from 18 percent.

- The United States could be importing about 25 percent of its gas requirements by the turn of the century, according to some private industry forecasts, although most US import needs could be met by expanded use of Canadian gas.

- Lacking significant domestic gas reserves, Japan will continue to rely on imports for about 95 percent of its gas requirements through the end of the century. Japan has developed the most diversified group of suppliers and could easily meet increased needs by expanded imports from Indonesia and Malaysia or from new projects in the Middle East or North America, although the Soviets could also enter the Japanese market by then.

Because of the seven- to 12-year leadtimes needed to bring new, non-Communist gas supplies onstream, consumers must line up supplies soon to meet their demand needs in the 1990s. Except for Soviet gas, however, the development of new gas supplies will be costly. The cost of gas from the Norwegian Troll Field, for example, could exceed current West European import gas prices by 40 to 100 percent, according to some Norwegian Government estimates. New liquefied natural gas (LNG) export projects to Western Europe may not be economic until the turn of the century,

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Failure to ensure development of new gas projects could leave the major industrialized countries more heavily dependent on Middle East oil or enhance Soviet ability to capture a greater share of the West European and Japanese gas markets in the 1990s.

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Given the likelihood of a temporary gas glut over the next several years, the supply problem in the 1990s may not be addressed fast enough. Although we expect the supply cushion to erode gradually as the 1990s approach, the need for additional supplies may not be recognized soon enough to encourage investors to make the huge capital commitments necessary to develop alternative supplies. As a result, Moscow, as the lowest cost supplier with spare export capacity, will have a golden opportunity to increase its gas sales in Western Europe. A second export pipeline to Western Europe probably would take only a fraction of the time needed to develop alternative gas supplies. In the Far East, the probable demise of a Canadian LNG export project to Japan could pave the way for Japanese purchases of Soviet gas from the Sakhalin project.

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To avoid increased reliance on Soviet gas, the West Europeans will probably have to make a political commitment soon to develop large, new indigenous supplies to meet gas needs in the 1990s or promote export projects in Africa and the Middle East. Development of the Norwegian Troll Field will probably require tax concessions or subsidies to get off the ground, and consumers will probably have to pay a premium for security of supply. In the Japanese market, a proposed Alaskan LNG export project—similar in size to the one operating—could avoid Japanese reliance on Soviet gas, if Tokyo's official interest in the Soviet Sakhalin gas project can be overcome.

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Natural Gas Markets: Growing Soviet Opportunities

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Introduction

Natural gas is an important fuel for enhancing energy security. Gas provides about 26 million barrels per day oil equivalency (b/doe) or 20 percent of world energy needs, and proved world gas reserves of more than 85 trillion cubic meters (some 500 billion barrels of oil equivalency) are sufficient to last more than 50 years at current rates of consumption—roughly 20 years longer than proved world oil reserves will last at current depletion rates. Gas, moreover, avoids the environmental problems or public opposition associated with coal and nuclear power and is readily substitutable for oil in most industrial, residential, and electric utility applications. Since 1973, increased gas use has met nearly 30 percent of the increase in world energy requirements and is partially responsible for the decline in oil consumption and prices.

Rising dependence on imported gas supplies, however, could pose security problems for some regions. Western Europe, Japan, and the United States account for about half of world gas consumption but as a group hold less than 12 percent of proved world reserves (figure 1). Communist countries, the Middle East, and Africa contain about 75 percent of proved world gas reserves, with the Soviet Union alone accounting for more than 40 percent of total world reserves. Thus, by the 1990s, we believe the major industralized countries could face similar price and security of supply concerns for gas that oil currently poses. To reduce their vulnerability, consuming nations must take steps to increase indigenous production where feasible and promote gas development projects in diverse areas of the world to ensure adequate and secure supplies.

Current Gas Surplus

The main concern in international gas markets in recent months has shifted from lining up new supplies to absorbing contracted gas deliveries because of depressed demand. After steadily increasing during the 1960s and 1970s, gas consumption declined sharply in Western Europe and growth slowed considerably in Japan during 1980-82. The world economic recession that began in 1980, combined with the sharp escalation in international gas prices in recent years, was responsible for the large but temporary reduction in gas use:

- According to Organization for Economic Cooperation and Development (OECD) data, West European gas consumption declined abruptly in 1980 after two decades of uninterrupted growth, falling more than 7 percent by the end of 1982. Only last year did demand rebound.

- Gas demand in Japan—the largest liquefied natural gas (LNG) importer—has risen less than 2 percent between 1980 and 1982, compared with a sixfold increase between 1973 and 1979.

- US gas use has dropped nearly 20 percent between 1979 and 1983.

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Lower-than-expected gas demand, together with rising supply availability from projects initiated in the 1970s, has resulted in a temporary surplus. Because of contractual obligations and projected demand levels, we think the West Europeans could face a surplus of up to 15 billion cubic meters (bcm) this year—about 7 percent of projected demand. In Japan, if supplies from existing LNG projects were delivered in full contract volumes, Tokyo would face a potential surplus of as much as 7.5 bcm in 1984—about 25 percent of annual demand.

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deliverable surplus gas supplies in the United States this year could total nearly 60 bcm—about 13 percent of current annual consumption.

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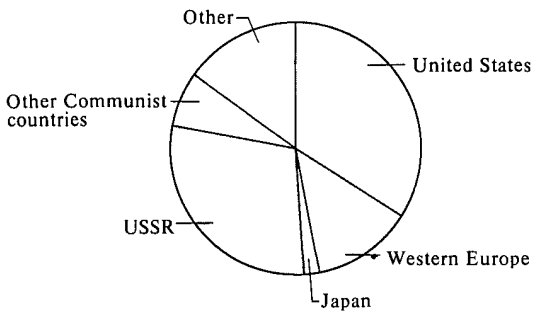
Several consumers are taking action to cope with expected surpluses. France and Austria are planning to cut back new deliveries of Soviet gas, according to US Embassy reporting. Paris, for example, is seeking a five-year buildup to the full contract volume of Soviet gas, rather than the agreed-upon three years. Spain and Belgium are looking to reduce contracted

Figure 1
World Gas Consumption and Reserves, January 1983

Percent

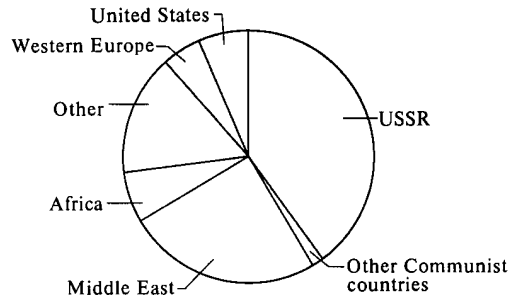
Consumption

1.5 trillion cubic meters



Proven Reserves

87.6 trillion cubic meters



[redacted] 25X1

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volumes of Algerian gas, while Italy is planning to boost gas use in electricity generation to absorb contracted Algerian supplies. In the Far East, Japan has considered temporarily suspending deliveries of Malaysian LNG. In the United States, imports of Canadian gas remain less than 50 percent of contractual volumes, Mexican imports are at minimum contract levels, and a major gas transmission company has suspended the largest import contract with Algeria, according to US Department of Energy data. (See Figure 2 at end of text.) [redacted]

Balance of the 1980s

Surplus supplies worldwide will probably persist for some time. Although gas demand is expected to grow, the increase in gas usage during the remainder of the decade can be met through existing supply commitments in Western Europe and Japan. [redacted] US gas supplies should be adequate through the late 1980s, because additional imports will probably be available from Canada. [redacted]

Western Europe. Lowered prospects for economic growth, together with rapid escalation of European gas prices in the late 1970s and early 1980s, have reduced sharply projected West European gas demand. Most projections call for West European gas consumption to reach about 247 bcm in 1990, compared with an estimated 215 bcm in 1983, according to preliminary OECD data. Just a few years ago, industry and government projections placed 1990 gas requirements between 270 and 310 bcm. On the supply side, projections of indigenous European gas production are now more optimistic than two to three years ago. As a result, West European net gas import demand in 1990 has been reduced by about 20 percent, compared with industry and government projections made in 1982. [redacted]

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International Gas Trade and Markets

International shipments of natural gas have more than doubled since 1973 to over 190 billion cubic meters (bcm), representing 12 percent of marketable gas consumption and the equivalent of 3.2 million barrels of crude oil per day. We believe natural gas trade will continue to expand over the next two decades, with shipments possibly exceeding 300 bcm in 1990 and perhaps reaching about 500 bcm in the year 2000. Nevertheless, even by the end of the century, gas trade will probably account for less than 20 percent of world consumption, with the bulk of gas consumed in the countries where it is produced. The inflexibility and high cost of gas transport will continue to limit trade. The cost of transporting gas, for example, can run as much as five to 10 times higher than the cost of transporting an equivalent amount of energy in the form of crude oil from the Middle East. Moreover, we believe a sharp increase in projected domestic production and consumption of gas in several LDCs will further limit the share of gas traded internationally.

