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Report No. 19947

IMPLEMENTATION COMPLETION REPORT

ON A

LOAN

IN THE AMOUNT OF US\$84.0 MILLION

TO THE

ARAB REPUBLIC OF EGYPT

FOR A

GAS INVESTMENT PROJECT

December 27, 1999

**Energy Sector
Infrastructure Development Group
Middle East and North Africa Region**

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IMPLEMENTATION COMPLETION REPORT

ARAB REPUBLIC OF EGYPT GAS INVESTMENT PROJECT (Loan 3354-EGT)

Currency Equivalents

Currency Unit = Egyptian Pounds (LE)

	<u>Official Rate</u>	<u>Market Rate</u>
May 1988	US\$1 = LE 2.242	N.A.
May 1991	US\$1 = LE 3.17	US\$1 = LE 3.17
Nov 1998	US\$1 = LE 3.39	US\$1 = LE 3.39
April 1999	US\$1 = LE 3.40	US\$1 = LE 3.40

Abbreviations:

EGPC	=	Egyptian General Petroleum Corporation
ENPPI	=	Engineering Company for Petroleum and Petro Chemical Industry
ERR	=	Economic Rate of Return
ESMAP	=	Energy Sector Management Assistance Programme
GASCO	=	Gas Company of Egypt
GCGDC	=	Greater Cairo Gas Distribution Component
GOE	=	Government of Egypt
GUPCO	=	Gulf of Suez Petroleum Company
ICR	=	Implementation Completion Report
LPG	=	Liquefied Petroleum Gas
LRMC	=	Long Run Marginal Cost
METROGAS	=	Metropolitan Gas Company
MOPIC	=	Ministry of Planning and International Co-operation
PETROGAS	=	Petroleum Gas Company
PSAs	=	Production Sharing Agreements
SAL	=	Structural Adjustment Loan
TGGC	=	Trans-Gulf Gas Component
TCF	=	Trillion Cubic Feet

FISCAL YEAR

January 1 to December 31

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IMPLEMENTATION COMPLETION REPORT

ARAB REPUBLIC OF EGYPT

GAS INVESTMENT PROJECT
(Loan 3354-EGT)

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IMPLEMENTATION COMPLETION REPORT

ARAB REPUBLIC OF EGYPT

GAS INVESTMENT PROJECT (LOAN 3354-EGT)

PREFACE

1. This is the Implementation Completion Report (ICR) for the Gas Investment Project in the Arab Republic of Egypt, for which Loan 3354-EGT in the amount of US\$84.00 million was approved on September 26, 1991 and declared effective on September 3, 1992.
2. The Loan was closed on June 30, 1999, after it was extended once from its original closing date of December 31, 1997. The Loan was 99.6 percent disbursed. The small undisbursed amount (US\$303,306.63) was cancelled on November 9, 1999.
3. The ICR was prepared by Mr. Uruj Kirmani, Senior Implementation Specialist (MNSID) and Mr. P. Venugopal (Consultant). The ICR was reviewed by Mr. Mourad Belguedj, Chief (EMTOG); Mr. Mohammed Al-Sheik, Lawyer (LEGMN); Mrs. Marie Ange Le, Operations Analyst; Mrs. Zoubeida Ladhibi-Belk, Sector Manager; and Jean-Claude Villiard, Sector Director (MNSID). The completion mission is grateful to the officials of Egyptian General Petroleum Corporation (EGPC) and Petroleum Gas Company (PETROGAS) for their assistance.
4. Preparation of this ICR began during the project's final supervision/completion mission in March 1999. The report is based on material in the project file, discussions with the Borrower, and information collected in the field. The comments from the Borrower's Perspective (EGPC) and (PETROGAS) are included as Annexes A and B, respectively.

IMPLEMENTATION COMPLETION REPORT**ARAB REPUBLIC OF EGYPT****GAS INVESTMENT PROJECT
(LOAN 3354-EGT)****Evaluation Summary****Introduction**

1. The Gas Investment Project approved in 1991, followed four pioneering projects in the gas sub-sector, which the Bank had supported at the turn of the 80s decade. All five projects were in pursuance of the Bank policy initiated in 1978, to increase lending in the oil and gas sector, with emphasis on gas exploration, development and infrastructure to transmit and distribute gas in the domestic market. Natural Gas would provide clean energy, reduce environmental pollution and displace more valuable petroleum products, which could in turn be exported contributing towards foreign exchange earnings. Egypt was a notable case of success of the Bank's policy. From the first involvement of the Bank over 20 years ago until the present, several achievements have been made in the gas sub-sector, comprising lending for the five projects and advising on the investment strategies, economic pricing of energy and development of gas institutions. Remarkable increases in gas reserves (from 9 TCF to 34 TCF of proven reserves) and utilization in the domestic market of both natural gas and Liquefied Petroleum Gas (LPG) extracted from the wet gas produced with oil have taken place. A vast pipeline network has been built in Lower Egypt and expansion of gas network in Upper Egypt and other parts of the country are now being made. In gas distribution to cities, private sector companies have been given a big role. Finally, the Government has increased the average price for gas to industrial and commercial consumers to the economic price; the gas tariffs for residential consumers, however, have remained much lower than the economic price. This category of consumers is cross-subsidized to ensure availability of clean fuel (both natural gas and LPG) to a large number of residential consumers, which are below poverty line.

Statement/Evaluation of Project Objectives

2. Four key objectives, in tune with the Bank's policy for the country and the sector, were focussed at appraisal of this project. These are given as under.

- (a) Augment the supply of gas and LPG for domestic use and substitute petroleum products and release the latter for export.
- (b) Improve the environment, particularly through the capturing of flared gas.
- (c) Seek institutional development in gas distribution activities.
- (d) Evolve rational consumer pricing for natural gas, having achieved earlier, such rationale in pricing petroleum products after prolonged discussions with the Government of Egypt (GOE).

3. The Project comprised of two physical components. First, the Trans-Gulf Gas Component (TGGC) was aimed at recovering flared associated gas in an offshore field, and from the Sinai area, transport it onshore, extract value added fractions (LPG and condensate), and transmit the dry sales gas by pipeline to the City of Suez for domestic consumption. Second, Greater Cairo Gas Distribution Component (GCGDC) would expand the gas distribution network in Greater Cairo area as a follow-up of an earlier Bank project for Cairo Gas Distribution (Cr. 1024-EGT). In addition, as part of technical assistance, three studies relating to Gas Distribution Pricing Study (ESMAP), supply planning further development of gas from Gulf of Suez, and upgrading refinery outputs in secondary processing were included in the project.

Implementation Experience and Results

4. Achievement of Objectives and Sustainability.

(a) At the macro-economic level, Egypt maintained a steady constant net balance of foreign exchange in petroleum trading in the period 1992-98 as new energy demands could be met by newly discovered gas, while oil production did not increase. The proven gas reserves increased from 9 trillion cubic feet (TCF) to 34 TCF during the last decade.

(b) **Institutional Development.** Egyptian General Petroleum Corporation (EGPC) was solely responsible for all petroleum activities on behalf of the Government. It was reorganized in 1997, when the GOE decided to involve the private sector in domestic gas business. New institutions in downstream gas processing, transmission and distribution were created. In March 1977, the Government spun off gas operations from EGPC to a new company, Gas Company of Egypt (GASCO) formed under the new investment law. Although it is a public company, with EGPC as the majority shareholder, it has been given full autonomy to conduct its business efficiently. It is responsible for receiving all gas produced upstream from EGPC, processing it to recover LPG and condensate, and selling dry gas to major consumers, e.g., cement and power plants, and selling bulk gas to the other distribution companies. In addition, several private companies have been incorporated to construct city gas distribution systems and distribute it in designated areas of Egypt. PETROGAS, the beneficiary for GCGDC and co-signatory with Bank of the Project Agreement in respect of GCGDC has been split, but will continue to exist as two wholly-owned subsidiaries of EGPC. One subsidiary, PETROGAS, will trade in LPG and the other, METROPOLITAN GAS (METROGAS) will distribute natural gas in existing areas of the cities of Cairo, Alexandria and other designated areas, where the (former) PETROGAS had been distributing gas. The measures taken by the Government to confer financial autonomy on GASCO and for private sector participation in gas distribution by providing attractive terms to encourage private investment are to be commended. However, METROGAS, as 100 percent subsidiary of EGPC is not covered under the newly introduced terms and conditions for the private sector gas distribution companies. It is important that the financial viability of the METROGAS for gas distribution in the existing market areas of Cairo and other cities, is maintained and covenants in the Project Agreement complied with. Recommendations in this regard are made in the ICR (paras. 11 and 12).

(c) **Physical Achievements.** Both TGGC and GCGDC exceeded the physical targets as estimated at appraisal. TGGC exceeded the appraisal estimates by 50 percent and GCGDC

by over 70 percent (408,000 residential consumers were connected compared with appraisal estimate of 237,000 consumers). The studies were carried out satisfactorily, and were made use of in revising gas tariffs, in planning and implementing a Phase II project in the Gulf by EGPC, and in providing information to investors interested in Refinery Expansion in Egypt (para. 14).

(d) **Project Costs and Financing.** There was a cost overrun of 44 percent over appraisal estimate for various reasons. In TGGC, some designs had to be changed and facilities sized for vastly larger production of gas, LPG and condensate as well as for optimizing the use of offshore platforms, to incorporate gas lift system for secondary oil recovery from the October field. This was not postulated at appraisal. Later, Gulf of Suez Petroleum Company (GUPCO) optimized secondary recovery operations, which included one larger size platform for gas lift operations in addition for TGGC operations. In GCGDC, more customer connections (from 237,000 residential consumers estimated at appraisal to 408,000 actually connected) were provided. Further, PETROGAS changed its policy and decided to bear the cost of meters and regulators for residential consumers. This added substantially to the costs. The financing for the Gas Investment Project comprised IBRD: 22 percent, European Investment Bank (EIB): 7 percent, Islamic Development Bank: 4 percent. The rest of the funds (67 percent) were provided by EGPC.

(e) **Economic Rate of Return.** The economic rate of return for the project is reevaluated at 19 percent compared to 18 percent at appraisal, which is satisfactory. By components, the ERR for TGGC is placed at 31 percent as compared with the SAR estimate of 28 percent and for GCGDC at 10 percent as compared with the SAR estimate of 16 percent. These returns are also satisfactory. For GCGDC, the return is reevaluated lower than at appraisal, due to higher construction costs than estimated at appraisal as indicated in para. (d) above. In extending gas distribution to new cities, salient features in GCGDC worthy of note are the outlook for the higher regime of oil/oil product prices, as in place presently and the right mix of consumers, with a predominance of commercial and industrial consumers as compared to residential consumers.

(f) **Implementation Delays.** The project implementation was delayed by 18 months. The TGGC was completed ahead of the original schedule in July 1994. Most of the tasks under GCGDC were also completed as scheduled. However, a delay of 18 months occurred in constructing a peripheral supervisory control and data acquisition and monitoring system (SCADA). SCADA had not been explicitly considered at appraisal. The decision to install it was taken in mid-1994 and its installation was to be completed within the original loan closing date. However, procurement problems arose, with the lack of clarity in the first round of bidding. After clarifying the issues encountered earlier, a second round of bidding was made. Consequently, the finalization of the contract was delayed. It was commissioned in May 1999, about 18 months behind original schedule. The closing date of the loan was extended from December 31, 1997 to June 30, 1999 to complete the SCADA contract.

