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**SURVEY OF DEVELOPMENTS RELATED TO NATURAL GAS
AND LPG IN THE ESCWA REGION
(1989-1991)***

* Issued without formal editing.

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I. Introduction

The ESCWA region holds 17 percent of the world's natural gas reserves rendering it a potential contributor to the international gas market which is growing steadily. Interregional and intraregional trade in gas and related products remained minimal during the 1989-91 period with the only instance of natural gas trade within the region halted due to the Gulf War. Liquefied Natural Gas (LNG), however, continued to be exported from the United Arab Emirates to Japan. The region's reserves increased only slightly during the 1989-91 period compared to a worldwide increase of over 6 percent. Marketed production of natural gas has increased steadily during the past decade as ESCWA countries have undertaken efforts to further reduce flaring and have encouraged the domestic use of gas to replace petroleum and petroleum products.

The 1989-91 period witnessed a continuation of the trend in which increases in the domestic utilization of gas in many ESCWA countries have been realized. The encouragement of natural gas use domestically has become the policy of many ESCWA countries holding natural gas reserves as a means to reduce petroleum and petroleum product consumption. This policy is designed to allow more petroleum for export in countries such as Egypt and Syria or to reduce drains on hard currency in oil importing countries such as Jordan. Major oil exporting countries have invested heavily in gas utilizing industries to best utilize total energy resources.

The Gulf crisis and ensuing war disrupted gas production in Iraq and Kuwait but had little effect in the rest of the region. Gas processing facilities were damaged in both Iraq and Kuwait and efforts have been directed at restoring these facilities. Iraq has been particularly successful in restoring prewar production and processing capacity. Kuwait's reserves are largely associated and the resumption of gas production has been linked to oil production capacity. The Gulf crisis and war created an air of uncertainty which resulted in the postponement of investment and exploration activities in other ESCWA countries, especially Gulf Cooperation Council (GCC) countries. However, since the end of the war, exploration activities have resumed with significant gas discoveries found in Egypt, Oman and the United Arab Emirates. Also, the implementation of various investment plans to exploit natural gas reserves has resumed.

The demand for natural gas is growing worldwide partly because of increases in demand resulting from the general concern over environment related issues. Gas is the cleanest burning fossil fuel and many governments are encouraging its use over other fuels. Growing recognition of environment related problems may further encourage ESCWA region countries to use natural gas domestically. Natural gas is currently used in the household and industry sectors and for the production of electricity within the region.

Reserves of many ESCWA countries are in excess of their domestic needs. Intraregional trade of natural gas occurred on a limited basis prior to the Gulf War and potential for increasing trade exists within the region. Syria, Iraq, the United Arab Emirates, Qatar and Oman now have the resources to supply nearby countries with gas if investment in recovery and transport facilities is undertaken.

Environmental considerations may also affect future demand for ESCWA region gas from other regions. The Far East has been a market for ESCWA region LNG and Japan has expressed interest in purchasing gas from Qatar and Oman. Its demand for LNG is expected to increase, from 42 bn cu m/y in 1989 to 50-60 bn cu m/y in the year 2000.¹ Other potential customers include India and Pakistan. Europe has also been considered as a potential market for ESCWA region gas. Demand for gas is increasing in Europe due in large part to concerns about the quality of the environment. Currently EEC countries import gas from Norway, Russia, Libya and Algeria. As consumption increases, and if other suppliers cannot meet its needs, Europe may turn to the ESCWA region for additional supplies. Also, energy shortages as well as growing concerns in Eastern Europe and the former Soviet Union over the condition of the environment may cause some of those countries to purchase gas from international markets. World demand for LNG is expected to grow by 50 percent during the nineties to reach 90 bn cu m/year by the year 2000 and should be 120 bn cu m/year by 2010.² Further opportunities may exist for ESCWA countries to market gas in other regions as the international gas market grows.

II. ESCWA Region Natural Gas Reserves

Proven gas reserves in the ESCWA region declined slightly during the 1989-1991 period, as shown in Table 1, mainly due to negligible declines in some member countries. ESCWA's share of total world reserves of gas also fell to from 19 percent in 1989 to 17 percent in 1991 largely as a result of increases in proven reserves elsewhere in the world. This figure was only 16 percent in 1987. While its importance in the gas market is not of the same magnitude as the international oil market, these figures show that gas is important as a domestic energy source in the region and that the ESCWA region has the potential to become an important exporting

¹G. Vernon Hugh, "LNG -- Continued Market Expansion", Petroleum Economist, Dec. 1989, pp 367-369.