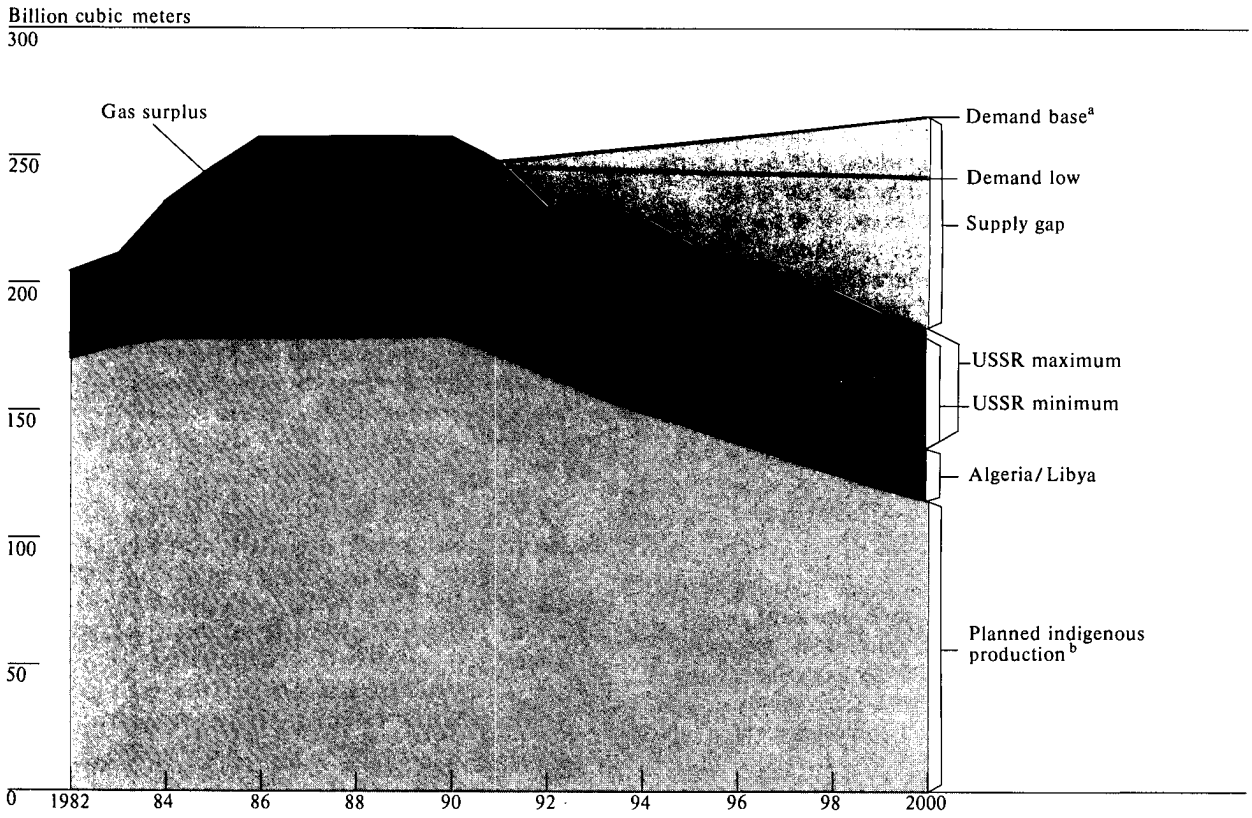
We believe the bulk of internationally traded gas will continue to move via pipeline over the next two decades. Pipeline gas exports totaled an estimated 150 bcm in 1983, or nearly 80 percent of total gas exports, with the Netherlands, USSR, Norway, and Canada accounting for more than 90 percent of pipeline exports.

The growth of the liquefied natural gas industry in recent years has increased supply flexibility in the gas industry by enabling supplies to be transported greater distances and delivered to markets with no external pipeline sources of gas. However, there are still only a few countries that have facilities for receiving and distributing the fuel. Many countries have been dissuaded from importing LNG by the militant pricing policy of Algeria and the high capital costs associated with constructing regasification facilities, LNG tankers, and internal gas distribution networks. There are only 18 LNG import terminals in the world—nine in Japan, five in Western Europe, and four in the United States. LNG shipments totaled an estimated 42 bcm in 1983, with Algerian and Indonesian exports accounting for 38 and 29 percent, respectively, of total trade. By 1990 we believe LNG shipments will approximate 70 bcm, with Algerian and Indonesian exports accounting for more than half of the trade. Australia is likely to begin exporting LNG near the end of the decade.

The inflexibility and high cost of gas transport have resulted in the development of three geographically segmented markets—Europe (pipeline and LNG), United States (pipeline and LNG), and the Far East (LNG only)—each serviced by a small number of suppliers:

- *The* European *market—West and East—is the largest gas-trading market. The Netherlands, the USSR, and Norway are the major pipeline suppliers. The Netherlands exported about 36 bcm to West European countries in 1983; the USSR shipped about 60 bcm, divided between Eastern Europe (55 percent) and Western Europe (45 percent). Algeria delivered about 2 bcm to Italy in 1983 through the recently operational trans-Mediterranean pipeline. LNG imports into Western Europe from Algeria and Libya totaled about 13 bcm in 1983.*
- *Gas is supplied to the* US *import market via pipeline from Canada and Mexico and by LNG tankers from Algeria. US gas imports totaled about 27 bcm in 1983, the bulk from Canada. Both Canada and Mexico have no alternative export outlets. LNG imports from Algeria totaled nearly 4 bcm; the largest import contract, however, is now in dispute, and deliveries have been suspended.* 25X1
- *In the* Far East, *Japan is the sole LNG importer and accounts for nearly 60 percent of world LNG trade. Last year, Tokyo imported an estimated 25 bcm of LNG from Indonesia, Brunei, the United Arab Emirates, the United States (Alaska), and Malaysia. Japan is the largest market for LNG imports because of its geographic location, which precludes gas imports by pipeline, and its desire to reduce oil dependence. Although Japan probably will remain the largest LNG importer through the end of the century, by 1987 South Korea is expected to begin importing nearly 3 bcm of Indonesian LNG,* [redacted] *demand could reach 7 bcm annually in the 1990s. South Korea will need to invest between $750 million and $1 billion in receiving terminals, tankers, and storage facilities,* [redacted] *Taiwan also has plans for importing about 2 to 4 bcm of LNG in the 1990s,* [redacted] *new shore facilities and LNG carriers will also cost between $750 million and $1 billion.* [redacted] 25X1 25X1 25X1 25X1 25X1

Figure 3
Western Europe: Natural Gas Supply and Demand, 1982-2000



[a] Midpoint estimate.

[b] Based on individual country submissions to the IEA.

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Current supply contracts with the USSR, Algeria, and Libya call for deliveries by 1990 of more than 75 bcm, some 5-10 bcm in excess of 1990 requirements (figure 3). The potential surplus could be even greater in the mid-1980s when new Soviet deliveries and Algerian shipments are scheduled to reach full contract volumes. At that time, potential surplus supplies could approximate 25-30 bcm—about 10 percent of projected annual demand. We believe such conditions will force purchasers to take only the allowable minimum level from some contracts, renegotiate lower contract volumes, or shut in domestic production.

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imports of Dutch gas will be near minimum contract levels during the mid-1980s and Algerian deliveries will approximate only 80 to 90 percent of contract volumes.