(g) **Project Sustainability.** Sustainability is highly likely, given that TGGC was commissioned five years back (in 1994), and GCGDC's core operations of gas supply to all customers commenced two years later (in 1997), and both components have

performed satisfactorily since then. With incremental investments, EGPC implemented a follow-on phase to TGGC and PETROGAS similarly to GCGDC. The result has been, not only to raise physical output considerably in both cases, but also to increase the net economic benefits well beyond those indicated in para (e).

(h) **Bank Performance.** The Bank performed through all phases of the project cycle as efficiently as it should. One facet of it, deserving highlighting, was the regularity of supervision missions. The missions met with and briefed the authorities and the agencies at several levels. That helped in the resolution of project problems effectively and without delay. It also provided the Bank opportunity to review the developments and policy changes in the sector and offer comments and advice to the Borrowers. The missions, in turn, received up-to-date information on the sector from the concerned agencies.

(i) **Borrower Performance.** The Borrower performance was of a high order. The staff were result-oriented. As mentioned in the text of ICR, although the loan did not become effective for 14 months, PETROGAS took practical implementation actions that prevented slippage of its implementation plan from its original schedule.

(j) **Project Outcome.** The project is assessed as 'satisfactory' in its overall outcome. The positive factors are: (i) the physical results of production in TGGC exceeded appraisal expectations; (ii) in GCGDC, the number of gas connections were far in excess of appraisal targets. ERR for the project, as a whole is also placed higher than expected. There has been positive achievement of the sector objectives, be it institutional development or gas tariffs or increasing utilization of gas substituting for valuable petroleum products, which were released for export. The one adverse factor is the delay in installing SCADA that led to the loan closing date being extended by 18 months. But for it, the project might have merited a 'highly satisfactory' rating.

Findings and Lessons Learned

5. These may be summed up as follows:

(a) A project for city gas distribution should be planned after careful collection of economic data and analysis of the economic costs and benefits. Unless there is space heating and/or the distribution area includes medium level bulk consumers such as commercial establishments and small scale industries in sufficient numbers (which otherwise would not be supplied with gas directly), there may be no economic justification.

(b) Successes with reforms, privatization and price increases to attain economic levels are achieved, albeit slowly.

(c) Supervisions are important and must be regularly scheduled. The missions must use the opportunity not only to oversee progress of the project and solve problems, but also study the developments in the sector and offer unobtrusive guidance and advice.

(d) In procurement of specialized contracts, as in SCADA, the Borrower should be assisted by the specialists (consultants or Bank's pool of experts) in the field to obviate the difficulties experienced in this project.

IMPLEMENTATION COMPLETION REPORT

ARAB REPUBLIC OF EGYPT

GAS INVESTMENT PROJECT (LOAN 3354-EGT)

A. Introduction

1. The Gas Investment Project was the last of a series of five pioneering projects in the oil and gas sector in Egypt supported by the Bank as part of its policy to encourage discovery and utilization of natural gas in the developing countries. The mid and late 1970s had witnessed sudden and steep increases in oil prices with serious impacts on balance of payments in oil importing countries. Although Egypt was a net exporter of oil, increases to oil reserves had slowed down during the 1970s, while the domestic demand for energy was growing fast. International oil companies in Egypt, as elsewhere at that time, had little interest in finding gas or developing gas discoveries, unless the gas could be exported as Liquefied Natural Gas (LNG).

2. The World Bank Board decided in 1978 to increase the lending in the oil and gas sector, with particular emphasis on finding of gas in 'gas-prone' areas, developing 'dry' gas fields, reducing the flaring of associated gas, and processing gas to recover valuable Liquefied Gas Petroleum (LPG), and other gas liquids. Improving gas availability had to go hand in hand with the provision of facilities for the transmission and distribution to the domestic market. Gas would usually be consumed in the domestic market and would thus substitute for imported oil or release oil for export. The Bank's new policy of treating natural gas as an integral component of Borrowers' energy programs led to the Bank's involvement in investment strategies, the pricing of petroleum products/gas, institutional development to enhance the role of the private sector and the mobilization of financial resources. Among the successes the Bank achieved in the pursuit and implementation of its gas policy, perhaps one of the most notable was in Egypt.

3. Between 1979 and 1982, the Bank approved four projects in the oil/gas sub-sector in Egypt. These were the Gulf of Suez Project (Cr. 1732-EGT), Cairo Gas Distribution Project (Cr. 1032-EGT), Western Desert Gas Exploration Project (Cr. 1928-EGT) and Abu Qir Gas Development Project (Credit 2103-EGT). The Gas Investment Project (Ln. 3354-EGT) under review was approved in 1991 after a hiatus in lending to Egypt caused by lack of agreement on several macroeconomic issues. However, discussions with Egypt on gas sub-sector issue continued without interruption, both during the implementation phases of the earlier projects and later.

4. A few of the achievements in the gas sub-sector in Egypt over the period of the Bank's involvement in the sector are enumerated below:

(a) The main achievement was that gas consumption, hardly significant at 2 billion cu. meters in 1978 (10 percent of primary commercial energy consumed), rose to 16 billion cu. meters (33 percent of primary commercial energy consumed) in 1998. Gas reserves increased phenomenally and presently stand at 1.06 trillion cu. meters.

(b) Projects for the capture of flared gas have almost eliminated all flaring and have added to the gas available for consumption. The environment has also benefited from reduction in flaring.

(c) Domestic production of LPG, non-existent 20 years ago, amounted to 1.3 million tons in 1998.¹

(d) The pipeline network of over 3500 kilometers of high-pressure lines alone now covers Lower Egypt, with connections to fields in the Gulf of Suez, the Mediterranean, and the Western Desert. Export by pipelines to other countries is being considered.

(e) New gas institutions, both public and private sector, dedicated to downstream gas activities of different kinds, have been established. Of unique significance is the Government's policy of involving the private sector in gas distribution. Since 1997, several private sector companies, local as well as foreign (e.g., Nile Gas)², have been established to expand gas utilization in various regions of Egypt.

(f) The price for natural gas to the producers (international oil companies) was made attractive by linkage to the export prices of a basket of petroleum products in Egypt. Just as important, domestic tariffs for natural gas were revised to reflect the Long Run Marginal Cost (LRMC) in the current supply driven situation in the market.

5. The Bank's role was that of a catalyst. Good work was done by the institutions concerned in Egypt, led by EGPC and its affiliates, which were ably assisted by technical collaboration with foreign companies and consultants. In addition to the Bank-financed projects, other subsequent projects were successfully implemented through such collaboration. Today, Egypt has a cadre of qualified and competent personnel in all departments, from engineering to construction and maintenance, operations, marketing, and support services.

6. The objectives set for the Gas Investment Project and their realization were part of and fitted into the strategy of the gas sub-sector delineated above.

Statement/Evaluation of Objectives of the Gas Investment Project

7. The key objectives envisaged at appraisal of the Gas Investment Project are given as follows:

- (a) Augment the supply of gas and LPG for domestic use and substitute petroleum products, which could be exported and contribute towards balance of payment support.
- (b) Improve the environment, particularly through capturing flared gas.
- (c) Seek institutional development in gas distribution activities.
- (d) Rationalize consumer pricing for natural gas, having achieved earlier such rationalization in pricing petroleum products.

8. There were two main physical components of the project. These were as follows:

- (a) **Trans-Gulf Gas Component.** This component comprised capturing about 70 MMCFD of associated gas that was being flared in the offshore Gulf of Suez and at Sinai (Belayim Field), processing it for recovery of dry gas, LPG and condensate and transmit dry sales gas by pipeline to

¹ In view of increasing demand, the Government imported 600,000 tons LPG in 1998. With increased natural gas supply to the consumers, LPG imports are expected to decline considerably.

² Nile Gas is a company with major participation by the British Gas (UK) for the supply of natural gas in Upper Egypt.

Suez for domestic consumption. The component was implemented by the Borrower – EGPC (which was the holding company in charge of all petroleum activities in Egypt) – through ENPPI, its fully owned engineering subsidiary.

(b) **Greater Cairo Gas Distribution Component.** This component was designed to extend the gas distribution network in Cairo and to cover additional households, commercial establishments, and industries within designated areas of the city as Phase 2 of a program (initiated under IDA Credit 1024-EGT). PETROGAS – a fully owned subsidiary of EGPC, solely responsible for gas distribution to residential, commercial and industrial consumers, and sale of LPG – was the implementing agency. The amount of the loan relating to this component was on lent by EGPC to then PETROGAS.

9. Besides these physical components, three studies to be conducted by EGPC formed part of the project. The first study was to estimate the economic cost of gas supplied to different categories of consumers (Gas Distribution Pricing Study); the second would identify future gas recovery projects (Gas Development Planning Study); and the last would help to improve the production of higher value petroleum products (Refinery Rehabilitation Study).

10. EGPC and its affiliate companies concerned with the implementation of the project had prior experience in the kind of work involved. The Bank correctly assessed that this local experience could be drawn on for efficient and cost effective implementation.

B. Achievement of Objectives

11. **Macro-economic.** At the macro-economic level, the balance of payments in petroleum trading was more or less constant during 1992–1998 largely due to increasing gas consumption in the domestic market. Crude oil production remained almost static, around 43 million tons per year. However, gas production rose from 8 to 12.5 million tons (of oil equivalent) or about 4.5 million tons (of oil equivalent) over the period and, by and large, met the growth in consumption of energy within the country, and in turn supported the balance of payments by contributing towards reduced import of value added petroleum products.

12. Sector Objectives

(a) **Institutional Development.** In the gas sub-sector, some significant institutional changes took place during the period. Upstream gas exploration and production had always been and continues to be contracted to international oil companies under Production Sharing Agreements (PSAs). EGPC had solely managed the gas transmission network and its operations. The downstream distribution of gas was managed through its wholly-owned subsidiary company, PETROGAS. PETROGAS functioned on a cost plus fee-for-service basis, the fee being determined annually so as to maintain their financial viability or to enable them to fulfill covenants, if any. The companies had little incentive to be cost efficient or expand their business. The Bank had consistently advised EGPC to introduce a commercial culture in the functioning of the companies. The Government made a major policy change when it decided to attract private investments in order to expand domestic utilization of gas. As a first step, it spun off the gas utilization business from the direct responsibility of EGPC. In March 1997, the Government established Gas Company of Egypt (GASCO) owned 70 percent by EGPC and 30 percent by two other government companies for gas processing, transmission and supply to bulk consumers under Investment Law 230. GASCO could thus function as a commercial entity with financial autonomy. As a result of GOE's encouragement to the private sector in expanding gas utilization, several companies including City Gas, Nile Gas, and National Gas have been established within several governorates. These

companies have the mandate to construct City Gas distribution systems and supply piped gas to consumers of all categories. PETROGAS continues to function as a wholly-owned subsidiary of EGPC responsible for gas distribution in Cairo and other designated areas, but under a new name "METROGAS".

(b) **Financial Aspects of former PETROGAS (and now METROGAS).** In effecting the institutional reforms, GOE had ensured that GASCO and the gas distribution companies in the private sector had the needed financial viability and the incentive to operate efficiently. PETROGAS, however, was initially affected adversely in the scope of its operations and the Bank had expressed concern at the likely effect on its finances. Of its three businesses, namely, bulk gas sales in Egypt, LPG distribution in Egypt and City Gas Distribution in Cairo and Alexandria, it lost bulk gas sales to GASCO (in March 1997) and LPG distribution to a newly-formed PETROGAS (in mid-1999) through bifurcation. The residual function of City Gas Distribution has been assigned to a new company, 'METROGAS'. Both PETROGAS (new) and METROGAS will remain wholly-owned subsidiaries of EGPC. GOE has agreed to METROGAS extending gas distribution to some other cities besides Cairo and Alexandria with a view to allowing the company to grow. As a wholly-owned subsidiary of EGPC, METROGAS will be remunerated on a cost-plus-fee basis, but EGPC will enable METROGAS to comply with the financial covenants on debt-service coverage and self-financing ratios that the old PETROGAS had agreed to comply with under the Project Agreement with the Bank.