²Ibid., p. 369.

region in an integrated international gas market.

Country	1989	1990	1991	% change 1990-91	% change 1989-91
Bahrain	183	177	170	-3.85	-7.00
Egypt	332	351	351	0.04	5.76
Iraq	2690	2690	2690	0.00	0.00
Jordan	28	11	3	-75.00	-89.89
Kuwait	1546	1518	1373	-9.53	-11.17
Oman	262	204	280	37.42	7.00
Qatar	4618	4621	4587	-0.73	-0.66
Saudi Arabia	5305	5249	5226	-0.44	60.38
Syria	113	156	181	16.17	-0.75
United Arab Emirates	5686	5555	5644	1.59	-0.75
Yemen	156	198	198	0.00	27.06
Total ESCWA	20919	20730	20704	-0.13	-1.03
Total World	112003	119400	123973	3.83	10.69
ESCWA/World (%)	19%	17%	17%		
Source: <u>Oil and Gas Journal</u> , various issues.					

Most gas produced in the ESCWA region is consumed in the country of production. Recent gas discoveries in Egypt, Jordan and Syria have been exploited quickly for domestic use and plans or domestic use of gas in Yemen are also under consideration. These countries are following a strategy of replacing domestic oil consumption with gas when possible to allow for increases in oil exports or, in the case Jordan, decreases in oil imports. Oman has also discovered significant gas reserves recently and has developed plans to utilize it.

III. ESCWA Region Gas Production and Consumption

ESCWA region gas producing countries made considerable efforts during the past decade to reduce flaring and losses of natural gas.

Petrochemical, fertilizer and other industries were developed to utilize associated and nonassociated reserves of natural gas. The GCC area now boasts a modern, competitive petrochemical industry which competes successfully worldwide and uses natural gas as a feedstock. Other ESCWA countries encouraged the domestic use of natural gas as a substitute for petroleum and petroleum products. Gas is increasingly used by households throughout the region for domestic activities. In addition, natural gas is used to produce electricity in many countries of the region.

Marketed production of natural gas in Bahrain declined slightly in 1990. Bahrain's reserves are limited and it is currently actively exploring for hydrocarbon resources and hopes to find gas. Seismic surveys and exploration wells have been undertaken offshore but reserves have not yet been located.³

Egypt is actively pursuing a policy of substituting oil and petroleum products with natural gas for domestic consumption. Marketed production increased during 1990 by almost five percent as shown in Table 2. During 1991 further increases in marketed production occurred resulting in a total of 9240 million cubic meters.⁴ This represents an increase of more than 14 percent over the 1990 level.

Officials are optimistic that further reserves will be found and estimate that reserves will reach 2,265 billion cubic meters by 2,010.⁵ Discoveries were made in late 1991 and early 1992 offshore and in the Nile Delta and Western desert areas. Plans to develop them include a gas pipeline from offshore reserves. Egypt is also planning to expand the gas distribution network in Cairo and is undertaking work on another gas system which will gather gas from the Gulf of Suez and the Sinai and add ten percent to total gas production.⁶

Efforts have also been made to encourage greater efficiency in consumption of energy products including gas. During 1991 Egypt raised prices of natural gas to reflect the opportunity cost of energy on the international markets and will gradually raise prices of other energy products in an effort to curb consumption.⁷

³Arab Oil and Gas, vol. 21, no. 491, 1 March 1992, p. 22. and Arab Oil and Gas, vol. 21, no. 493, 1 April 1992, p. 21-22.

⁴Arab Oil and Gas, vol 21, no. 492, 16 March 1992, p. 34.

⁵Middle East Economic Digest, 3 April 1992, p. 16.

⁶Arab Oil and Gas, 16 September 1991, p. 12.

⁷Arab Oil and Gas, 1 September 1991, p. 41.