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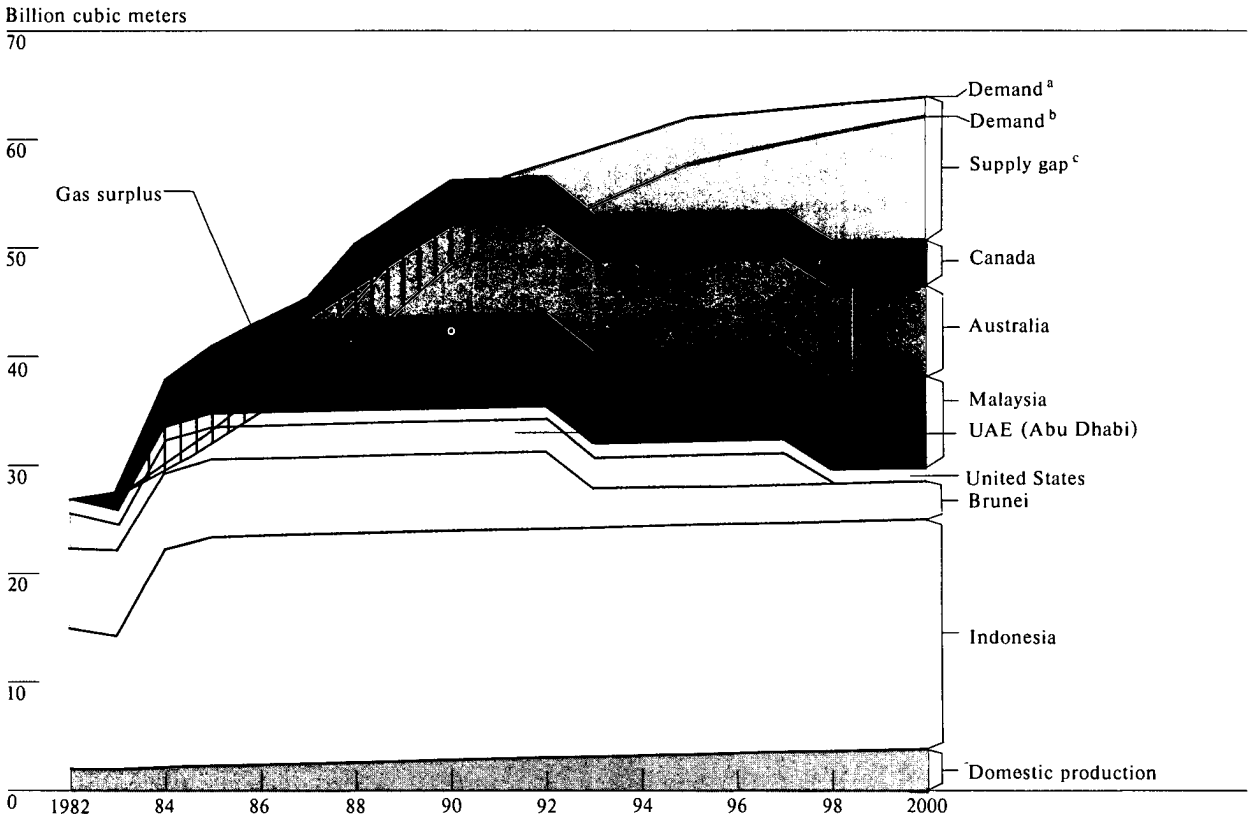
Japan. As the world's largest LNG importer, Japan has sharply scaled back prospective gas needs. The latest official Japanese Government projection estimates 1990 gas requirements at 55 bcm—nearly 20

Figure 4
Japan: Natural Gas Supply and Demand, 1982-2000



[a] Japanese Government.
[b] Petroleum Association of Japan.
[c] Based on projects under construction or agreed to.

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percent below the 1979 estimate. Japanese industry sources place 1990 gas demand even lower. As a result, if all the LNG projects now agreed to or under construction are completed as scheduled, we believe supplies could exceed 1990 requirements by as much as 8 bcm. As in Western Europe, surplus supplies could be greatest in the mid-1980s, when gas deliveries from projects in Indonesia and Malaysia are expected to reach full contract volumes under strict "take or pay" provisions [1] (figure 4).

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[1] Under "take or pay" provisions, purchasers must pay for a stipulated percentage of contracted volumes not taken.

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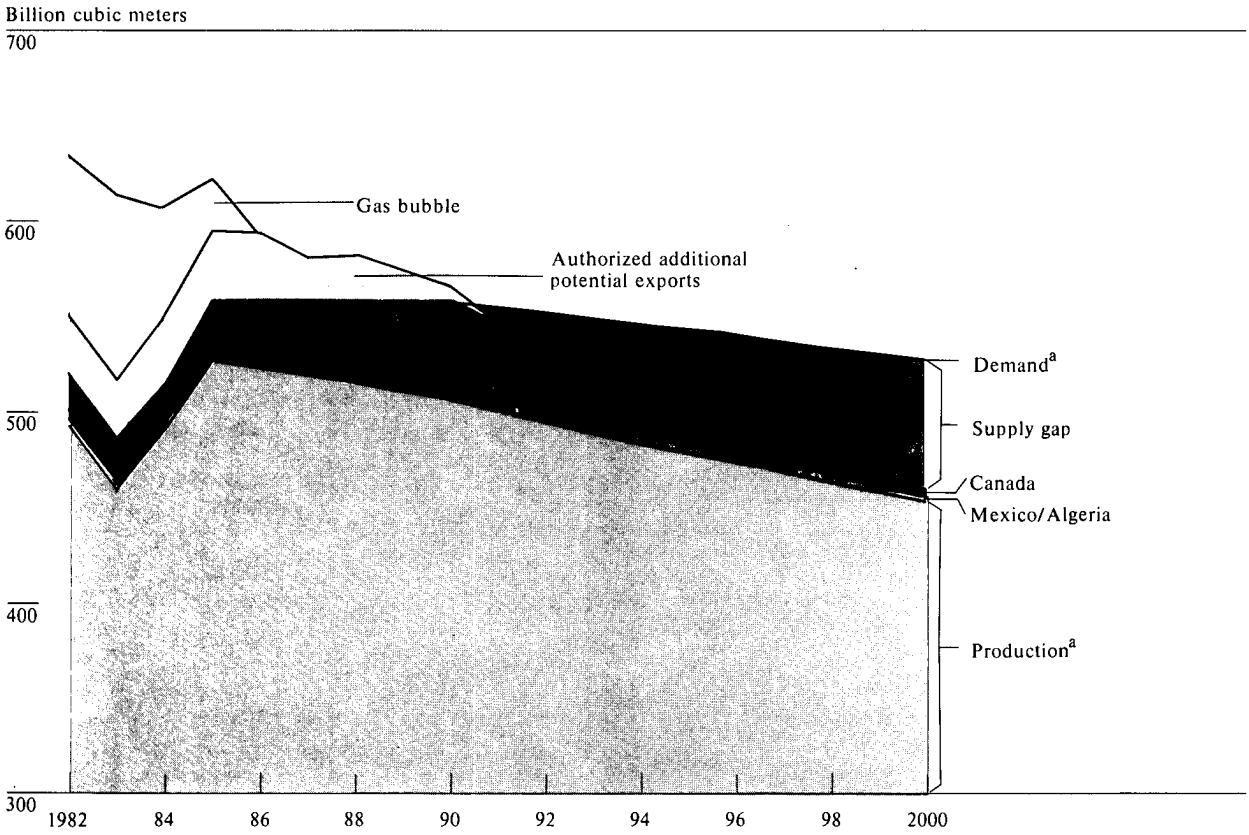
Figure 5
United States: Natural Gas Supply and Demand, 1982-2000



[a] Department of Energy projections.

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United States. Gas demand and production projections by the Department of Energy indicate 1990 US import requirements of around 50 bcm—an amount slightly below currently contracted supplies (figure 5). Some [redacted] are less sanguine concerning domestic production estimates, and their forecasts point to a potential supply gap in 1990 of nearly 25 bcm—in part reflecting the recent suspension of one Algerian import contract. In any event, such a shortfall easily could be met by additional supplies from Canada, provided gas pricing problems can be resolved. Mexico has shown only limited interest and ability in adding much volume to the US gas market, [redacted]

Market Conditions in the 1990s

The generally favorable gas supply conditions facing major consumers in the 1980s could change dramatically in the 1990s. Beyond 1990, Western Europe, the United States, and to a lesser extent Japan, probably will require large, new volumes of gas imports. We think that nearly half of total 1995 import requirements in these regions have yet to be lined up. [redacted]

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Demand projections by government [redacted] sources indicate moderate growth in West European and Japanese gas consumption during the 1990s. These sources place West European gas requirements at between 260 and 275 bcm in the year 2000, up [redacted]

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Forecasting Gas Demand and Supply

Great uncertainty surrounds long-term gas demand/supply forecasts. The success of past long-term forecasts has been minimal, and recent projections remain vulnerable to the shortcomings of past projections. The threat of unexpected supply disruptions and uncertainties regarding economic growth, price trends, and the responsiveness of supply and demand to price changes all hinder forecasting. Even small changes in economic growth and price assumptions can cause substantial modifications in projected energy requirements. Some analysts now even believe sharp declines in energy and gas requirements in recent years have led forecasters to understate future demand requirements.