(c) **Gas Tariffs.** During the project implementation period, some progress was also made with regard to rationalizing consumer gas tariffs. Effective from January 1998 the average consumer tariff was raised equivalent to the LRMC of supply. However, there is a cross subsidy provided to residential customers from commercial and industrial customers. The burden on the latter is but small, whereas the residential consumers enjoy a large benefit, as they consume only about 1.5 percent of the total volume of gas sold. There are adequate gas reserves to cater to demand, if only the infrastructure can be developed fast enough. However, there is a need to take steps to reduce subsidies in tariff for the natural gas residential and commercial consumers (at present, it is 20 percent of the economic price) as well as for LPG consumers, who are provided LPG at a subsidy equivalent to 75 percent of economic price.

(d) **Manpower Development.** The project enabled 80 employees of PETROGAS (now METROGAS) to be trained abroad and about 7,000 staff to be trained in a training school established by PETROGAS in Cairo. The school has also provided training to the guest workers from other Arab countries.

13. **Physical Achievements.** Both components of the project were completed successfully – TGGC in July 1994 and GCGDC in June 1999. The original project completion date was June 30 1997. Thus, TGGC was completed ahead of time. The core tasks of GCGDC, i.e., laying the network and connecting new customers to gas was also completed prior to the original closing date. A peripheral piece of work, providing an optional supervisory monitoring system (SCADA) delayed overall project completion by 10 months. TGGC achieved far higher recovery of LPG and condensate, about an average of 50 percent above target quantities. Under GCGDC, about 25 percent more customers than originally planned were connected to piped gas supply. (Actual figures of production are contained in para. 21.)

14. All the studies have been carried out. The Gas Distribution Pricing Study carried out by consultants was followed by other supplemental studies, also by consultants, under financing arranged by EGPC. These studies helped to determine the LRMC of gas to bulk gas consumers and within Cairo, and in the revision of gas tariffs effected from January 1, 1998. The Gulf of Suez Gas Development Study was carried out by EGPC itself. Following it, EGPC financed a Phase II Project in the Gulf for additional gas

recovery, dovetailing it to TGGC and commissioning it in March 1999. Canadian consultants carried out the study of the refineries. EGPC is seeking private investments for modernizing the refineries.

15. Financial/Economic Achievements

(a) **Project Costs** - For TGGC, costs exceeded appraisal estimates by 37 percent (\$85 million compared to \$62 million, excluding customs duties), mostly due to facilities having to be sized for far larger yields of LPG and condensate than anticipated at appraisal. For GCGDC, the actual cost was 46 percent over the appraisal estimate (\$306 million compared to \$209 million, excluding taxes and duties). This is partly explained by the increase in the number of gas connections from 237,000 residential consumers at appraisal to 408,000 consumers on completion of the project. The rest of the cost overrun was due to higher prices of materials and much higher engineering and construction costs far beyond the price contingency provisions in the appraisal estimates. The Gas Investment Project as a whole required a capital outlay of \$391 million (excluding taxes and duties) compared to the SAR estimate of \$271 million – an overrun of 44 percent. The materials were procured under the Bank's procurement procedures. ENPPI was responsible for procurement and construction supervision for TGGC. For GCGDC, Egypt Gas (a company owned 70 percent by PETROGAS and 30 percent by others) had the sole responsibility for detailed design and procurement services, as well as the construction of networks, the installation of consumer piping and the conversion of appliances.

(b) **Financing** - Thirty-three percent of the project financing was from external resources: 22 percent from IBRD, 7 percent from European Investment Bank (EIB) and 4 percent from Arab-Islamic Bank. The balance was provided from internal cash of EGPC/ PETROGAS.

(c) **Economic Rate of Return (ERR)** - The reevaluated ERR from the Gas Investment Project as a whole comes to 19 percent compared to the appraisal (SAR) estimate of 18 percent. By components, TGGC would yield 31 percent against 28 percent at appraisal and GCGDC, 10 percent against 16 percent at appraisal. These returns are satisfactory. The lower return from GCGDC compared to the expected return at appraisal is mainly due to increases in the investment costs (adjusted for inflation), as explained in para. 15(a). The investment costs were also relatively lower under the first Cairo Gas Distribution Project, where the ERR was reevaluated at 14 percent (PPAR Report 6860 of June 24, 1997).

16. **ERR in City Gas Distribution.** A few salient factors that affected the ERR of GCGDC are worthy of note when extending distribution of gas to other cities. First is the price of oil/oil products. In April 1999, when the ICR was taken up for preparation, Brent blend crude oil (benchmark) was selling at \$15/ barrel and the outlook at that time for a higher price for oil looked bleak. But OPEC and some other oil exporting countries then decided to adopt production quotas and have achieved success in adhering to the quotas. As a result, oil prices have risen, attaining \$27/ barrel for Brent blend in November 1999 (seasonal effect included). The OPEC target is, however, a \$21/ barrel with seasonal variations around that figure. Although this figure will be barely reached as the average for 1999, it seems highly probable that in 2000 and beyond, OPEC will succeed in achieving it. Accordingly, for ERR calculations for the Project as a whole and the two major components of TGGC and GCGDC, the price for crude oil is assumed at \$21/ barrel (in 1999 \$).³ The second factor

³ A sensitivity analysis was made in the low case of oil price at \$15/barrel yielding ERR of GCGDC at 5 percent, median case of oil price at \$21/barrel yielding ERR of 10 percent, and high case with oil price of \$27/barrel resulting in ERR of 4 percent.

to be mentioned is the consumer-mix. In Greater Cairo, residential consumption would constitute 35 percent and commercial and industrial, 65 percent. It is the latter group of consumers with its very low capital investment per unit of gas consumed that will contribute significantly to the economic rate of return as the gas tariff tax residential consumers is highly subsidized. The third factor is the investment costs. For GCGDC, these costs could perhaps have been lower had not only the materials been procured under ICB procedures of Bank's Procurement Guidelines, but instead of direct contract also the engineering and construction of the network was procured under the Bank procedures. The latter was financed and contracted out by PETROGAS to Egypt Gas, an affiliate of EGPC on a negotiated basis.

17. **Social Impact.** The Project has indirectly contributed towards achieving social objectives. With the supply of gas to over 700,000 consumers in Greater Cairo area, the quality of life of the average Egyptians, particularly their families have significantly improved, with clean fuel from the gas tap in the kitchen. Previously, they had to make special efforts to transport kerosene and LPG cylinders in high rise apartments. The time spent on cooking and the cost of fuel has declined considerably contributing to the economic and health benefits of a family (as kerosene contains sulfur, fumes and particulates, which are injurious for health and the clean natural gas has a higher burning efficiency than kerosene).

18. **Gender Impact.** The most significant beneficiaries of the gas distribution component of this project are female consumers, who are about 50 percent of the population. Since the chores of cooking fall on women folk in Egypt, they faced difficulties in carting kerosene and LPG cylinders, particularly in poorer areas. With the availability of piped natural gas to their cookers and availability of clean fuel, cooking chores have been eased may also entail a health benefit as above for the whole household over biomass or kerosene.

C. Implementation Record and Major Factors Affecting the Project

19. **Trans Gulf Gas Component.** TGGC was completed by mid July 1994, ahead of the schedule. GCGDC was however delayed, requiring an extension of the loan closing date by 18 months. Although most of the core components, i.e., residential units, commercial establishments, and industries were connected to gas according to the original schedule, the implementation of the SCADA system was delayed. To complete this last control, the closing date was extended from December 31, 1997 to June 30, 1999. Additional details on the implementation factors of importance follow.

20. During implementation of TGGC, in order to improve oil recovery from the October Field, the Operator decided to install gas-lift method of oil production. Significant changes had to be made in the design of the offshore platform originally designed to house gas compressors to compress recovered flared gas and to transmit it to shore. The modified design of the platform provided for the dual purpose of gas compression and gas lift. The revised cost of the platform was allocated between the two duties. On commissioning of the offshore gas-turbine compressors, some liquid entrainment problems were encountered, which the suppliers successfully remedied. The construction contractors, who had done a good job in adhering to the timetable for construction, nevertheless had shown some carelessness in the disposal of construction wastes and the maintenance of a clean working environment. Bank staff pointed out these deficiencies and advised that manuals on waste management be prepared for guidance to personnel.

21. **Greater Cairo Gas Distribution Component.** PETROGAS implemented the project in an efficient manner. Although the effectiveness of the loan was delayed by 14 months, PETROGAS prepared and processed all bidding documents during this period and finalized contracts as soon as the Loan was declared effective. Meanwhile, they used material in stock and replenished them when

procurement under the loan commenced. The anticipatory action taken by PETROGAS obviated a corresponding delay in project implementation.

22. Significant delays occurred in the installation and commissioning of the Supervisory Control and Data Acquisition System (SCADA) for monitoring and controlling gas distribution operations in Cairo. The first cycle of bidding had to be abandoned due to unsatisfactory bid specifications (consultant having done a poor job) and a second cycle was undertaken. The SCADA contract could only be finalized in November 1997, making it necessary for the loan closing date to be extended to June 30 1999, which was long enough to accommodate a subsequent delay in the delivery of some crucial instruments and equipment by a sub-contractor.

D. Project Sustainability

23. Both TGGC and GCGDC had follow-on projects planned and implemented by EGPC/PETROGAS. In respect of TGGC, the follow-on Phase II expansion completed by EGPC added very substantially to the volume of gas, LPG and condensate. Against the SAR output figures of 60 MMCFD of dry gas, 35 tons/day of LPG and 900 barrels/day of condensate, the achievement under the Bank project was 65 MMCFD of dry gas, 200 tons/day of LPG and 1500 barrels/day of condensate. EGPC's Phase II Project – a follow-on expansion – has increased production to 105 MMCFD of dry gas, 650 tons/day of LPG and 4000 barrels/day of condensate. As for GCGDC, the SAR had envisaged 240,000 customer connections. In fact, 300,000 customers were actually connected under the Bank project. The follow on project of PETROGAS has brought up the number of customer connections to 408,000. Sustainability of the Bank project – as evidenced by the achievements of the follow-on projects appears assured.

E. Bank Performance

24. Through all phases of the project, from identification to completion, the Bank and the implementing agencies cooperated in full measure. The project was identified as appropriate choice within the petroleum sub-sector, in line with two power sub-sector projects of the time, and complementing GOE's Structural Adjustment Program of 1989 (supported by an IBRD Structural Adjustment Loan) approved in June 1991.

25. Preparation of the Gas Investment Project presented no difficulties. The Gulf of Suez Petroleum Company, the joint operating company (AMOCO and EGPC as partners) in the Gulf of Suez had all basic data needed to prepare TGGC. PETROGAS, similarly, had full details and plans for expansion of gas distribution in Cairo for GCGDC. The Bank interacted with these companies, as well as with EGPC/ENPPI and the project took shape regarding design, works to be done, and approximate costs and justification. The issue of pricing of petroleum products had been resolved in March 1990, but the pricing of natural gas to consumers remained to be addressed. In preparing the project, a pricing study was accordingly included, in addition to other studies⁴ for increasing gas supply made under the direction of EGPC.