The Gulf War seriously disrupted oil and gas production in Iraq. Prior to the crisis, Iraq produced mostly associated gas for domestic consumption. Some gas was exported to Kuwait. The Gulf war damaged some production and processing facilities. Recently officials announced that gas production is 45 percent of the prewar level.⁸ Iraq has been producing associated gas from northern fields and pumping the surplus oil back into the ground. Iraq uses gas for electricity generation, domestic cooking and heating.

Country	1989	1990	% change 1989-90
Bahrain	5730	6170	7.68
Egypt	7740	8110	4.78
Iraq	6450	4180	-35.19
Jordan	54	156	188.89
Kuwait	8160	5230	-35.91
Oman	2790	2800	0.36
Qatar	6200	6720	8.39
Saudi Arabia	29800	30500	2.35
Syria	1040	1070	2.88
United Arab Emirates	22380	22100	-1.25
Total ESCWA	90344	87036	-3.66
Total World	2039782	2071025	1.53
ESCWA/World (%)	4.4	4.1	

Source: ESCWA based on various national and international sources.

Jordan is continuing its efforts in exploration for natural gas and a study is underway to identify ways and means of furthering its utilization of existing resources near the Iraqi border. Currently its natural gas is used for fueling an electric generation plant and work is currently underway to expand its

⁸Jordan Times, 9 June 1992, p. 7.

capacity. Jordan announced in 1991 that using natural gas for electricity generation has saved \$20 million in fuel oil bills.⁹

The occupation of Kuwait in 1990 and the ensuing Gulf War halted the production of gas during the second half of 1990 and 1991. Kuwait's gas reserves are mostly in the form of associated gas and production levels are usually related to oil production. Kuwait's four gas booster stations were damaged or destroyed during the war and, after the war, gas burned along with the burning oil wells or escaped from gushing wells. The LPG plant, however, was not damaged and enough repairs were made to terminal facilities to allow exports of butane and propane to Japan in early 1992.¹⁰ During 1991 Kuwait imported gas for domestic use.¹¹

The first phase of the North Field project, designed to exploit significant gas reserves in Qatar, was inaugurated in September, 1991 with the bulk of the approximately 20 mn cu m/day of gas produced used domestically.¹² Fifty thousand barrels/day of NGL are also produced for export. Phase II of the project, which will be export oriented, is proceeding with efforts currently aimed at obtaining markets and financing. The design and construction of a new terminal at Ras Laffan is underway and a letter of intent has been signed to export LNG from Ras Laffan to Japan in 1997.¹³ Qatar also has plans to build a refinery which will produce methyl tertiary butyl ether (MTBE) and methane using natural gas as a feedstock. Other plans include exporting gas to neighboring countries and a possible scheme to supply Pakistan with gas via a proposed pipeline.

Syria is initiating a US\$ 300 million gas gathering project in its nonassociated gas fields in the Palmyria region.¹⁴ Syria is also in the process of commissioning a comprehensive study on natural gas utilization. In late 1991 a gas processing plant with a capacity of over four million cubic meters/day was opened at the Omar field using associated gas from nearby oil fields.¹⁵ Two other gas processing plants at Suwaidiyah and Jbaisseh are in operation with a total capacity of almost 2.4 million cu m/d. In

⁹Jordan Times, 12 August 1991, p. 1.

¹⁰Arab Oil and Gas, vol 21, no.493, 1 April 1992, p. 8.

¹¹Middle East Economic Survey, 24 June 1991, p. D5.

¹²Arab Oil and Gas, 16 September 1991, p.5.

¹³Ibid.

¹⁴Middle East Economic Survey, 16 December 1991, p.A9.

¹⁵Arab Oil and Gas, 16 December 1991, p.19.

early 1992 Syria initiated work on an electric generation plant designed to utilize natural gas.¹⁶ During 1991 Syria and Turkey discussed the possibility of Syria exporting natural gas from a field close to the Turkish border and a Turkish company indicated willingness to build a gasline to facilitate the transaction.¹⁷ Syria is also considering exporting natural gas to Lebanon.