Methodology

To assess gas market conditions through the remainder of the decade, we examined an array of long-term forecasts completed during the past year. Our survey included forecasts by major oil companies, consulting firms, financial institutions, and governments. We examined the forecasts for reasonableness of assumptions concerning economic growth and energy prices. In deriving a base or summary case, we attempted to represent the consensus opinion, tempered when necessary by possible alternative scenarios:

- *For* Western Europe, *we relied primarily on recent forecasts by the OECD, EC, and private industry sources. Several forecasts contained a low-demand scenario in the 1990s. We believe the higher end of the demand range is more likely, given near-term downward pressure on gas prices because of surplus supplies.*

- *In the* Japanese *market, we relied on Tokyo's latest official projection and Japanese private-sector forecasts. Although these forecasts are largely in agreement for the 1980s—indicating rising demand requirements—projections diverge sharply in the 1990s. Rather than estimating continued growth in demand, for example, the Japanese Institute of Energy Economics—a respected private forecasting firm—predicts gas demand will peak in 1990 and then trend moderately downward. Four LNG projects with a total capacity of more than 20 bcm slated to expire in the 1990s are unlikely to be renewed, according to the institute. Such a scenario probably would lead to heavier dependence on imported oil than Tokyo currently projects. We have assumed Tokyo will proceed with its gas use plans.*

- *In assessing the* US *gas market, we used recent Department of Energy (DOE) projections of gas consumption and production. Forecasts by some major US oil companies indicated lower domestic production prospects, resulting in greater potential import requirements. Nearly all forecasts point to greater US reliance on imported gas supplies as the end of the century approaches.* 25X1

Key Assumptions

Prices. *Most of the energy supply/demand projections assume declining real oil prices to the mid-1980s, flat real prices through 1990, and real price increases of 1.5 to 3 percent per year through 2000. In general, prices of other fuels are expected to move in line with oil prices.* 25X1

Growth. *The forecasts assume average annual real economic growth of about 1.5 to 2.5 percent during the 1980s for Western Europe. Forecasts point to an average annual growth rate of 2.4 to 2.8 percent during the 1990s. For Japan, most forecasters assume average annual real economic growth of between 3.0 and 4.0 percent during the 1980s and 2.5 to 4.0 percent during the 1990s. In the United States, DOE projections are based on a 3.3-percent growth rate during the 1980s and 2.4-percent growth rate during the 1980s.* 25X1

from a projected 247 bcm in 1990. Gas use is slated to grow mainly in the residential and industrial sectors. Some forecasts, however, contain a lower growth scenario, with total West European demand essentially flat in the 1990s. In Japan, official government projections and private industry forecasts point to Japanese demand requirements of 62-64 bcm in the year 2000, compared with estimates of approximately 52 bcm in 1990. Most of the growth in gas consumption will come in the industrial and commercial/

residential sectors, because Japanese electric utilities—which account for around 75 percent of Japanese gas use—have become increasingly reluctant to conclude new contracts. In the US market, Department of Energy projections indicate a decline in gas consumption from 560 bcm in 1990 to 525 bcm in the year 2000. Higher gas prices resulting from reduced domestic production will impede gas use, as will price competition from oil and coal,

Indigenous production is expected to decline significantly in Western Europe and the United States during the 1990s. Planned West European gas production from existing fields is likely to fall from a projected 180 bcm in 1990 to around 116 bcm by the end of the century. In Japan, gas production will grow, but the lack of significant reserves will cause domestic gas production to provide only about 6 percent of gas requirements by the end of the century. In the United States, Department of Energy estimates point to domestic gas production of about 455 bcm in the year 2000, compared with a projected 505 bcm in 1990. Some private industry sources forecast an even sharper drop in domestic production, and believe the projected weakness in world oil prices will continue to delay development of Alaskan natural gas resources.

Import requirements are likely to grow in all three regions. In light of currently contracted supplies from the Soviet Union and Algeria, the West Europeans face a potential supply gap of between 76 and 91 bcm in the year 2000—approximately 30 percent, of projected gas demand. The likely availability of additional Dutch gas supplies and development of the Norwegian Sleipner Field would reduce the supply gap to between 50 and 60 bcm in the year 2000. Under a low-demand scenario, the supply gap would still be about 30-35 bcm by the end of the century, approximately 13 percent of projected demand. On the basis of gas consumption and production projections by the Department of Energy, and existing import contracts, uncovered US gas import requirements approximate 50 bcm in 1995 and 65 bcm in the year 2000. If some industry estimates of lower domestic production of natural gas prove accurate, the supply gap could reach nearly 110 bcm in the year 2000—approximately 20 percent of projected demand. Based on existing commitments, additional Japanese import requirements approximate 7 bcm in 1995 and 12 bcm by the end of the century. Failure to proceed with the Canadian LNG export project to Japan, however, would increase these import requirements by an additional 4 bcm in the 1990s. 25X1

Western Europe and the United States are likely to become increasingly dependent on imported natural gas supplies over the next two decades, if gas supply and demand trends play out as we now envision: 25X1 25X1

- By the year 2000, Western Europe could be importing about 50 percent of its gas needs if the large untapped Norwegian reserves are not exploited by then. Even if some of the new Norwegian gas begins to flow by the end of the century and gas demand in Western Europe grows slowly, gas imports could still approach 40 percent of consumption by 2000, up from 18 percent.

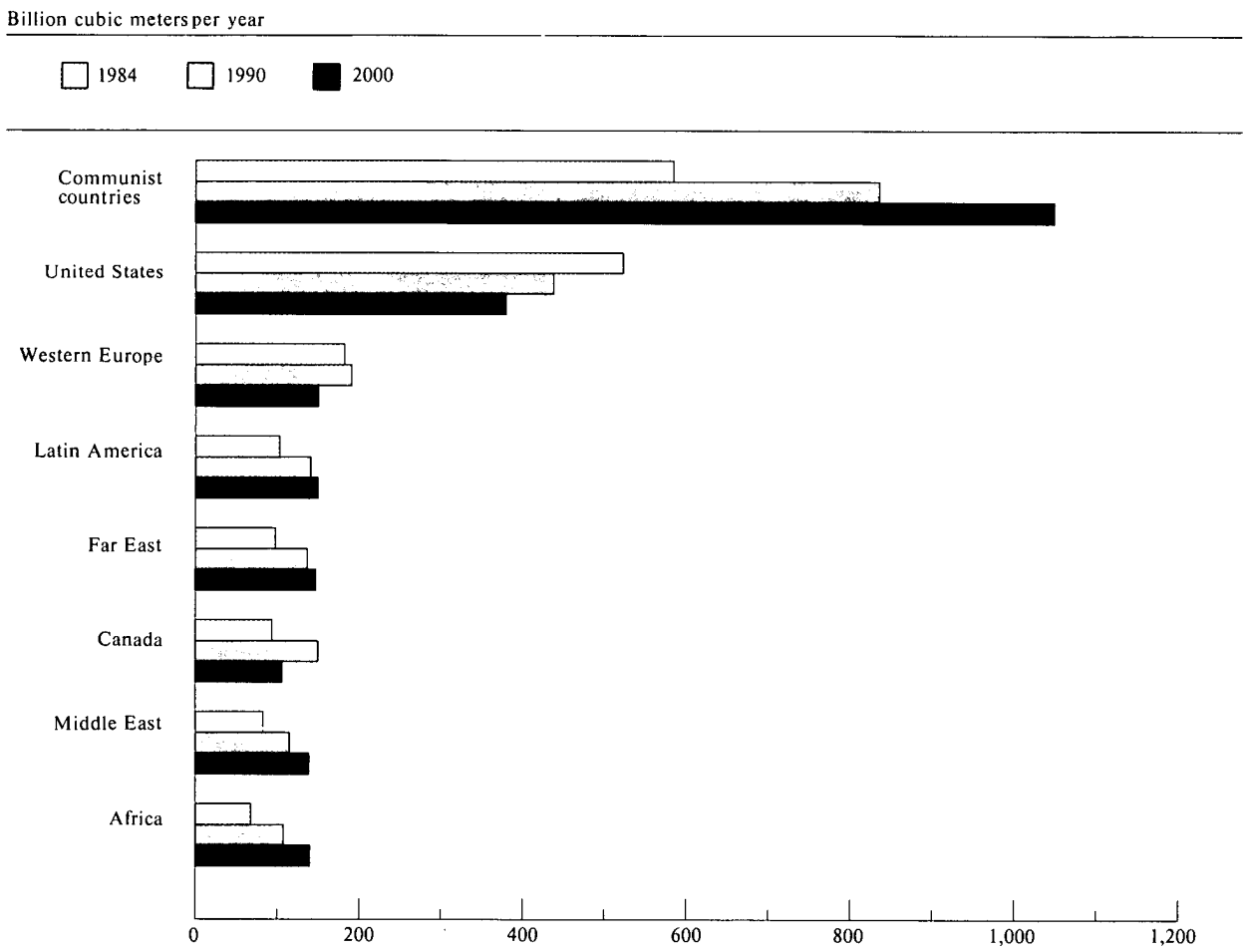
- The United States could be importing about 25 percent of its gas requirements by the turn of the century, although most US import needs could be supplied by expanded use of Canadian gas.

- Lacking significant domestic gas reserves, Japan will continue to rely on reports for about 95 percent of its gas requirements through the end of the century. Japan has developed the most diversified group of suppliers and could easily meet increased needs by expanded imports from Indonesia and Malaysia or from new projects in the Middle East or North America, although the Soviets could also enter the Japanese market by then. 25X1 25X1

The Supply Issue

The bulk of gas reserves to meet the rising import needs of Western Europe, Japan, and the United States are in remote or politically sensitive areas of the world. Estimates by a major US firm of defined reserves and likely reserve additions suggest that the Communist countries—led by the Soviet Union—could account for about one-half of world gas productive potential by the year 2000, up from about one-third at present (figure 6). The Middle East and Africa are projected to provide about 25 percent of the potential additions to gas productive capacity between now and the end of the century. 25X1 25X1

Figure 6
World Natural Gas Productive Capacity[a], 1982-2000



[a] Based on defined reserves plus likely potential.