26. A Bank team comprising six members with expertise in gas reservoirs, gas engineering, marketing and distribution, energy economics, finance, and refining appraised the project. It elaborated the conceptual framework of the project and set out a blue print for implementation. Detailed preparation included determining material packages to be procured and works contracts to be awarded, in optimum sizes for cost efficiency and speedy implementation. Time schedules were established, cost estimates were itemized, and studies were designed. The meticulous attention given to all aspects of the project in

⁴ Gas Master Plan Study.

appraisal helped in supervision. Nevertheless, SCADA installed for overseeing gas distribution operations in Cairo does not appear to have been explicitly covered at appraisal. It was as late as mid-1994 that the Bank approved discussions with consultants for the initiation of the SCADA scheme. This is not to suggest that there was a serious omission at appraisal, since the project could have been implemented without SCADA with higher operating cost and higher risks in densely populated areas. Its installation was, however, in line with good industrial practices in developed countries.

27. Periodic supervision missions visited Cairo and the project sites during the implementation of the project. The aide-memoires show that the agencies concerned received timely advice on finding solutions to technical and procurement problems and issues relating to compliance with the covenants. More notably, the supervision missions reviewed the progress in the gas sub-sector as a whole, including new reserves, investment plans, policies on pricing, institutional reforms, private sector induction and related matters. The missions had useful discussions from time to time with the Ministry of Planning and International Co-operation (MOPIC), Ministry of Petroleum (MOP), EGPC, PETROGAS, other subsidiaries of EGPC and private companies. Such discussions apparently had some positive effect on the developments in the sector. The Bank's Resident Mission in Cairo took an active interest in the working of the supervision missions and provided the follow-up as needed.

28. Bank Performance was, therefore, satisfactory through all stages. The performance ratings given in the Project Status Reports (Form 590) have been appropriate.

F. Borrower Performance

29. EGPC (Borrower) was directly responsible for TGGC. The Public Sector Consulting Engineering Company for Petroleum and Petro Chemical Industry (ENPPI) assisted it in design, project management and construction supervision. At all stages of the project cycle, the performance of EGPC/ENPPI was highly satisfactory.

30. PETROGAS assumed all responsibility for GCGDC. Its performance was also satisfactory at all stages of the project cycle. Although the SCADA scheme was not taken up until mid-1994, SCADA could still have been installed and commissioned within the original loan closing date, had the consultants presented, in the first instance, a bid package with precise specifications. The specifications had to be revised, leading to a second cycle of bidding and project delay. But for the delay with SCADA, PETROGAS would merit a highly satisfactory rating for performance.

31. EGPC/PETROGAS complied with the covenants, except that EGPC delayed submission of the audited accounts beyond due dates for reasons (consolidation delays and non-computerization)⁵ which the Bank could accept.

⁵ On compliance with covenants, one covenant where Bank had to condone delays in compliance was the submission of the consolidated audited financial statements of EGPC within six months of the closing of the fiscal year. EGPC/PETROGAS complied with the other covenants in due time. EGPC owns a number of subsidiary companies, each of which prepares its audited financial statements within six months of the closing of the fiscal year. But EGPC necessarily waits for the financial statements from the subsidiaries so do the auditors of the accounts of EGPC and invariably time runs out. Considering that large companies, with affiliates, the world over do compile consolidated accounts and do present them to the shareholders in far less time than six months, EGPC would be well advised to emulate them. Computerization of the accounts of EGPC and of its subsidiaries has not proceeded far enough to facilitate prompt presentation of the financial statements. Nevertheless, a 'satisfactory' for overall compliance with covenants is appropriate.

G. Assessment of Outcome

32. The project outcome is deemed 'satisfactory'. The foregoing discussion has explained why a 'satisfactory' rating has been given against the different elements – achievement of objectives, implementation record, borrower performance etc.. Delay in completing the project by 18 months is the one major deficiency, but for which a 'highly satisfactory' rating would be justified.

H. Future Operations

33. TGGC has been operating successfully since July 1994. GCGDC has also been successfully supplying gas to all new customers under the project. Follow-up investments have taken the Bank project under both components far beyond the original scope. EGPC and PETROGAS receive daily reports of operational performance, the arrangements for which are satisfactory.

I. Key Lessons Learned

(a) A project for city gas distribution should be planned after careful collection of economic data and analysis of the economic costs and benefits. Unless there are space heating and/or the distribution area includes medium level bulk consumers such as commercial establishments and small scale industries in sufficient numbers, which otherwise would not be supplied with gas directly, there may be no economic justification.

(b) Sector reforms, privatization and price increases to attain economic levels succeed in the long-term, although not necessarily in the short term. In Egypt, the Bank steadfastly persisted in its advice on these measures in the Energy Sector and it is gratifying that the advice was ultimately appreciated. As a result of it and other reasons, there has been an upsurge in the development of the gas sub-sector in the recent three or four years.

(c) Supervisions are important and must be regularly scheduled. The missions must use the opportunity not only to oversee progress of the project and solve problems, but also study the developments in the sector and offer unobtrusive guidance and advice.

(d) In procurement of specialized contracts, as in SCADA, the Borrower should be assisted by the specialists, specialized in the field to obviate the difficulties experienced in this project. These specialists could first be tapped from the Bank's in-house resources, and supplemented by outside consultants, if necessary.

IMPLEMENTATION COMPLETION REPORT
ARAB REPUBLIC OF EGYPT
GAS INVESTMENT DEVELOPMENT PROJECT
(Loan 3354-EGT)

PART II: STATISTICAL TABLES

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Table 1: Summary of Assessments

A. Achievement of objectives	Substantial	Partial	Negligible	Not applicable
Macro-economic policies	X			
Sector policies	X			
Financial objectives	X			
Institutional development	X			
Physical objectives	X			
Poverty reduction				N.A.
Gender concerns				N.A. ⁵
Other social objectives				N.A. ⁵
Environmental objectives	X			N.A.
Public sector management	X			
Private sector development	X			

B. Project sustainability	Likely	Unlikely	Uncertain
Operational & Policy	X		

C. Bank performance	Highly satisfactory	Satisfactory	Deficient
Identification		X	
Preparation assistance		X	
Appraisal		X	
Supervision		X	

D. Borrower performance	Highly satisfactory	Satisfactory	Deficient
Preparation		X	
Implementation		X	
Covenant compliance		X	
Future Operation		X	

E. Assessment of outcome	Highly Satisfactory	Satisfactory	Unsatisfactory	Highly Unsatisfactory
		X		

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The benefits have accrued to women, who are most involved in cooking. The substitution of kerosene (with sulfur base) and LPG (ex-refinery-sulfur based) with natural gas has reduced health hazards. Clean natural gas fuel has significantly contributed in reducing environmental pollution.

Table 2: Related IBRD Loans/IDA Credits

Loan No.	Title	Amount (US\$ m)	Date of Approval (FY)	Status
L-1453	Regional Electrification	48.0	77	Closed
L 1733	Power Generation	102.0	79	Closed
Cr-0935	Power Generation	37.0	79	Closed
L-1732	Gulf of Suez	75.0	79	Closed
L-1886-0	Power III	7.0	80	Closed
L-1886-1	Power III	59.0	84	Closed
Cr-1052	Power III	120.0	80	Closed
Cr-1024	Cairo Gas Distribution	50.0	80	Closed
L-1928	Western Desert Gas Exploration	25.0	81	Closed
L-2103	Abu Qir Gas Development	90.0	82	Closed
Cr-1162	Technical Assistance	6.9	81	Closed
L-2460	Construction Industry	51.6	84	Closed
L-2594	Vocational Training (Electricity)	19.3	85	Closed
L-2732	Channel Maintenance	45.0	86	Closed
L-3103	Power IV	165.0	89	Closed
L-3137	Engineering and Tech. Education	30.5	90	Closed
L-3441	Kureimat Power	220.0	92	Closed

Table 3: Project Timetable

Steps in Project Cycle	Date Panned	Actual Date
Concept Review	January 6, 1988	January 6, 1988
Preparation	May 10, 1988	May 10, 1988
Appraisal	November 26, 1990	November 26, 1990
Negotiations	May 30, 1991	May 30, 1991
Letter of Development Policy (if applicable)	N.A	
Board Presentation	June 21, 1991	June 21, 1991
Signing	September 26, 1991	September 26, 1991
Effectiveness	December 26, 1999	September 3, 1992
First tranche release (if applicable)	N.A	N.A
Mid-term review (if applicable)	N.A	N.A
Second (and third) tranche release (if applicable)	N.A	N.A
Project Completion	December 31, 1997	May 31, 1999
Loan Closing	December 31, 1997	June 30, 1999
Last Disbursement	April 30, 1998	November 5, 1999

**Table 4: Loan Disbursements: Cumulative, Appraisal Estimate and Actual
(US\$ million)**

	FY92	FY93	FY94	FY95	FY96	FY97	FY98	FY99	FY00
Appraisal	7.7	43.2	58.5	69.3	80.6	84.0	84.0	84.0	84.0
Actual	-	18.4	46.2	56.0	65.8	72.0	75.2	81.6	83.7
Percent of Appraisal	0	42.6	79.0	80.8	81.6	85.7	89.5	97.1	99.6

Table 5: Key Indicators for Project Implementation

Key Implementation Indicators in SAR/President's Report	Estimated	Actual
1. To minimize flaring of natural gas and increasing the delivery and production volume of natural gas. Increase exports potential of natural gas by substituting gas for higher value tradable petroleum products.	1. To capture wet gas from offshore October and from Sinai (Belayim) field and transmit 60 MMCFD dry sales gas to Suez area and releasing liquid products for export.	1. Gas Flaring minimized after completion of Transgulf component. Dry gas sales have been increased to 100MMCFD cubic feet per day, thus releasing additional liquid petroleum for export.
2. Decreasing emission of carbon dioxide and sulfur oxides to improve air quality.	2. Decrease emission by providing natural gas to additional 237,000 residential, 4,000 commercial and 21 industrial consumers by 1997.	2. PETROGAS completed SAR implementation target by 1997 as planned and improved marketing by making gas available to over 1 million consumers in Egypt, until June 30, 1999, thus decreasing emission of CO ₂ and sulfur dioxide and improve air quality.
3. Continue institutional building efforts to increase the commercialization of PETROGAS.	3. Strengthen PETROGAS's performance.	3. PETROGAS's financial performance improved.
4. Timely implementation of Transgulf component.	4. Completion by July 1994.	4. Completed in July 1994.

Table 6: Key Indicators for Project Operation

Key operating indicators in SAR/President's Report	Estimated	Actual
<ol style="list-style-type: none"> 1. Volume of petroleum products substituted with natural gas. 2. Volume of natural gas captured by reducing flaring. 3. Reducing Pollution and improve air quality in Greater Cairo. 4. Achieve economic operation of Transgulf component. 	<ol style="list-style-type: none"> 1. Natural gas supply increase to the network by 60 MMCFD as a result of decreased flaring. 2. Reduce pollution by providing gas to additional 237,000 residential, 4,000 commercial and 21 industries that were earlier using liquid petroleum. 	<ol style="list-style-type: none"> 1. Natural gas supply to the network was increased by 100 MMCFD. 2. Significant reduction in pollution occurred and improvement in air quality achieved as natural gas was provided to additional 408,000 residential, 6,000 commercial and 21 industrial consumers in Greater Cairo Area. 3. EGPC got over 40 percent ROR on Transgulf.