Recent discoveries in Oman have resulted in an upward revision of total reserves in 1992 to over 400 billion cubic meters.¹⁸ Oman also announced two new discoveries of gas during 1991 located in the northern part of the country close to areas where gas had previously been found.¹⁹ These and other discoveries made in 1990 are a result of serious exploration efforts on the part of Oman which are continuing. Various licenses for exploration and drilling during 1991 were awarded in the Haffar area believed to be rich in gas.²⁰

At present Oman utilizes gas domestically for reinjection into oil fields, fueling electricity generation and desalination plants and other industrial uses. Plans are underway to increase domestic use of gas as well as to invest in downstream industries using natural gas as a feedstock and other export schemes. Although an earlier plan to set up a floating methanol plant has been shelved, a considerable investment of US\$ nine billion for an LNG plant was recently announced.²¹ Recent forecasts estimate that, at planned production levels, Oman holds enough reserves to export for 20 years and to satisfy domestic needs for 50 years.

Saudi Arabia increased its gas output somewhat in 1990 as shown in Table 2 and preliminary figures show that marketed production increased to 32 billion cubic meters or by almost five percent in 1991.²² Saudi Arabia is undertaking various projects to expand its petrochemical industry which utilizes natural gas. New facilities under construction and in earlier planning stages include those designed to meet the expected increases in demand for MTBE in export markets during this decade. Additional developments

¹⁶Middle East Economic Digest, 31 January 1992, p. 29.

¹⁷Arab Oil and Gas, 1 October 1991, p. 20.

¹⁸Arab Oil and Gas, vol 21, no. 490, 16 February 1992, p. 19.

¹⁹Middle East Economic Survey, 24 June 1991, p.A7.

²⁰Arab Oil and Gas, 1 October 1991, p.23.

²¹Middle East Economic Digest, 21 February 1992, p. 17.

²²Oil and Gas Journal, vol. 21, no. 492, 16 March 1992, p. 32, citing figures supplied by Cedigaz.

include four contracts signed in late 1991 to provide LPG to customers in Japan, South Korea and the USA.²³ Saudi Arabia's exports of LPG to Japan increased from 5.7 million tons in 1989 to over 6.7 million tons in 1990.²⁴ Additional agreements with other Japanese companies are under discussion.

The United Arab Emirates increased its exports of LNG to Japan from 3,200 cubic meters in 1990 to 3,500 cubic meters in 1991 or by over nine percent.²⁵ Overall marketed production of natural gas in Abu Dhabi increased by almost 12 percent in 1991.²⁶ Plans exist to significantly increase gas production including doubling onshore natural gas production in Abu Dhabi during the next two years. The additional gas will be processed by a planned gas processing plant at Habshan and used at the Das Island LNG plant which will be expanded. Pipelines will also be constructed. Other plans include an MTBE plant in Dubai's Jebel Ali free zone and the construction of a pipeline to further increase the utilization of gas for electricity generation at the free zone by 67 percent.

Exploration efforts undertaken by the United Arab Emirates have been successful and reserves for 1992 have been reassessed recently at 8,891 billion cubic meters. Exploration for both oil and gas is continuing in the United Arab Emirates and endeavors are expected to intensify during the next five years. The number of rigs devoted to exploration will increase from 12 in 1991 to 20 in 1992.

Although Yemen has yet to produce gas for domestic use, it commissioned two studies during 1991 to assess the potential for developing gas in the Marib Jawf area for domestic use and export.²⁷ Rising gas oil ratios in the Marib oil fields has caused a slowdown of oil production to avoid the necessity of flaring gas until plans to process the gas are implemented. An earlier study by a Dutch firm recommended that the gas be used to produce LPG and LNG. The project would cost US\$1.2 billion which would have to be borrowed from the World Bank and private sources. A gas recycling unit is currently under construction on the Assal-al-Kamil field. Its capacity will be approximately 11 mn cu m/day and is expected to be completed by 1994. Yemen is committed to developing its gas reserves for domestic use and in September, 1991

²³Middle East Economic Survey, 16 December 1991. p. A6.

²⁴Arab Oil and Gas, 1 January 1992, p.13.

²⁵Middle East Economic Digest, 21 February 1992, p. 17.

²⁶Arab Oil and Gas, vol. 21, no. 492, 16 March 1992, p. 33.

²⁷Arab Oil and Gas, 16 September 1991, p.16.

it was announced that gas imports will not be authorized in 1992.²⁸ Yemen currently produces gas at the Alif field but this gas is used for reinjection purposes.

²⁸Ibid., p.17.