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With domestic gas production from existing fields in Western Europe projected to decline, the West Europeans must either develop new indigenous gasfields or promote gas export projects in Africa and the Middle East to avoid increased dependence on Soviet supplies. The cost of these new gas supplies, however, will be high. Compared with a current price of about $3.60 to $4.00 per million Btu for imported gas supplies in Western Europe, the cost of delivering Norwegian gas from the Troll Field is placed at $5.50 to $8.50 per million Btu [redacted] The cost of new gas supplies from the Middle East or Africa could be even higher. Capital costs for a large-scale, 15- to 20-bcm LNG project could approximate $15-20 billion. Long-distance gas pipelines from the Middle East or Africa, moreover, could pose security problems. [redacted]

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Key Gas Suppliers

USSR. *With the world's largest gas reserves, the Soviets are well placed to meet West European gas needs. Under the current Soviet Five-Year Plan, one-sixth of total industrial investment is earmarked for the gas industry, and the Soviets are building six major gas pipelines—one an export line to Western Europe—covering 20,000 kilometers. Because the Soviets can acquire pipeline right-of-way through their own territory and other Communist countries virtually cost free and are willing to accept low or even negative returns initially on gas exports to ensure hard currency earnings, Moscow can underprice any competitor. With Soviet energy sales accounting for roughly 70 percent of Moscow's hard currency earnings and with gas expected to partially replace oil in this trade, we believe the Soviets probably will continue to undercut any competition.*

Algeria. *Despite near-term problems with gas production and exports, we believe that declining production of oil and refined products in the 1990s will force Algeria to seek expanded markets for natural gas. Development of southern gasfields, as planned, could provide Algiers with an exportable gas surplus of about 20 bcm annually above current export commitments in the mid-1990s. Because of Algiers's militant pricing policy and past supply interruptions to France, however, West European purchasers may well view the Soviets as a more secure source of supply for the 1990s.*

Netherlands. *The Hague has authorized additional gas export commitments, but the volume and timing of such exports are yet to be announced. US Embassy reporting indicates possible additional exports of 10-15 bcm per year. Negotiations with West European purchasers are scheduled to take place this year.*

Norway. *With more than 30 percent of Western Europe's total proved gas reserves, Norway could provide Western Europe with an additional 40 bcm in the 1990s. About half of this total would come from the deep ocean waters of the Troll Field. Development of West Troll has been declared commercial by Norske Shell based on a $6 billion development plan that would make the project about 1.5 times more expensive per unit capacity than any other offshore development project. Total development costs could approximate $30 billion,* 25X1
Because of the Troll Field's long development leadtime, a contract would have to be signed in early 1985 to enable the field to start production by 1993-95 at the earliest, 25X1 25X1 25X1

Canada. *Canada may be unable to meet US import requirements in the 1990s. Authorized gas supplies available for export to the US market will decline from more than 50 bcm per year at present to under 10 bcm by 1995. Based on 1982 Canadian National Energy Board projections of supply and domestic demand, total gas volumes available for export in 1995 will approximate only 22 bcm. Even under industry scenarios of optimistic production, Canadian consumption requirements would leave less than 50 bcm of gas available for export in 1995 and 30 bcm in the year 2000.* 25X1

Mexico. *Mexico has shown only limited interest and ability in adding volume to the US gas market—its sole export outlet—* 25X1 25X1
Even if Mexico should overcome difficulties associated with increasing gas production, we believe domestic consumption of natural gas is likely to grow and constrain the amount available for export. 25X1 25X1

Other. *Several countries have proposed LNG export projects that could substantially boost gas availability in the 1990s (table 1):*

- Canada *has proposed a 4-bcm-per-year LNG export project to Japan to diversify gas exports. The issue of gas supply for the project, however, has yet to be resolved, and a principal Japanese buyer has deliberately delayed requesting the necessary loan for the $2.4 billion project.*

- Australia—*with 900 bcm of proved gas reserves—is moving ahead on a $2.5 billion LNG export project to Japan. Although startup of the project has been delayed twice by Japanese buyers until 1988, a proposed restructuring of the deal would give Japanese participants a majority equity share, which could ensure the project's survival. Australia could earn nearly $1.5 billion a year in export revenues from the project in the early 1990s.*

- US *firms have proposed two Alaskan LNG export projects to Japan. One—a 20-bcm-per-year project—has been greeted coolly by the Japanese and would probably require a consortium of buyers in the Far East because of the project's size. Although a feasibility study is planned, we believe the Japanese are more concerned with formal compliance with the Tokyo-Washington agreement to promote US energy exports to Japan rather than with actual gas purchases from the project. Another proposed project of 2 bcm per year, however, has been received with interest by Japanese trading companies, according to State Department sources. The Japanese firms believe the project could fill the gap left by the probable demise of the Canadian project and thus avoid Japanese Government efforts to make them buy Soviet gas from the Sakhalin project.*

- Nigeria *has revived plans for a scaled-down LNG export project of 4-5 bcm per year with a potential cost of $2.5 billion. The former Nigerian regime had proposed a slush fund from 50,000 b/d of oil exports above the OPEC quota to finance the project. With oil providing more than 90 percent of Nigeria's foreign exchange, Lagos is eager to diversify its energy exports with gas—90 percent of which is flared.*

- Abu Dhabi, *currently the only Middle Eastern LNG exporter, has discovered additional natural gas reserves in the Persian Khuff. Even after only limited tests, geologists expect the area to be highly productive.*

- Qatar *has proposed a $6 billion LNG export project to supply 8.5 bcm per year from the giant North Dome gasfield to consumers in Japan and Western Europe. A British firm and French firm are negotiating with Qatar to complete an agreement to develop the field.*

- Indonesia, *one of the largest exporters of LNG, is looking to develop huge gas reserves near Natuna Island for export to Japan or elsewhere. In 1982, LNG exports netted Jakarta $2.2 billion and provided more than 12 percent of export earnings.*

- Malaysia *contains the largest proved natural gas reserves in the Far East and has proposed an expansion of its current 8.5-bcm-per-year export project to Japan and has offered to sell gas to South Korea.*

Several other countries have also proposed LNG projects, including Cameroon, Trinidad and Tobago, Thailand, and Chile (appendix).

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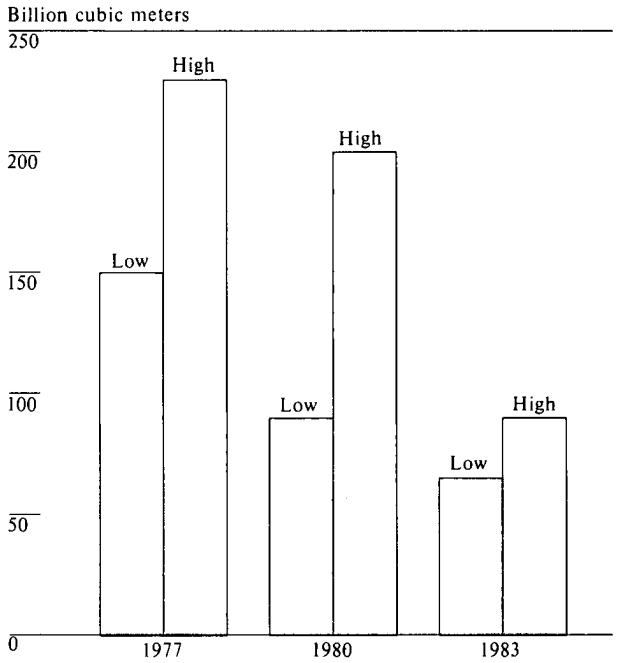
In the Far East, Japanese development of LNG projects in Australia, Canada, Alaska, or the Middle East would enhance Japan's energy security by diversifying gas supplies away from heavy reliance on one or two suppliers. Indonesia and Malaysia, which could sharply increase gas exports, are already slated to supply about one-half of Japanese gas requirements in the 1990s, and the Soviet Sakhalin project could provide an additional 4 bcm of gas to Japan in the early 1990s. Because the Soviets are near and want hard currency, Soviet gas probably will be Tokyo's cheapest source of supply. [redacted] Japanese Government officials have indicated that their negotiating position concerning Soviet gas is to get it 20 percent below current LNG import prices. [redacted]

In the US market, Canada and Mexico together may not be able to fulfill US gas import requirements in the 1990s, if they materialize as some industry sources project. Any additional Canadian supplies, moreover, will be costly to develop because potential reserves are largely in inhospitable regions requiring new technology. LNG supplies probably will be even more expensive. Declining US indigenous production should raise domestic prices, making some LNG projects more economic in the 1990s. The uncertainty surrounding both domestic gas deregulation and the Alaskan gas pipeline project, however, along with the recent problems of Algerian LNG supplies, make it unlikely any new LNG projects will be embarked upon before the next decade. [redacted] If energy demand projections materialize, failure to develop LNG projects quickly or to secure more Canadian gas could force the United States into relying more heavily on Middle East oil. [redacted]