Table 7: Studies Included in the Project

Studies	Estimated	Actual
<ol style="list-style-type: none"> 1. Gas Distribution Pricing Study. 2. Gulf of Suez Development Study. 3. Refinery Rehabilitation Study. 	<ol style="list-style-type: none"> 1. Expected completion by March 1993. 2. EGPC to complete by 1994. 3. Completion by 1994. 	<ol style="list-style-type: none"> 1. DONG's Danish Consultant completed the study on July 15, 1993. 2. EGPC completed this study and designed Transgulf Phase II Project based on its results. 3. CIDA financed this study and completed in 1995. Its results were used in the rehabilitation of existing references.

**Table 8A: Project Costs
(US\$ million)**

A. Trans-Gulf Gas Component

Item	Appraisal Estimates			Actual Costs		
	Local Costs	Foreign Costs	Total	Local Costs	Foreign Costs	Total
Surveys/Basic Eng. & Design	0.35	0.60	0.95	0.82	0.82	1.64
Sinai/Belaim Area	0.84	3.33	4.17	0.37	5.08	5.45
Offshore October Platform	3.94	18.10	22.04	0.67	27.97	28.64
Belayim/Oct. Submarine Pipeline	0.36	2.14	2.50	0.49	6.71	7.20
West Bank Facilities	5.86	26.68	32.54	2.87	38.94	41.81
Total	11.35	50.85	62.20	5.22	79.52	84.74

B. Greater Cairo Gas Distribution Component

Item	Appraisal Estimates			Actual Costs		
	Local Costs	Foreign Costs	Total	Local Costs	Foreign Costs	Total
Materials	1.29	77.76	79.05	4.62	87.60	92.22
Engineering & Construction & Procurement Services	91.78	36.54	128.32	61.49	140.74	202.23
Market Development & Training	0.13	1.18	1.31	0.10	1.30	1.40
SCADA	0.00	0.00	0.00	0.50	10.05	10.55
Total	93.20	115.48	208.68	66.71	239.68	306.40
Gas Investment Project- as a whole	104.55	166.33	270.88	71.93	319.20	391.14

**Table 8B: Project Financing
(US\$ million)**

Source	Appraisal Estimates			Actual Costs		
	Local Costs	Foreign Costs	Total	Local Costs	Foreign Costs	Total
IBRD	0.0	84.0	84.0	0.0	84.0	84.0
European Investment Bank	0.8	33.0	33.8	0.0	29.0	29.0
Islamic Bank	0.0	0.0	0.0	0.0	16.5	16.5
EGPC/ PETROGAS	103.7	49.3	153.0	71.9	189.7	261.6
Total	104.5	166.3	270.8	71.9	319.2	391.1

Table 9A: Trans Gulf Gas Component- Economic Costs & Benefits

Costs & Revenues (constant dollars)									
Price of Sales gas		\$	1.11 /MSCFD	(Long Run Marginal Cost)					
Price of Condensate		\$	21.00 /BBL	from 1999					
Price of LPG			360.18 /Ton	from 1999					
Year (FY)	Capital Cost \$M	O & M Cost \$M	Gas Prod. MMSCFD	Condensate BBL/Day	LPG Prod. Tons/Day	Gas	Condensate	LPG	Flow
1992	25.79								(25.79)
1993	51.12								(51.12)
1994	21.94								(21.94)
1995	0.86	1.98	54	1004	100	21.78	5.50	9.53	33.96
1996	2.59	1.98	54	1004	100	21.78	5.50	9.53	32.24
1997	6.90	1.98	65	1209	121	26.22	6.62	11.53	35.49
1998	5.18	1.98	65	1209	121	26.22	6.62	11.53	37.21
1999	2.63	1.98	65	1209	121	26.33	9.27	15.91	46.91
2000		2.34	65	1500	200	26.33	11.50	26.29	61.79
2001		2.34	65	1500	200	26.33	11.50	26.29	61.79
2002		2.34	65	1500	200	26.33	11.50	26.29	61.79
2003		2.34	65	1500	200	26.33	11.50	26.29	61.79
2004		2.34	65	1500	200	26.33	11.50	26.29	61.79
2005		2.34	59	1350	180	23.70	10.35	23.66	55.37
2006		2.34	53	1215	162	21.33	9.31	21.30	49.60
2007		2.34	47	1094	146	19.20	8.38	19.17	44.41
2008		2.34	43	984	131	17.28	7.54	17.25	39.73
2009		2.34	38	886	118	15.55	6.79	15.53	35.53
2010		2.34	35	797	106	14.00	6.11	13.97	31.74
2011		2.34	31	717	96	12.60	5.50	12.58	28.33
2012		2.34	28	646	86	11.34	4.95	11.32	25.26
2013		2.34	25	581	77	10.20	4.45	10.19	22.50
2014		2.34	23	523	70	9.18	4.01	9.17	20.02
2015		2.34	20	471	63	8.26	3.61	8.25	17.78
ERR=									31%

NOTE:

TGGC was completed in July 1994. EGPC followed on with its own Phase II during FY95-FY99. This latter project physically integrated with TGGC. For example, the new LPG Recovery Unit used a state-of-art process for total extraction of LPG from all of the wet gas. Thus TGGC benefited as more LPG could be produced due to Phase II than before under TGGC as such. The table, accordingly, includes costs in FY95-99 allocable to TGGC for the additional production of LPG and other products. On the benefit side, production volumes were allocated between TGGC and Phase II and the table shows the former from FY2000. The economic value of gas has been taken as its LRMC of \$1.105/MCF. As fuel oil substitute value, it would be double the LRMC. LRMC is more appropriate, although it depresses the ERR, as the present situation is 'gas supply in excess of demand'.

Table 9B: Economic Rate of Return

GCGDC-ERR Calculations

	FY 1993	1994	1995	1996	1997	1998	1999-2010
BENEFITS							
<u>Value of Fuels Substituted (US\$ Million)</u>							
LPG		4.03	8.67	21.68	23.76	23.79	32.82
Fuel Oil		1.61	3.57	4.13	4.68	5.15	6.30
Gas Oil		2.35	4.91	5.03	5.46	6.14	7.52
Kerosene		0.01	0.14	0.43	0.59	0.59	0.72
Gas Qualitative Benefits (at \$30 in residences & \$15 in Commercial units/ per million cm)		0.54	1.10	2.74	2.95	2.95	2.95
TOTAL ECONOMIC BENEFITS	0.00	8.53	18.39	34.01	37.44	38.61	50.30
COSTS							
PETROGAS INVESTMENTS	42.81	49.95	55.25	60.02	106.70	14.40	
Bottles Returned		(5.39)	(4.05)	(12.77)	0.00		
Customer Investments		0.02	0.90	2.07	1.14		
O & M Costs		3.29	3.29	3.29	4.94	4.94	4.94
Cost of Gas		2.05	4.45	7.13	7.89	8.28	8.28
TOTAL ECONOMIC COSTS	42.81	49.93	59.84	59.73	120.67	27.62	13.22
<u>Net Economic Benefits</u>	(42.81)	(41.39)	(41.45)	(25.72)	(83.23)	10.99	37.09
ERR=	10%						

Assumptions and Bases-GCGDC ERR

Substitution Ratios Product by Gas						
		Residential	Commercial	Industrial		
LPG		1.000	0.710	0.012		
Fuel Oil			0.210	0.500		
Gas Oil				0.487		
Kerosene			0.080	0.001		
		1.000	1.000	1.000		
Conversion Factor & Economic Prices						
		Thermal Equivalent Ratio in '000	Thermal Efficiency Ratio	Conversion Factor (ton/MCM)	Import/ Parity Price \$/ton	Export pt./cm
Natural Gas	BTU/MCM	35300	90%			
LPG	BTU/ton	42850	89%	0.833	360	100.2 Import
Fuel Oil	BTU/ton	36600	80%	1.085	105	38.1 Export
Gas Oil	BTU/ton	38400	85%	0.973	176	57.3 Import
Kerosene	BTU/ton	39600	85%	0.944	193	60.9 Import
Crude Oil-Brent					\$ 21.00	OPEC Target- from 1999
Crude Oil-Suez					\$ 19.00	mean for each year
LRMC of Gas for bulk deliveries (e.g., city gate)						
British Gas updated- Production from				i.e.,		
New Fields-20 Years	3.90 US cents/cm	\$ 0.039		0.13 L.E/cu.m		

Table 9C: ERR of GAS INVESTMENT PROJECT

	GCGDC Net Benefits (In Million Dollars)	TGGC Net Benefits	Total Benefits
1992	0.00	(25.79)	(25.79)
1993	(42.81)	(51.12)	(93.93)
1994	(41.39)	(21.94)	(63.33)
1995	(41.45)	33.96	(7.49)
1996	(25.72)	32.24	6.52
1997	(83.23)	35.49	(47.74)
1998	10.99	37.21	48.20
1999	37.09	46.91	84.00
2000	35.44	61.71	97.15
2001	35.44	61.71	97.15
2002	35.44	61.71	97.15
2003	35.44	61.71	97.15
2004	35.44	61.71	97.15
2005	35.44	55.37	90.81
2006	35.44	49.60	85.04
2007	35.44	44.41	79.85
2008	35.44	39.73	75.17
2009	35.44	35.53	70.97
2010	35.44	31.74	67.18
2011	35.44	28.33	63.77
2012	35.44	25.26	60.70
2013	35.44	22.50	57.94
2014	35.44	20.02	55.46
2015	35.44	17.78	53.22
ERR=	10%	31%	19%

Table 10: Status of Legal Covenants

LOAN AGREEMENT SECTION	Status	Original Date	Revised Dates	Covenant Description	Comments
2.02 (b) 01	C	Annual	—	The borrower may open and maintain in dollars a special account in the National Bank of Egypt on terms and conditions satisfactory to the Bank.	None
5.01 (a) (iii) 02	CD	Annual	—	The borrower shall furnish to the Bank not later than 6 months after the end of each fiscal year: (a) certified copies of its financial statements; and (b) the report of audit acceptable to the Bank.	See Footnote #4 on pp. 8.

PETROGAS PROJECT AGREEMENT SECTION	Status	Original Date	Revised Date	Covenant Description	Comments
4.01 (b) (iii) 02	C	Annual	—	PETROGAS shall furnish to the Bank not later than 6 months after the end of each fiscal year: (a) certified copies of its financial statements; and (b) the report of audit acceptable to the Bank.	None
4.02 (a) 03	C	Annual	—	PETROGAS shall not incur any debt, unless the net revenues of PETROGAS for the fiscal year shall be at least 1.5 times the estimated maximum debt service requirements of PETROGAS for any succeeding fiscal year on all debt of PETROGAS.	None
4.03 (a) 03	C	Annual	—	PETROGAS shall produce, for each of its fiscal year, funds from internal sources equivalent to not less than 25 percent of the annual average of PETROGAS' capital expenditures incurred.	None

Key to Status:

- C = Complied with
 CD = Compliance after Delay
 NC = Not Complied with
 Soon = Compliance Expected in Reasonably Short Time
 CP = Complied with Partially
 NYD = Not Yet Due

Table 11: Compliance with Operational Manual Statements

All the statements of the Operational Manual have been complied with.

Table 12: Bank Resources: Staff Inputs

Stage of Project Cycle	Planned		Revised		Actual	
	Weeks	US\$(000)	Weeks	US\$	Weeks	US\$(000)
Identification/ Preparation	-	-	-	-	114.5	250.7
Appraisal/Negotiations	-	-	-	-	37.7	114.9
Supervision			-	-	165.1	541.0
Completion /a	-	-	-	-	2.1	12.5
TOTAL	-	-	-	-	318.4	919.1

/a The ICR completion costs are lower as most of the preparation work for the draft ICR was carried out in the last supervision mission.

