Preface

This report is presented in compliance of Section 20 of the Oil and Gas Regulatory Authority Ordinance, 2002, for Financial Year 2003-04, in two parts as under:-

PART-I Conduct of OGRA Affairs including Anticipated Developments next year

PART-II State of the Regulated Segments of Pakistan's Petroleum Industry

The Authority

M.H. Asif
Member Finance

Rashid Farooq
Member Oil

Munir Ahmad
Chairman

Jawaid Inam
Member Gas/Vice Chairman

Contents

Annual Report 2003-04

Contents

Contents

PART – II: REPORT ON THE STATE OF THE REGULATED SEGMENTS OF PAKISTAN'S PETROLEUM INDUSTRY

Annual Report 2003-04

Contents

List of Exhibits

Annual Report 2003-04

Annual Report 2003-04

Abbreviations and Acronyms

ACGR	Annual compound growth rate
AJK	Azad Jammu and Kashmir
APCA	All Pakistan CNG Association
APL	Attock Petroleum Limited
ARL	Attock Refinery Limited
Bcf	Billion Cubic Feet
bhp	Brake horsepower
BSCFD	Billion Standard per Cubic Feet per Day
BTU	British Thermal Unit
BTU/SCFT	British Thermal Unit per standard cubic feet
CIDA	Canadian International Development Agency
CNG	Compressed Natural Gas
CPC	Central Power Generation Co. Ltd.
E&P	Exploration and production
ECA	Economic Consultant Associates
ECPL	Engro Chemical Pakistan Limited.
ERR	Estimated Revenue Requirement
FFC	Fauji Fertilizer Company
FKPCL	Fauji Kabirwala Power Company Limited
FO	Furnace oil
FY	Fiscal year
GDP	Gross domestic product
GDS	Gas Development Surcharge
GoP	Government of Pakistan
HSE	Health, Safety and Environment
HSFO	High-sulfur fuel oil
IDF	Institutional Development Fund of World Bank
IFC	International Finance Corporation
ILBP	Indus Left Bank Pipeline
IPO	Initial public offering
IRBP	Indus Right Bank Pipeline
KAPCO	Kot Addu Power Company
KESC	Karachi Electric Supply Company
KM	Kilometer
LNG	Liquefied Natural Gas

LPG	Liquefied Petroleum Gas
MGCL	Mari Gas Company Limited
MMcf	Million cubic feet
MMscfd	Million standard cubic feet per day
MPNR	Ministry of Petroleum and Natural Resources
MTOE	Million Tonnes of oil-equivalent
NGRA	Natural Gas Regulatory Authority
NSC	National Security Council
NWFP	North West Frontier Province
OGDCL	Oil and Gas Development Company Ltd.
OGRA	Oil and Gas Regulatory Authority
PARCO	Pak-Arab Refinery Company
PCA	Petroleum Concession Agreement
PKR	Pakistan rupee
PPIAF	Public Private Infrastructure Advisory Facility
PPL	Pakistan Petroleum Ltd.
ROA	Return on Assets
RoR	Rate of return
RR	Revenue Requirement
SCADA	Supervisory control and data acquisition
SMS	Sales meter station
SNGPL	Sui Northern Gas Pipelines Ltd.
SOPs	Standard operating procedures
SSGCL	Sui Southern Gas Company Ltd.
T&D	Transmission and distribution
Tcf	Trillion cubic feet
TOE	Tonnes of Oil Equivalent
TPA	Third-party access
UFG	Unaccounted for Gas
UK	United Kingdom
USA	United States of America
USOA	Uniform System of Accounts
WAPDA	Water and Power Development Authority

PART-I

Report on Conduct of OGRA Affairs

1. Chairman's Review

OGRA has made significant progress during the Financial Year 2003-04 towards achieving the objectives of its establishment. The estimated revenue requirement of the two gas utilities in the country for FY 2004-05 was determined in due time ensuring notification of the revised sale prices on July 1, 2004. Review motions against these determinations were disposed off. Earlier, their requirment for total revenue of the completed FY 2002-2003 was also determined. A number of regulations and standards were notified/drafted. 5 new licences were issued in the natural gas sector and 535 in CNG and LPG sectors promoting significant investment. Capacity for taking over oil sector regulation was also developed. Consultation process to review the current regime of guaranteed return to the gas utilities was carried forward and processing of capacity building loan from the World Bank was completed.