Figure 7
Changing Projections of World LNG Trade in 1990



[redacted]

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Energy Security Implications

According to our analysis, surplus gas supplies and gas distribution flexibility in all three gas-consuming regions probably will be sufficient to handle even a major gas supply disruption during the remainder of the decade. The surplus of gas during the 1980s, together with Soviet marketing efforts, however, could also prevent or delay development of those new gas projects needed to meet West European demand requirements in the 1990s. Failure to develop new gas supplies could leave the major industrialized countries more heavily dependent upon Middle East oil or allow the Soviet Union to capture a greater share of the West European gas market in the 1990s. Moreover, delays in developing alternative LNG projects for the Japanese market could bode well for Soviet efforts to sell gas from the Sakhalin LNG export project. [redacted]

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Looming gas surpluses during the 1980s will pose the major deterrent to developing new supplies. Several proposed LNG export projects have already been scrapped or delayed indefinitely (figure 7). Last year, for example, France and other participants in the proposed Kribi LNG project in Cameroon postponed further work on the facility until the 1990s, and members of a consortium led by Enagas of Spain

Gas Project Leadtimes

Except in the Soviet Union, major new international gas export projects will take about seven to 12 years to be brought onstream. Gas export projects require several years to develop not only because of exploration and drilling efforts, but also because of the immense construction of the distribution infrastructure needed to get gas to markets. The construction of gas pipelines entails laying miles of pipe, in some cases over rough terrain or under water, and installing compressor stations (figure 9). LNG projects require construction of liquefaction trains, port facilities, tankers, and reception terminals (figures 10 and 11):

- USSR. *Pipelaying operations for the 4,450-kilometer Soviet gas export pipeline were completed in 18 months, and the pipeline is partially operational. During the peak of construction, as many as 18,000 workers were assigned to pipelaying operations. The Soviets committed themselves to completing the gas export pipeline ahead of schedule as a riposte to the US embargo. The normal time for such pipelaying operations could be even less in the future because Moscow will have added much of the infrastructure necessary to build pipelines.*
- Algeria. *The trans-Mediterranean pipeline to Italy from Algeria was completed in 1981—four years after the signing of the 1977 agreement. Gas did not begin flowing until mid-1983, however, because of price disputes. The pipeline will not reach operational capacity of 12 bcm until 1986.*
- Indonesia. *Following several years of exploration and drilling to prove up sufficient reserves for an export project, it took an additional four years for Indonesia to construct the Badak and Arun LNG plants. The Arun plant, completed in 1978, required 38.5 million manhours, and more than 8,000 workers were employed during the peak construction period.*
- Malaysia. *The $2 billion LNG facility took about four years to construct.* 25X1

Because much of non-Communist gas reserve potential is in deep ocean waters, in hostile climates, in complicated geological structures, or remote from existing gas markets, new gas export projects are likely to take even longer to develop:

- *the Norwegian Troll Field will take at least 10 to 12 years to be brought onstream.* 25X1
- *LNG projects in Nigeria, Cameroon, and Qatar will require seven to 10 years to come on line.* 25X1

completely withdrew from the Cabo Negro LNG project in Chile. Additional Dutch gas export agreements during the 1980s, moreover, could delay development of Norwegian gas supplies, Indeed, recently proposed negotiations over the sale of Dutch gas supplies to the United Kingdom could delay or prevent development of the Norwegian Sleipner Field, Failure to develop Sleipner, we believe, could postpone indefinitely development of the Norwegian Troll Field.

The buyer's market could also hamper producers and consumers from reaching acceptable prices for new gas supplies. Having weathered the sharp price increases and seller's market of the 1978-81 period, consumers are likely to take advantage of the current and projected buyer's market to press for price concessions from existing suppliers. The French and West Germans are already renegotiating the price of new Soviet gas supplies, and Rome has indicated it intends to play off the Dutch, Soviets, and eventually the Algerians in upcoming negotiations to extract maximum price concessions, according to US Embassy reporting. Indeed, in a recent agreement to resume Libyan LNG deliveries suspended since 1980, Rome achieved a price nearly 15 percent below both the Libyan demands and the current price of Algerian

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Figure 8. Pipelaying operations can take several years. 25X1

LNG to France and Belgium. Lower gas prices from existing contracts, however, will make new gas projects even more unattractive. New gas projects under consideration in Nigeria, Cameroon, Qatar, and Norway, for example, will require extensive capital investments that will result in per-unit-gas costs substantially higher than gas from existing sources.

In addition, the projected surplus in contracted West European supplies will be greatest in the mid-1980s when new projects—such as the Norwegian Troll Field and/or LNG export projects in Africa or the Middle East—must be undertaken if supplies are to be deliverable in the 1990s. We believe these projects will require seven to 12 years to be brought onstream. Indeed, the inflexibility and long leadtimes of gas projects indicate that, if gas pipelines and LNG facilities are not undertaken even in periods of slack demand, additional supplies will not be available during periods of rapid demand growth or energy supply disruptions. The European gas deal with the Soviets, for example, was undertaken when energy prices were rising. The deal is now less attractive because of weak demand. Had the pipeline project started in 1976, Western Europe would have had gas to resort to when oil prices exploded in 1979-80. We are concerned that such a scenario could be repeated this century if Norwegian or other gas supplies are not developed quickly and oil flows are disrupted in the 1990s. 25X1 25X1

Soviet Influences

In our view, recent Soviet marketing efforts could also undermine the development of alternative gas projects, leaving Moscow well placed to meet West European and Japanese import requirements in the 1990s. Potential sales of natural gas to hard currency countries offer one of the few bright spots in the

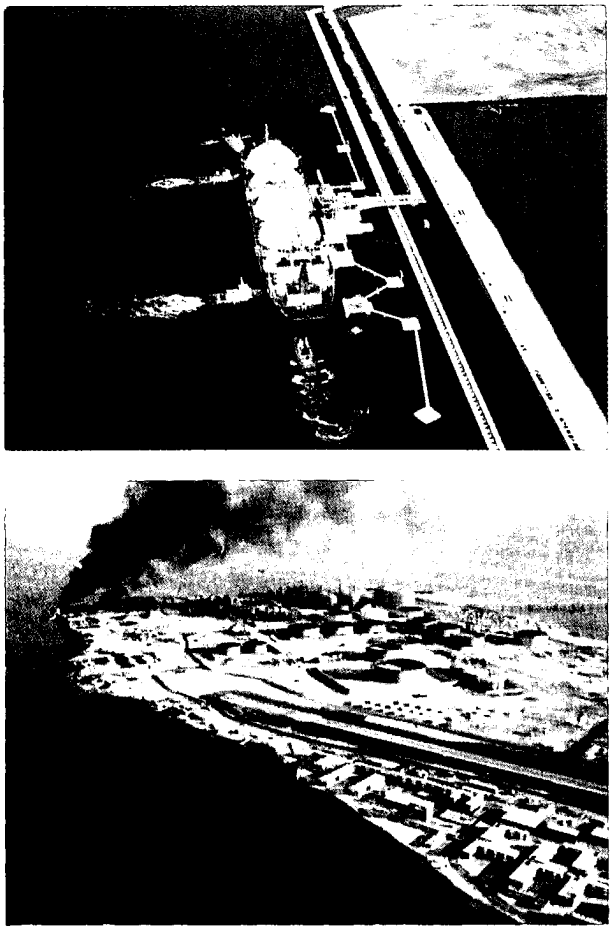

Figure 9. LNG receiving terminal and tanker in Japan (top). LNG plant in Abu Dhabi (bottom).

Soviet export catalogue. We expect the Soviets to aggressively market their gas in the West, undercutting competitors' prices when necessary. Because the Siberia–Western Europe gas transmission line is already in place, there would be no cost to the Soviets if they chose to do so. Moscow has already been offering spot sales and discounts on gas deliveries above 80 percent of contracted volumes, Recent attempts to negotiate gas deals with the Finns, Swedes, and Greeks have also caused the Soviets to cut offer prices sharply to near parity with coal and heavy fuel oil, according to Embassy reporting. In recent negotiations with Turkey, Moscow has even agreed in principle to deliver the gas below the price of fuel oil.