Table 13: Bank Resources: Missions

Stage of Project Cycle	Date	Number of Persons	Days in Field	Specialized Staff Skills Represented	Ratings		Types of Problems
					Implementation	Development Status Objectives	
Identification	09/06/87	3	10	E, FA,	n.a.	n.a.	
Preparation	01/22/88	5	20	C, Ec, Sp, E, FA	n.a.	n.a.	
Pre-appraisal	08/27/90	4	10	Sp, Ec, Sp, FA	n.a.	n.a.	
Appraisal	11/26/90	5	12	Sp, E, Sp, Ec, Sp	n.a.	n.a.	
Appraisal to Loan Effectiveness	No missions				n.a.	n.a.	
Supervision 1	07/22/91	1	7	E	n.a.	n.a.	
Supervision 2	02/08/92	2	10	Sp, C	S	S	
Supervision 3	06/28/92	2	10	Sp, C	S	S	
Supervision 4	11/15/92	1	10	Sp	S	S	
Supervision 5	05/04/93	2	10	Sp, C	S	S	
Supervision 6	10/16/93	3	10	Sp, C, C	S	S	
Supervision 7	05/14/94	2	10	Sp, C	S	S	
Supervision 8	11/03/94	3	7	Sp, C, C	S	S	
Supervision 9	04/18/95	2	5	Sp, C	S	S	
Supervision 10	01/10/96	3	10	Sp, C, C	S	S	
Supervision 11	05/08/97	3	12	Sp, C, C	S	S	
Supervision 12	10/28/97	2	7	Sp, C	1	1	Bidding process for SCADA was repeated. Delay in implementing SCADA contract may cause problems.
Supervision 13	02/02/98	1	10	Sp	1	1	SCADA
Supervision 14	04/16/98	2	11	Sp, C	1	1	Procurement
Supervision 15	03/17/99	4	12	Sp, FA, E, C	1	1	

Key to specialized staff skills:

E = Engineer

Ec = Economist

FA = Financial Analyst

L = Lawyer

Sp. = Specialist

C = Consultant

Env = Environmental Specialist

Key to ratings: Development objectives

as shown in Project Status Report (Form 590):

1= all objectives substantially achieved;

2= major objectives achieved, minor objectives remained;

3= major objectives are likely to be achieved;

4= major objectives not achieved;

Key to ratings: Implementation status

as shown in Project Status Report (Form 590):

1= no significant problems;

2= moderate problems;

3= major problems, actions being taken;

4= major problems, actions yet to be addressed;

S = Satisfactory

U = Unsatisfactory

n.a. = not applicable

Annex A

IMPLEMENTATION COMPLETION REPORT

ARAB REPUBLIC OF EGYPT

GAS INVESTMENT DEVELOPMENT PROJECT

(Loan 3354-EGT)

MISSION'S MEMORANDUM OF UNDERSTANDING

SUPERVISION/ICR MISSION

(March 1999)

AIDE-MEMOIRE

1. A World Bank Mission comprising Messrs. Uruj Kirmani and P. Venugopal visited Cairo from March 19-26, 1999, to supervise the Gas Investment Project and discuss the preparation of the draft Implementation Completion Report (ICR). Mr. Badr Kamel (Resident Mission, Cairo) was co-opted to the mission at Cairo. Mrs. Zoubeida Ladhibi-Belk, Sector Manager, Energy, participated in the mission's activities towards its conclusion and reviewed the progress in the gas sector with the concerned officials.
2. The Mission held discussions with the officials of the Ministry of Planning and International Cooperation (MOPIC), Ministry of Petroleum (MOP), Egyptian General Petroleum Corporation (EGPC), Petroleum Gas Company (PETROGAS) and Gas Company of Egypt (GASCO), among others. A list of officials met is given in Attachment 1.
3. The Mission wishes to express its thanks for the excellent cooperation and courtesies extended to it by the officials of all the concerned agencies.
4. The findings of the Mission, the agreements reached with EGPC and PETROGAS, and the recommendations made are summarized as under. A formal communication from the Bank Headquarters will be sent to confirm or amend the Mission's findings as appropriate.

MISSION'S FINDINGS

5. **Overall Project Implementation.** The Gas Investment Project comprises two components: (a) Trans Gulf Gas Component (TGGC), with EGPC as the implementing agency; and (b) Greater Cairo Gas Distribution Component (GCGDC), with PETROGAS as the implementing agency.

TRANS-GULF GAS COMPONENT

6. The Mission was pleased to note that the facilities installed under Phase I of TGGC which were commissioned in July 1994 have been operating satisfactorily with production of dry gas, LPG and condensate well above SAR estimates. Under its own financing, EGPC has since expanded these facilities under a Phase II program. Phase II of TGGC was commissioned in March this year. Dry gas supplies to Suez area have increased from 65 million cubic feet per day (MMSCFD) under Phase I to

about 105-110 MMSCFD on completion of Phase II. Production of LPG and condensate have also increased substantially with almost maximum recovery of these products now being achieved through installation of state-of-the art gas processing and natural gas liquid (NGL) recovery units under Phase II. Significant environmental benefits (reduction in Green House gases) are accruing through the nearly total elimination of flaring of natural gas and its capture, processing and utilization. High economic rates of return of the order of 30% are expected under Phase I, to be enhanced further under Phase II.

GREATER CAIRO GAS DISTRIBUTION COMPONENT (GCGDC)

7. PETROGAS had completed this component in June 1997 (original project closing date) in so far as the core of the project was concerned, namely, laying the distribution network and extending gas connections to customers in the Greater Cairo project area. In fact, it had exceeded the number of connections by about 25% over the SAR estimates, by this period. But SCADA, a peripheral facility, however, a useful supervisory equipment, had not been installed. Details concerning SCADA are presented in the next section. PETROGAS continued adding new customer connections in Greater Cairo in a program of its own outside of the Bank project and financing as from July 1997. As a result, 408,000 customers in Greater Cairo area are presently connected compared to about 240,000, i.e., about 70% more than estimated in the Staff Appraisal Report (SAR)

SUPERVISORY CONTROL AND DATA ACQUISITION SYSTEM (SCADA)

8. The contract for SCADA was finalized as late as November 1997 after much time had been lost in tendering and re-tendering. According to the initial schedule under the contract, the SCADA system was expected to be installed by December 31, 1998 and commissioned by January 31, 1999. The original closing date of this loan was extended from December 31, 1997 to June 30, 1999 to ensure successful completion of SCADA component. However, implementation delays occurred, as the sub-contractor responsible for the supply of the Microwave equipment did not deliver the equipment in time, resulting in delays in the installation work.

9. PETROGAS discussed and agreed a revised implementation schedule with the previous supervision mission (November/December 1998). According to it, the SCADA sub-project would be completed by April 30 1999, and commissioned by May 31, 1999. The Mission inspected the project under implementation and was satisfied with the progress achieved. PETROGAS assured the mission that the project would be fully operational by May 31, 1999, i.e., well before June 30, 1999, the revised closing date for the subject loan.

DISBURSEMENT

10. The Mission reviewed the disbursement status with MOPIC, EGPC and PETROGAS. Out of the total loan amount of US\$84 million, US\$78.12 million (93% of the loan amount) had been disbursed as of March 15, 1999. PETROGAS informed the mission that withdrawal applications for payments of about \$3.32 million under the Gas Meters and SCADA contracts had been sent to Washington. These were expected to be disbursed soon. The remaining funds estimated at US\$2.56 million would be utilized for outstanding payments for SCADA equipment, for the SCADA consulting services, and the procurement of the specialized spare parts. The loan is expected to be fully disbursed.

11. The Mission reminded PETROGAS/EGPC that all outstanding payment applications for the contracts fully performed by June 30 1999, the closing date of the subject loan, should be sent to the Bank as soon as possible, but not later than October 31, 1999.

SPECIAL ACCOUNT (S/A)

12. The Mission reviewed the status of the Special Account. Out of US\$5.0 million deposited in the Special Account, as of March 24, 1999, US\$258,000 remained unutilized. The Mission advised PETROGAS to utilize these funds for outstanding payments. In case of any difficulty, PETROGAS would seek guidance and assistance of Mr. Badr Kamel, at the Resident Mission, Cairo.

PROCUREMENT

13. Out of total 16 contracts for PETROGAS, the last two contracts (Consultancy Services and SCADA) are expected to be performed by May 31, 1999.

TRAINING

14. All training plans envisaged under this project were successfully implemented. 65 members of PETROGAS staff were trained abroad. In addition, about 7000 staff were trained in the Training Center established by PETROGAS. This Center also trains staff from the other Arab countries in gas industry skills.

PROJECT COSTS

15. Trans Gulf Gas component's (TGGC) costs had been reviewed during earlier missions. However, for the purpose of ICR, these were again analyzed. A 37% increase in costs at \$85 million of TGGC, compared to SAR estimates of \$62 million, was mainly attributable to: (i) expansion of facilities to provide for far larger production of LPG and condensates; and (ii) to modify the offshore platform, (originally designed for TGGC) to accommodate gas compressors required by the operating company (GUPCO) to improve oil recovery from the offshore oilfields.

16. The mission reviewed the revised project costs of the Greater Cairo Gas Distribution Component with PETROGAS. The final project costs of this component are expected to be about US\$306 million. The higher costs compared to \$206 million estimated in the SAR, reflect the physical increase in the scope of work (by about 25% under the project) as well as account for the full cost of 'customer meters and regulators' in residences. PETROGAS bore the latter costs instead of the customers as at first expected.

REORGANIZATION OF PETROGAS

17. The Mission learnt that, PETROGAS is about to be bifurcated into two EGPC subsidiaries, one for LPG distribution in the country, and the other to be responsible for distribution of natural gas in the area currently allocated to it by the Government, i.e., the current areas in Cairo covered by the network, and specified areas in Alexandria, Port Said, Ismalia and Fort Fuad.

18. In order to spread gas distribution network, in the whole country, (geographical areas covering 23 governorates), the Government has assigned some areas, and intend to assign the remaining areas, to private gas distribution companies set up under the Law of Investment. CITIGAS, EGYPTGAS, NATGAS, Nile Valley Gas and REPCO have entered into contracts with EGPC/GASCO for taking delivery of gas in bulk and collecting sales revenue from consumers according to tariffs determined by EGPC (see para. 21). The companies themselves will receive agreed fees (unrelated to the consumer tariffs) for each unit of gas handled for the different consumer categories.

19. As regards PETROGAS, earlier supervision missions had repeatedly pointed out that PETROGAS lost a major source of sales revenue in March 1997, when gas supplies to power companies and industries

were transferred to the newly-formed company, GASCO. It was therefore, not complying with financial covenants in the years FY97 and FY98 on debt service times and self-generating ratios as required under Article IV of the Project Agreement with the Bank (Ln. 3354-EGT). Nevertheless, since it had accumulated cash through profits of the period earlier to March 1997, it could meet debt service obligations and show that it could meet capital expenditure according to the self-generating ratios. But FY 1998 has been the last year even to do so, since past cash accumulations have dwindled. In future it would not be able to meet its debt service obligations.