With 10 to 15 bcm of spare capacity in existing lines, the Soviets could also use these pricing tactics to capture any small growth in West European import demand. Such additional Soviet sales could undercut sufficiently the volume of new gas supplies needed from the Norwegian Troll Field to make its development impractical in the next decade. Moreover, a second Soviet export pipeline—if demand warranted—probably would require less than half the development leadtime of Troll. A recent Danish discovery of gas in the North Sea, for example, will be shut in because of current market conditions, and export prospects to Sweden and West Germany will depend on the success of Soviet sales efforts. 25X1

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Moscow's efforts to attract new customers have been partially successful:

- Rome has given the Italian state energy agency formal approval to renew negotiations with the Soviets for additional gas purchases.
- Greece and the Soviet Union have signed a contract to conduct a feasibility study for a 1,200-kilometer natural gas pipeline from southern Russia to the northern Greek industrial area.
- Moscow has concluded an agreement for additional gas sales to Finland in which the price will not be linked solely to crude oil prices. 25X1

If Soviet price flexibility eventually results in sales to Sweden, Greece, or Turkey, Moscow will not only increase its hard currency earnings but also could limit access of potential suppliers to the European market (figure 11): 25X1

- An extension of the Finnish gas pipeline from the Soviet Union into Sweden probably would dampen Swedish interest in financing and building a gas pipeline from the Norwegian Troms Field to the continent. Such a pipeline through Sweden is one alternative for bringing about 25 bcm of northern Norwegian gas annually to the European market in the 1990s. 25X1 25X1

- An extension of the Soviet pipeline network into Greece or Turkey could effectively block access to the European market by suppliers in the Middle

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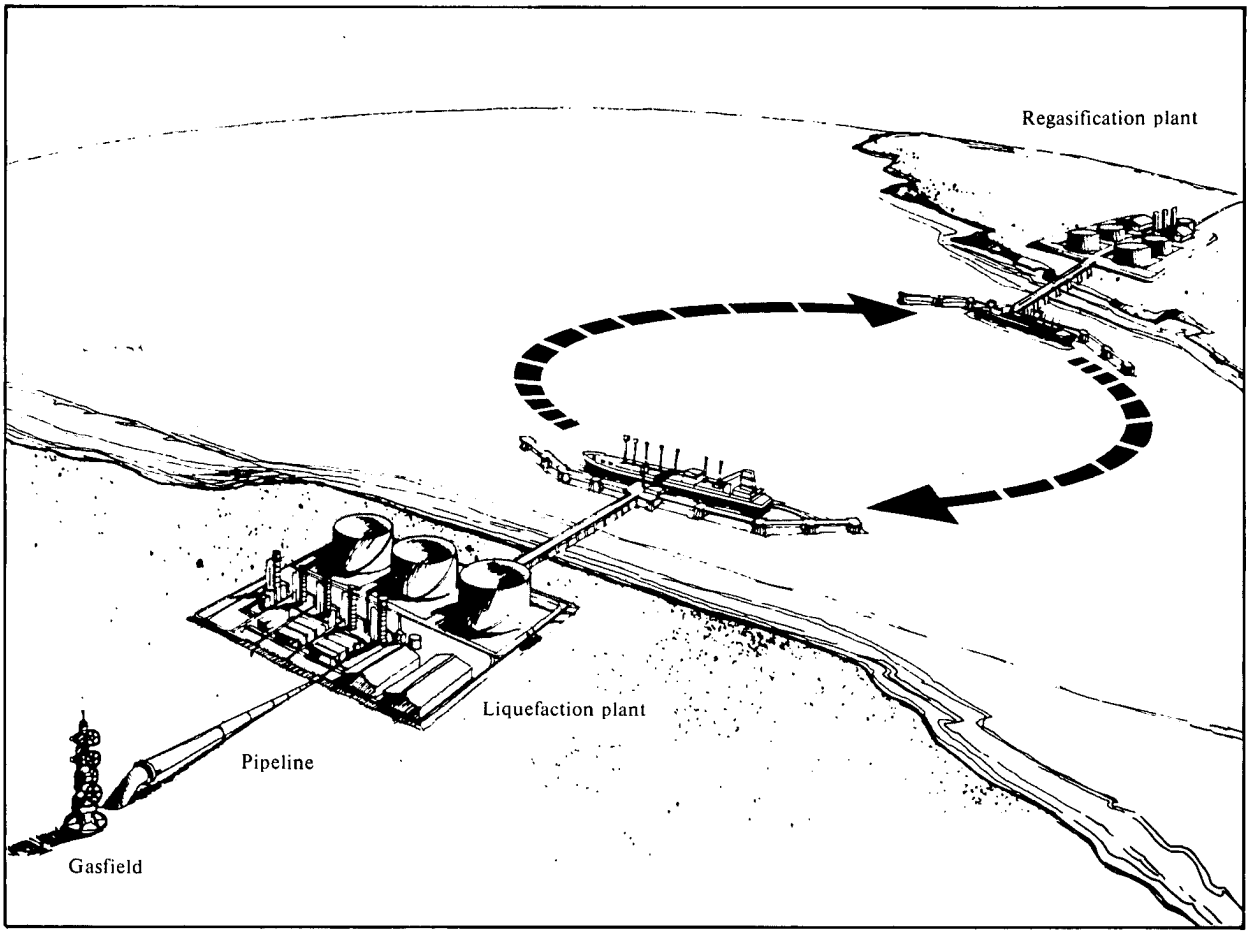
Figure 10
Typical LNG Project



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East, where 45 percent of world non-Communist gas reserves are located. Markets in Turkey and Greece are key steppingstones for Middle Eastern suppliers to the larger West European market because they will need to sell gas in transit to minimize the cost of delivery. Moreover, the alternative of shipping LNG to Western Europe from such countries as Iran, Qatar, and UAE would be more than 30 percent more expensive than shipments by pipeline,

Tying gas sales to goods and equipment purchases could put further pressure on the West Europeans and Japanese to import Soviet gas. In Italy, the president of the country's industrial association—Confindustria—has called for Rome to sign for Siberian gas to avoid jeopardizing Italian prospects in the next Soviet five-year plan. The prospect of large-scale, Soviet coal-slurry pipelines in the 1990s—each of which

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Figure 11
Selected Natural Gas Pipelines

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would reportedly involve an investment comparable to that required for the Siberia–Western Europe natural gas pipeline—could also lure the West Europeans to purchase Soviet gas in exchange for lucrative Soviet equipment contracts.

In the Far East, the Soviets are developing gas reserves off Sakhalin Island and plan a 4-bcm-per-year LNG export project to Japan. Toyko joined the project in the mid-1970s, and the venture is similar to the Siberia–Western Europe natural gas pipeline project. It involves the transfer of technology and equipment financed through Western credits—at below-market interest rates—in exchange for Soviet repayment through the delivery of energy resources. Moscow could earn about $700 million in hard currency annually from the gas sales. Because of projected gas surpluses, Tokyo has dragged its feet on the project. Recent problems associated with getting a similarly sized Canadian LNG export project to Japan off the ground, however, have been greeted with pleasure by some Japanese Government officials and bode well for the Sakhalin project. The officials believe substitution of the Canadian project with the Soviet Sakhalin project will provide more business for Japan.

Gas Security Options

Given the likelihood of continued softness in world energy markets, we believe new gas export projects cannot be justified on near-term commercial or even regional economic grounds. New LNG export projects for Western Europe, for example, may not be economic until after the turn of the century, Projects such as the Norwegian Troll Field—with production costs alone as high as $6.00 per million BTU—probably will require tax concessions or subsidies to get off the ground. A 1-percent interest rate subsidy, for example, could lower unit costs by 35 to 45 cents per million BTU, Alternatively, a price acceptable to buyers could be agreed upon and an individual tax structure for the project set up to allow production at the agreed price. Even if the Norwegians changed their position against government tax concessions or subsidies, however, we believe the West Europeans probably would have to make a political commitment to ensure development of Troll by paying a premium for security of gas supplies. Moreover, development of Troll will require a greater degree of regional planning and cooperation among the West Europeans. 25X1

In Japan, a proposed Alaskan LNG export project—similar in size to the one in operation—could be substituted for the Canadian gas project and thereby avoid Japanese reliance on Soviet gas. According to State Department sources, Japanese trading firms have expressed interest in the project, but Japanese Government backing of the Soviet Sakhalin project must be overcome. 25X1

From a regional strategic perspective, completion of some of the proposed gas projects would provide important redundant capacity to cope with potential disruptions of natural gas supplies through the balance of the century. In addition, excess gas supplies could be substituted to some degree for oil during an oil supply disruption. Fuel-switching capability has increased significantly in recent years as facilities have been converted to alternative fuels and as new equipment has been installed with multi-fuel flexibility. 25X1 for example, about 25X1 75 percent of all large industrial users in the United States can switch back and forth between oil and natural gas, and 90 percent of all new industrial equipment sold is capable of dual- or multi-fuel use. Such trends, we believe, are similar in Western Europe. As the existing capital stock is replaced worldwide, fuel-switching capability is likely to increase, providing important flexibility between oil and 25X1 gas during a supply disruption. In our view, failure to 25X1 proceed with new gas development projects in the next few years could leave the major industrialized nations more heavily dependent on Middle Eastern oil or 25X1 leave Western Europe vulnerable to a gas shortfall during the 1990s. 25X1 25X1