20. PETROGAS (Natural Gas), the proposed new subsidiary of EGPC, which is being formed in the public sector and would apparently inherit the obligations under the Project Agreement cited above, has all the appearance of a financially unhealthy subsidiary, even to begin with. It has little scope for growing either. The Mission has discussed this matter with MOP/EGPC, and has recommended, that, to ensure the financial viability of PETROGAS (Natural Gas) appropriate measures may be taken by the Government/EGPC, for placing PETROGAS' earnings and surpluses on a sound footing, and provide the company with the incentives to function with economy, efficiency and cost consciousness. EGPC may kindly inform the Bank about the steps taken in this matter as soon as possible, to ensure compliance of the financial covenants of the Loan Agreement.

GAS/LPG TARIFFS

21. PETROGAS informed the Mission that there was no change in sale price of Natural gas and LPG to various categories of consumers.⁶ The current pricing structure for natural gas and LPG is given as under:

<u>Consumer Category</u>	<u>Tariff (piastre per cubic meter)</u>
Consumption: 0---30 CM	10
30—60	20
>60CM	30
Commercial, Industrial, Power Sector and Investment Companies	14.1
LPG	L.E 2.5/cylinder of 12.5kg

IMPLEMENTATION COMPLETION REPORT

22. The Mission advised MOPIC, EGPC/ PETROGAS that, after completion of the project, the Bank and the Borrower have to jointly prepare the Implementation Completion Report (ICR). In the ICR, an assessment is made of the outcome of the project compared with objectives and targets stipulated at the time of appraisal of the project and reflected in the Staff Appraisal Report (SAR).

23. Part A of ICR relating to the project and Part B (statistical data) are prepared by the Bank. The Borrower has to provide Part C - Borrower's own assessment of the project, on completion. The Bank will integrate both parts and prepare the draft ICR, which would be submitted, for review by the Borrower. The Bank will finalize the ICR after taking into account the comments made by the Borrower.

24. The Mission discussed the draft outline of the ICR (Part A) prepared by the mission with EGPC and PETROGAS and obtained additional information to finalize the Bank's parts of the draft ICR. The

mission also reviewed with EGPC and PETROGAS the progress of the Borrower's assessment of the project, in terms of the outlines agreed with the last supervision mission. It requested EGPC and PETROGAS to provide their contribution to the Resident Mission, Cairo (Mr. Badr Kamel) by April 15, 1999.

ACTIONS AGREED

25. The Mission discussed and agreed on the following steps to be taken:

EGPC/PETROGAS

- (i) EGPC will submit the Borrower's contribution to ICR to the RESIDENT MISSION, CAIRO by April 15, 1999.
- (ii) PETROGAS will closely monitor the Special Account and submit their report to the World Bank Resident Mission, Cairo (Attention: Mr. Badr Kamel) by April, 30,1999, including the details of the expenditures to be incurred by June 30,1999.
- (iii) PETROGAS will closely monitor implementation of SCADA contract and complete this contract by April 30 1999, and commission it by May 31 1999. PETROGAS will immediately inform the Bank as soon as the SCADA sub-project is completed successfully.
- (iv) The financial viability of PETROGAS (Natural Gas) mentioned in para. 20, the subject was discussed with MOP, and EGPC. MOP assured the mission that the matter would be given due consideration by the Government.

BANK

- (a) The Bank will finalize the draft ICR after the receipt of the Borrower's contribution, and submit it to the Government for the review and clearance.
- (b) The Resident Mission, Cairo will closely monitor all outstanding procurement/disbursement issues. Mr. Badr Kamel, at the Resident Mission, Cairo, will be available for any assistance requested by EGPC/PETROGAS on these matters.

GENERAL

23. This is the last supervision mission for this project.

Attachment 1

EGYPT
GAS INVESTMENT PROJECT (Ln. 3354-EGT)

SUPERVISION /ICR MISSION
(March 1999)

List of Officials Met

Ministry of Planning and International Cooperation

Dr. Nadia El-Tatawy	Head, Sector for Cooperation with International and Regional Finance Organizations
---------------------	--

EGPC

1. Mr. Hassn Akl	Vice-Chairman for Production and Natural Gas
2. Mr. Abdel Fatah Abuzaid	Deputy Chairman for Foreign Trade

PETROGAS

1. Mr. Mustafa Tawil	Chairman
2. Mr. Mustafa Bakr	Financial General Manager
3. Mr. Mohsen Ahmed Othman	Natural Gas General Manager
4. Mr. Gamal Rashed	Project Manager

GASCO

1. Eng. Mohamed Tawila	Chairman
2. Eng.Hani Soliman	General Manager

ENPP1

1. Eng. Emad Abdel Latif	Manager – Trans Gulf Project
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EGYPT

**GAS INVESTMENT PROJECT (Ln. 3354-EGT)
SUPERVISION /ICR MISSION**

(March 1999)

DISTRIBUTION LIST

Ministry of Planning and International Cooperation

Dr. Nadia El-Tatawy
Head, Sector for Cooperation
with International and Regional Finance
Organizations

Ministry of Petroleum

Eng. Sanaa El-Bana
First Under Secretary

EGPC

1. Mr. Abdel Khalek Ayad
Chairman
2. Mr. Hassn Akl
Vice-Chairman for Production and Natural Gas
3. Mr. Abdel Fatah Abuzaid
Deputy Chairman for foreign Trade

PETROGAS

1. Mr. Mustafa Tawil
Chairman
2. Mr. Mustafa Bakr
Financial General Manager
3. Mr. Mohsen Ahmed Othman
Natural Gas General Manager
4. Mr. Gamal Rashed
Project Manager

GASCO

1. Eng. Mohamed Tawila
Chairman

World Bank

1. Mr. Khalid Ikram
Country Director – Egypt, Cairo
2. Mr. Jean-Claude Villiard
Director, MNSID

IMPLEMENTATION COMPLETION REPORT
ARAB REPUBLIC OF EGYPT
GAS INVESTMENT DEVELOPMENT PROJECT
(Loan 3354-EGT)
TRANS-GULF GAS COMPONENT
EGYPTIAN GENERAL PETROLEUM CORPORATION (EGPC)
BORROWER'S PERSPECTIVE

INTRODUCTION:

- 1- Pursuant to the policy of The Government Of Arab Republic Of Egypt (GOE) for providing clean fuel for residential, commercial and industrial consumers around Egypt, utilization of natural gas and LPG for domestic to substitute liquid petroleum products which could be exported and earn foreign exchange for the country and utilization of clean natural gas would be good for environment when flared gas is captured and atmospheric pollution is prevented.
- 2- GOE requested World Bank assistance for investments needed to harnessing flared associated gas in Gulf of Suez area and implement Trans gulf gas project, which included off shore production / processing facilities, submarine pipelines, on shore gas treatment plants and 160 km dry sales high pressure pipeline to supply gas in Suez area.
- 3- Egyptian General Petroleum Corporation (EGPC) signed a loan agreement with the World Bank in 1991 for gas investment project (Loan 3354-EGT).
- 4- EGPC was responsible for implementing of Trans-Gulf Gas Project component (TGGC) under this loan. And conduct 3 studies that would assist the government and EGPC in petroleum sector development.

OBJECTIVES

- 5- Trans-Gulf Gas Project was designed to achieve the following objectives of the government :
 - to utilize flared gas in Sinai and offshore Gulf Of Suez area to gain economic and environmental benefits;
 - to extract value added LPG and condensate from the gas stream;
 - to supply dry sales gas to Suez area consumers; and
 - By preventing flaring, improve environment by reducing green house gases in the atmosphere.

Implementation

- 6- EGPC designed the Trans-Gulf gas project in two phases to stagger investments. Under this loan Phase I of TGGC was implemented to process about 70 MMSCFD of wet gas and supply about 60 MMSCFD of dry gas to Suez area. In addition, about 200 tons /day LPG and 1500 bbls/day condensate would be recovered as value added products. Phase I included construction of offshore platform, offshore gas compression and treatment facilities, onshore gas handling and processing facilities and laying 160 km high pressure 16 inch dry gas pipeline from Ras Baker to Suez.
- 7- EGPC directly managed Trans-Gulf Gas Project; an Egyptian consulting company Engineering for the Petroleum and Process Industries (ENPPI) was engaged by EGPC for detailed design, engineering, procurement and construction supervision.
- 8- In spite of the several modifications in the project design to accommodate gas lift operation in the October field to improve oil recovery which included structural and process plant changes on the offshore as well as improvement in onshore gas facilities, with good strategic planning and project management, EGPC successfully completed this project in July 1994 as originally estimated at appraisal and achieved higher recoveries of LPG and condensate than the design targets. In this effort, World Bank staffs closely cooperated and assisted EGPC.
- 9- Under its own financing EGPC has completed phase II of the Trans-gulf gas component in March 1999 at a cost of about 115 mm US\$, phase II included state of the art designed LPG recovery units, gas compressors, LPG strategic storage facilities.
- 10- With completion of phase II of the Trans Gulf project, all available flared gas has been captured in the Sinai and Gulf of Suez area. The overall output has been:
 - increased supply of 105 mm scfd dry sales gas to Suez area.
 - additional LPG recovery of 450 - 500 tons / day.
 - Additional condensate recovery of 2500 bbls/day making total condensate recovery from wet gas 4000 bbls/day.

Major factors affecting the project

- 11- One of the factors, which affected the project, was major structural design changes in the offshore platform which would be major changes in the original project scope.
- 12- The second major factor was, on commissioning of the offshore gas turbine driven compressors, some liquid entrainment problems were encountered.
- 13- EGPC successfully managed in resolving these problems and made appropriate amendments in the contracts with the close cooperation and assistance of the World Bank.
- 14- With close cooperation between the management, the World Bank and all concerned parties, EGPC was able to complete and commission the project in time and achieved higher than targeted results in the LPG and condensate recovery.

Project sustainability

- 15- With the experience gained in the World Bank financed phase I of this project, EGPC has successfully completed phase II which would add increase sales gas availability from 60 to 105 mm scfd, in addition 450 ton/day LPG and 2500 bbls/day condensate would be recovered from phase II

facilities. This completes Trans gulf gas project. The sustainability of the project is assured as the economic and financial benefits would be maximized after the recovery and sales of dry gas and value added LPG and condensate. The expanded utilization of natural gas would enable the government to substitute liquid petroleum products with natural gas. These products could be exported to earn valuable foreign exchange for Egypt.

Studies

16- EGPC conducted three studies under this project. These included:

- Gas distribution pricing study was completed satisfactorily. The recommendations made in the study were followed very useful for the government to formulate the gas distribution and pricing issues.
- Gas development study for Gulf of Suez was conducted in house by EGPC and the results of this study were used for making further gas sector investments in the gulf of Suez e.g. TGGC phase II.
- Refinery sector study was made by the Canadian consultants and was successfully completed.

Bank Performance

17- Through all phases of the project, from identification to completion, the Bank and the EGPC cooperated in full measure. The project was identified as a fitting choice within the petroleum subsector to achieve the government objectives stated in para. 5.

18- Preparation of the Gas Investment project presented no difficulties. GUPCO, the joint sector operating company (AMOCO and EGPC as partners) in the Gulf of Suez had all basic data needed to prepare TGGC. The Bank interacted with these companies, as well as with EGPC/ENPPI and the project took conceptual shape with respect to the design, works to be done and approximate costs and justification. During implementation close cooperation and timely advice was available from the Bank staff, which greatly assisted EGPC in resolving implementation issues in a timely manner. This project is a good model of Bank / Borrower partnership for achieving good results in an efficient manner.

Borrower Performance

19- EGPC (Borrower) was directly responsible for TGGC. ENPPI assisted it in design, project management and construction supervision. At all stages of the project cycle, the performance of EGPC/ENPPI was highly satisfactory.