Appendix

Table 1
Existing LNG Projects

Exporters	Importers	Contract Volume *(bcm/yr)*	Contract Term	Comments
Algeria	Belgium	2.5	1982-2002	Deliveries of about 1.5 bcm/year are made up to Montoir, France, until Distrigaz's Zeebrugge terminal is operational in 1986. Belgium has the option to increase deliveries to 5 bcm in 1986.
Algeria	France	0.5	1964-90	Contract extended in 1976 to 1990.
		3.5	1972-98	Contract extended in 1976 to 1998.
		5.2	1982-2002	
Algeria	Spain	4.5	1974-94	Deliveries have never exceeded 1.5 bcm/year, and price and volume are under negotiation. Algeria has demanded $500 million for Spain's failure to import the full contract volume under the contract's take-or-pay clause.
Algeria	United States	1.4	1978-98	
		4.5	1982-2002	Suspended in December 1983.
Libya	Spain	1.4	1969-91	Current deliveries total about 0.8 bcm/year. Contract extended to 1991.
Libya	Italy	2.3	1969-90	Italy has signed a contract to buy 0.7 bcm/year over a 13-month period after purchases were suspended following a price dispute in 1980. Deliveries of about 1 bcm per year are possible without renovating Libyan facilities.
Brunei	Japan	7.2	1973-92	Will be extended to half of current commitment after 1992.
Abu Dhabi	Japan	2.9	1977-97	Extension undecided.
Indonesia	Japan	11.9	1977-99	An amendment signed in 1983 increased contract amount by an average of 1.4 bcm/year, and the contract will be extended.
		4.5	1983-2003	Bontang.
		4.6	1984-2004	Arun.
Malaysia	Japan	8.5	1983-2003	Deliveries are slated to reach full contract volume in 1986.
United States	Japan	1.3	1969-89	Contract extended by five years in 1982; extensions are likely.

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Table 2
LNG Projects Pending Finalization or Startup

Exporters	Importers	Contract Volume *(bcm/yr)*	Expected Startup	Comments
Canada	Japan	4.0	1987/1988	Issue of gas supply for the project unresolved; a principal Japanese buyer deliberately delayed requesting the necessary loan.
Australia	Japan	8.5	1988	Projected startup postponed from 1986 to 1988; a sales agreement with Japanese customers yet to be completed, but survival of the project likely.
Indonesia	South Korea	2.8	1987	Project is planned for late 1986 startup, but 1987 more likely.

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Table 3
Potential LNG Projects

Exporters	Potential Importers	Potential Volume (*bcm/yr*)	Comments
Middle East			
Qatar	Japan Western Europe	8.5	Buyers yet to be found; the Qataris doubt the durability of the $6 billion project given current market conditions.
Abu Dhabi	Japan	7.0	
Far East			
Bangladesh	Japan	4.0	
Thailand	Japan	2.0-4.0	Development unlikely because of downgraded gas reserve estimates.
Malaysia	Japan South Korea	8.5	Possible expansion of initial export project to Japan or South Korea.
Indonesia	Japan	8.5-14.0	Large new gas reserves offshore Natuna Island could be developed for a third LNG plant, providing large amounts of CO_2 can be removed from the gas.
Africa			
Nigeria	Western Europe	4.0-5.0	Original project scaled down from 16 bcm after cost estimates jumped from $4.5 billion to $16.5 billion and gas demand estimates in Western Europe were revised downward.
Cameroon	Western Europe	4.0	Work delayed until the 1990s. Without French financial guarantees of approximately $3 billion, the project unlikely to proceed.
South America			
Chile	United States Western Europe Japan	2.0	Foreign participants have withdrawn from the $1.2 billion project.
Argentina		5.5	Political and economic climate make development questionable.
Others			
Canada (Arctic) Pilot Project	United States Western Europe	3.5	US buyers have the right of first refusal; project could face extreme opposition from environmental groups.
Trinidad and Tobago	United States	6.5-8.0	A sales agreement yet to be reached.
Norway	Western Europe United States	8.5-11.5	Troms gas reserves not yet proved sufficient.
USSR (Sakhalin)	Japan	4.0	Firm commitments yet to be made by Japanese buyers.
United States (TAGS)	Japan South Korea Taiwan	20.0	Immense capacity of the project would require a consortium of buyers in the Far East and probably some gas shipments to the US west coast.
United States	Japan	2	A project about the size of the existing Alaskan LNG export to Japan proposed by US firms and favorably received by Japanese trading companies.

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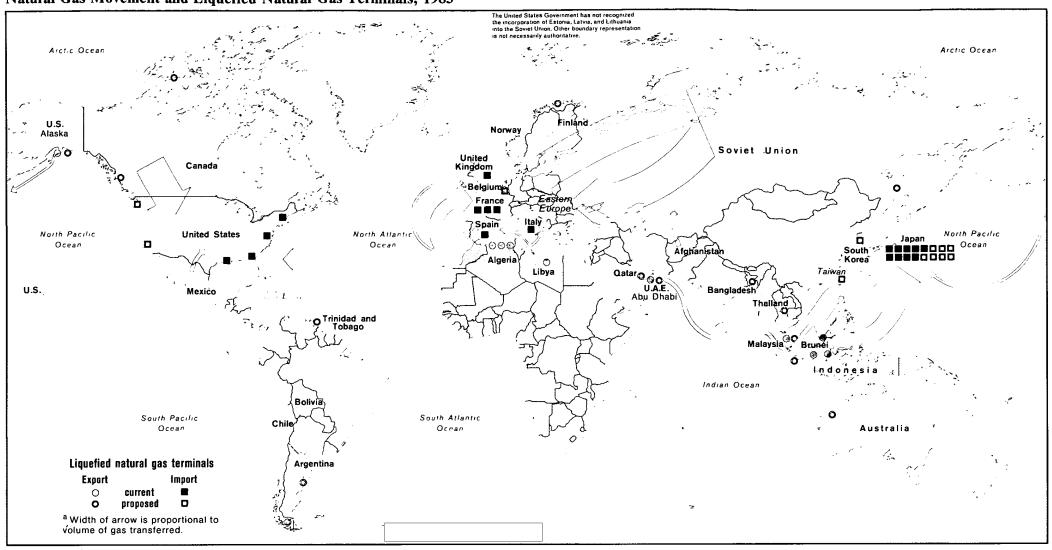
Figure 2
Natural Gas Movement and Liquefied Natural Gas Terminals, 1983[a]



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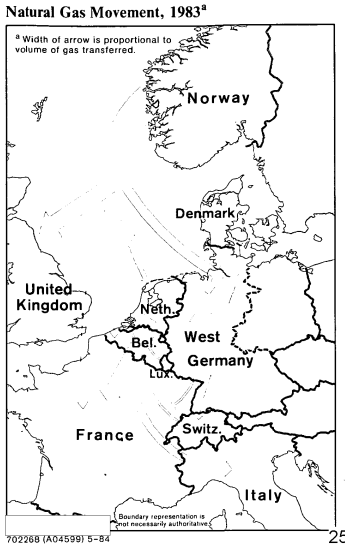
Natural Gas Movement, 1983[a]



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Billion cubic meters — *Billion cubic meters*

Exporters	Total Exports	Importers																
		Argentina	United States	Austria	Belgium	Denmark	Finland	France	Italy	Luxembourg	Netherlands	Spain	Switzerland	United Kingdom	Western Europe	Eastern Europe	USSR	Japan
Total	**191.8**	**2.4**	**27.2**	**2.8**	**8.5**	**0.1**	**0.8**	**22.2**	**15.3**	**0.3**	**2.6**	**2.1**	**1.3**	**11.1**	**34.2**	**33.1**	**2.6**	**25.2**
Natural gas	**150.1**	**2.4**	**23.4**	**2.8**	**6.9**	**0.1**	**0.8**	**13.2**	**15.3**	**0.3**	**2.6**	**0**	**1.3**	**11.1**	**34.2**	**33.1**	**2.6**	**0**
Canada	21.2	0	21.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bolivia	2.3	2.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chile	0.1	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mexico	2.2	0	2.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
West Germany	1.6	0	0	0	0	0.1	0	1.1	0	0	0	0	0.4	0	0	0	0	0
Norway	22.4	0	0	0	1.6	0	0	0.7	0	0	2.6	0	0	11.1	6.4	0	0	0
Netherlands	35.6	0	0	0	5.3	0	0	7.4	4.9	0.3	0	0	0.9	0	16.8	0	0	0
USSR	60.1	0	0	2.8	0	0	0.8	4.0	8.4	0	0	0	0	0	11.0	33.1	0	0
Algeria	2.0	0	0	0	0	0	0	0	2.0	0	0	0	0	0	0	0	0	0
Afghanistan	2.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.6	0
Liquefied natural gas	**41.7**	**0**	**3.8**	**0**	**1.6**	**0**	**0**	**9.0**	**0**	**0**	**0**	**2.1**	**0**	**0**	**0**	**0**	**0**	**25.2**
United States	1.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.4
Algeria	15.7	0	3.8	0	1.6	0	0	9.0	0	0	0	1.3	0	0	0	0	0	0
Libya	0.8	0	0	0	0	0	0	0	0	0	0	0.8	0	0	0	0	0	0
Abu Dhabi	2.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.3
Indonesia	12.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12.2
Brunei	7.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7.9
Malaysia	1.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.4

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