20- EGPC project staff has got a lot of experience by interacting with the Bank staff and the Bank staff were experienced to support project phases from feasibility till completion and broaden the aim and contents of the studies done under the project loan and the study done by EGPC for evaluation of LRMC.

Key Lessons Learned

21- The key lessons learnt by EGPC and agencies associated (e.g. ENPPI) with the project are:

- EGPC's close supervision of the consultants, the suppliers and their cooperation with the other operating companies e.g. GUPCO, PETROBEL was essential in achieving excellent results.
- Good understanding should be reached on the project concept, design and implementation.
- Clear understanding between EGPC and the Bank and close supervision by the bank staff was conducive in achieving the project objectives.

Annex C

IMPLEMENTATION COMPLETION REPORT
ARAB REPUBLIC OF EGYPT
GAS INVESTMENT DEVELOPMENT PROJECT
(Loan 3354-EGT)
GREATER CAIRO GAS DISTRIBUTION COMPONENT
BORROWER'S PERSPECTIVE (PETROGAS)

Introduction

- 1 - Pursuant to the policy of the Government of Arab Republic of Egypt (GOE) for providing clean fuel for residential, commercial and industrial consumers in greater Cairo area, and utilization of natural gas to substitute liquefied petroleum products where could be exported and earn foreign exchange for the country. One the utilization of clean natural gas would also improve environment and reduce pollution in greater Cairo area.
- 2 - GOE requested World Bank assistance for the investments needed to expand the gas distribution network, be addition, other donors, i.e., European investment bank and Islamic development bank were also requested to support expansion of gas distribution network under the proposed project.
- 3 - Egyptian General Petroleum Corporation (EGPC) signed a loan agreement with World Bank in 1991 for Gas Investment Project (Loan 3354- EGT).
- 4 - PETROGAS, a 100 percent subsidiary company of EGPC was made responsible for implementing Greater Cairo Gas Distribution Component (GCGDC) under this loan. PETROGAS signed a project agreement with World Bank in 1991.

Objectives and Implementation

- 5 - PETROGAS would expand the gas distribution network in greater Cairo area by providing additional 237000 residential, 4000 commercial and 21 industrial customers. PETROGAS would establish a training center to train Egyptian in gas distribution and utilization technology, train its staff in modern technology abroad and then train Egyptian staff in the training center.

Implementation

- 6 - PETROGAS prepared the project in close cooperation with the world bank and satisfactorily prepared all procurement documents well a head of the time before the loan was approved by the world bank and declared effective by the bank, 14 month after the loan approval. As after loan approved, ratification by Egyptian parliament and the legal approvals were obtained. PETROGAS utilized equipment and material from its own stock that was later replenished after receiving materials under World Bank financed contracts.

- 7 - With good strategic planning and project management, in spite of the delay in finalizing the World Bank contracts (until the loan was declared effective 14 month after board approval). PETROGAS was able to complete the targets stated in staff appraisal report (SAR) in time as scheduled, and thus avoided any implementation delays in gas distribution network. In fact, later PETROGAS has expanded the gas network to supply gas to 408000 residential consumers, 6000 commercial consumers exceeding SAR targets by 70 percent.
- 8 - The major delay (over 18 months) occurred in the implementation of SCADA Project. The delays occurred first in the procurement process, where due to lack of clear responsive bids, the first round of bidding was cancelled.

PETROGAS issued second round of bids with clarifications in the specifications, as were observed in the first round. The SCADA contract was finalized in November, 1997 and is expected to be completed by April 30, 1999. In order to complete SCADA Project, the Closing Date of this Loan was extended to June 30, 1999.

Major Factors Affecting the Project

- 9 - There were no significant difficulties in implementation of the project. There were some delays in the finalization of the contract for the procurement of gas meters, as some bidders had protested against PETROGAS decision, which upheld by the World Bank and the final contract was signed as decided by PETROGAS.
- 10 - PETROGAS trained 65 persons overseas, in advanced technology. In addition 15 Egyptian staff were trained abroad in SCADA Project.
- 11 - These experts have contributed in training over 6000 staff in gas industry skills. The training center is fully equipped with modern training aids. This has greatly contributed in developing skills of Egyptians as well as other nationals of neighboring countries.
- 12 - PETROGAS has greatly benefited from the contributions made by the World Bank staff and other experts in improving its technical financed and management performance.

Project Sustainability

- 13- With increased gas reserves and expansion of transmission network established in Egypt, the gas supplies are assured for the sustainability of the project. The gas consumers in Greater Cairo area would be increased by about 100 000 consumers per year for the next 5 years.
- 14- With additional financial incentives provided by the government for commercially efficient management of gas companies, the financial sustainability of the completed project as well as future investments by PETROGAS is assumed and ratified by the Government in the current 5 years plan ending 2001/2002. PETROGAS management for natural gas would take steps, as appropriate, to ensure its financial obligation and debt servicing, capital investments for expansion and efficient management of ongoing activities.

Future Operations

As mentioned in paragraph above, PETROGAS would:

- A - expand gas distribution network in Greater Cairo area.

- B - expand gas distribution network in Alexandria area and other areas allocated by the Government.
- C - PETROGAS would plan to achieve the government's objectives of maximizing gas Utilization in Egypt in a commercially efficient manner.

Bank Performance

- 15- PETROGAS has greatly benefited with the support provided by the bank staff throughout its associated in gas distribution business. The transfer of technology achieved through close interaction with the bank staff in technical, financial and managerial aspects is commendable.

Borrower Performance

- 16- PETROGAS staff has been exposed to the modern gas technology, gas distribution, utilization, marketing, gas pricing and other aspects through overseas training, participation in consultants work, on the job training in the specialized skills and finally in strategic planning and management through the experience gained during the implementation of this project.
- 17- PETROGAS staff is now seconded or working with other newly established public/private sector companies involved in gas distribution business in Egypt.

Assessment of Outcome

- 18- PETROGAS considers that 100 percent of project objectives have been achieved. PETROGAS has also contributed in expanding the knowledge about gas use to Egyptian cities, it has contributed towards improving environmental has important towards safety consciousness in public. The outcome is highly satisfactory.

Achievements

PETROGAS has:

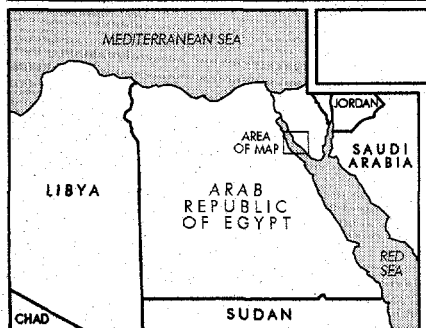
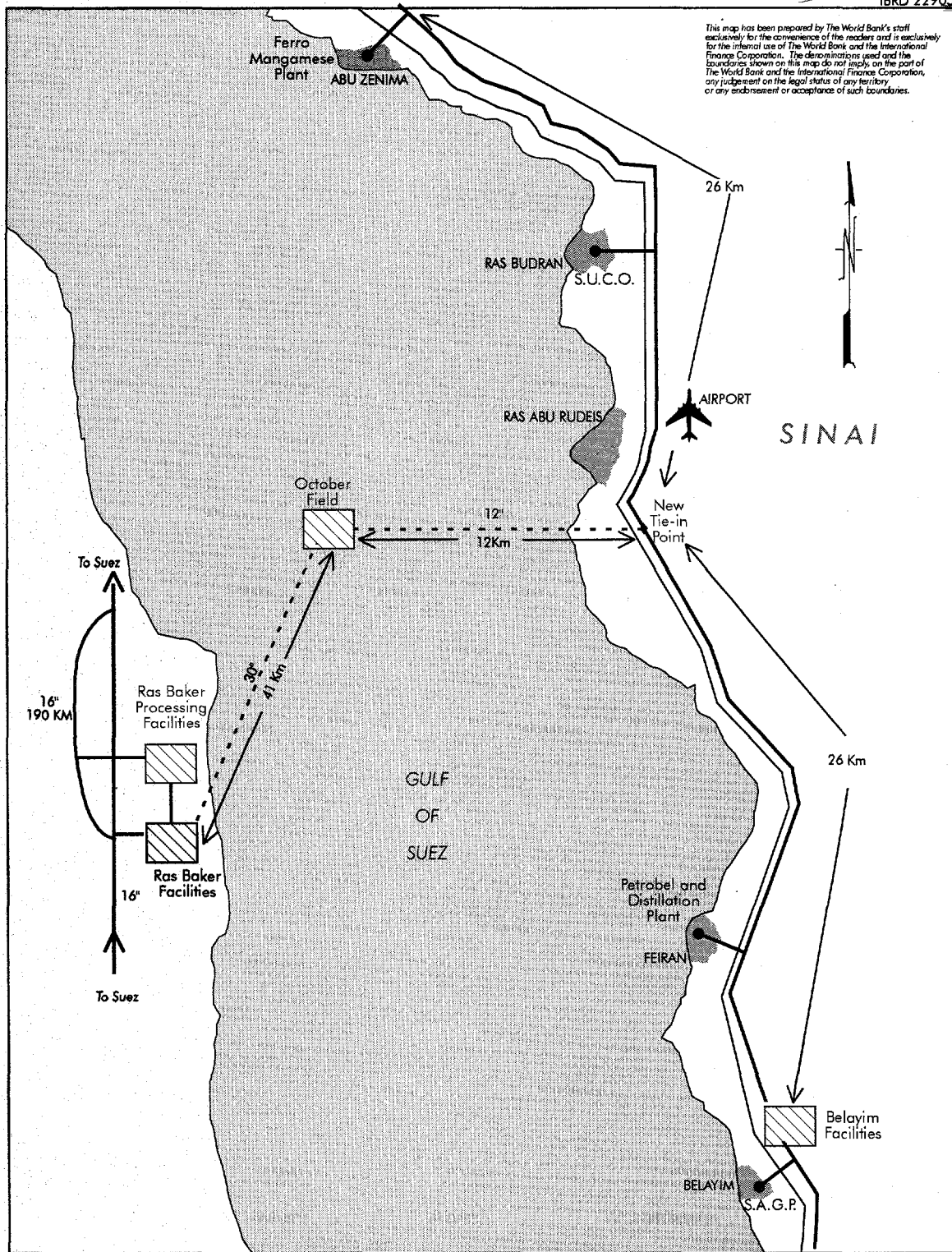
- 1- contributed in expanding gas utilization in the country and has substituted liquefied petroleum gas products significantly;
- 2- contributed in reducing pollution in Cairo by providing clear fuel to public;
- 3- developed skilled-trained staff to service gas industry in Egypt; and
- 4- developed management and marketing skills in Egyptian Staff.

Key Lessons Learnt

- 1- For procurement of specialized contracts, e.g., gas meters, SCADA etc., greater review should be made on the specifications prepared by the consultants.
- 2- The consultants staff should work closely with PETROGAS in Cairo and not entirely in their head office.
- 3- World Bank's close supervision has greatly contributed in achieving the success. Close continuous communication with bank staff to resolve outstanding issues has contributed in achieving good results.

MAP SECTION

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ARAB REPUBLIC OF EGYPT
GAS INVESTMENT PROJECT
 TRANS GULF COMPONENT

- Project: Existing:
- ON LAND PIPELINES
 - OFFSHORE SUBMERGED PIPELINES
 - MEASURING AND CONTROL STATIONS
 - COMPRESSION STATIONS
 - ROADS
 - BUILT-UP AREAS