OGRA has also taken some path-breaking steps contributing to reforming the sector and national economic development. For the first time in Pakistan's history of regulation of gas sector, efficiency-based and incentive-oriented targets for unaccounted for gas (UFG) have been enforced. This approach to the perennial problem of high level of UFG has resulted in recurring reduction in the cost of supply of natural gas by about Rs 2.5 billion per annum. Further reduction of almost the same magnitude has been achieved through disallowance of imprudent expenditure taking the total to about Rs. 5 billion per annum, which works out to Rs. 6.28 per MMBTU on the basis of average estimated sale during FY 2004-05. OGRA has taken an important step in the direction of investment promotion by issuing non-exclusive licenses to the gas utilities, creating opportunities for private investment in gas infrastructure. OGRA is also taking effective steps to ensure compliance of license conditions and adherence to the performance and safety standards that it has laid down.

During the year under review, the Authority decided 6 cases relating to revenue requirement of the two gas utilities. These descisions were made after in-depth scrutiny of the capital and operating expenditure on the altar of prudence, optimization, improved service to customers, and broadly speaking, public interest. Fullest possible opportunity was provided to all stakeholders, particularly

the consumers, to present their points of view which were given due weight. This has earned OGRA reputation of a fair and professional body by all concerned.
The functions related to regulation of LPG and CNG sectors were transferred to the Authority in March, 2003; therefore, 2003-04 was the first full year of regulation with reference to these sectors. The procedure for grant of CNG and LPG licences was streamlined to accelerate the pace of investment in these sectors. 347 new provisional and 144 marketing licenses were issued during the year in CNG Sector and 44 Licences were issued in LPG Sector for production, marketing and construction of storage and filling facilities. These activities paved the way for an estimated investment of Rs. 9 billion and about 12000 additional job opportunities.

To protect consumers' rights and ensure quick redressal of their grievances, the Authority notified Complaint Resolution Procedure Regulations in respect of natural gas, LPG and CNG sectors and set up a cell to deal with the complaints efficiently. Media campaign was launched to educate the public about their rights and encouraging them to raise their concerns and obtain redressal of their grievances. Transparency, professionalism and fairness being the hallmark of this effort, OGRA is making a difference and gaining confidence of the consumers.

Progress, OGRA has certainly made, but the sailing has not been entirly smooth. Independent regulation, even in countries having such institutions in place for decades, continues to face the problem of lack of acceptance of their role by the stakeholders. This, in fact, is inherent in the nature of the assigned task of balancing the divergent interests of investors, consumers and the Government. OGRA is a new organization which became functional in the gas sector in March, 2002, in CNG and LPG sectors in March 2003 whereas the oil sector is yet to become a regulated activity under the OGRA Ordinance, 2002. OGRA advised GoP in May 2004 in accordance with the provisions of the OGRA Ordinance that it was ready to perform the regulatory role as required under the Ordinance in respect of the Oil sector. However, till December, 2004 the transfer of this work is not in sight.

It is quite apparent that functionaries of the Government and the regulated entities continue to confuse regulatory affairs with policy matters and vice versa. This results in flamed actions and consequent delays, which are avoidable with better understanding of the new paradigm. The entities carrying out regulated activities also show discomfort over regulation by a new independent body rather than the old and familiar offices. The fact that GOP has proprietary

interest in most of the regulated entities makes matters more complex and difficult. OGRA believes that this situation will undergo qualititive improvement with privatization of the regulated entities and would like to see that process expedited.

OGRA is determined to avoid "regulatory capture" scenario and inspite of difficulties, play the role assigned under the law with full responsibility.

Before concluding, it must be placed on record that it is dedication, commitment and hard work of the members, officers and staff of OGRA that is solely responsible for its achievements so far and basis of hope for still better performance in future.

(Munir Ahmad)
December 31, 2004

2. Profile of the Authority

2.1 Composition

The Authority, under Sub-sections (2) & (3) of Section 3 of the Ordinance, is independent in performance of its functions and comprises of a Chairman, Member (Gas), Member (Oil) and Member (Finance). They have been selected through open competition and appointed in accordance with Sub-sections (4) to (9) of Section 3 of the Ordinance, which read as under:-

Quote:

(4) The Chairman shall be an eminent professional of known integrity and competence with a minimum of twenty years of related experience in law, business, engineering, finance, accounting, economics or petroleum technology.

(5) The Member Oil shall be a person who holds an appropriate degree in the relevant field and is an experienced, eminent professional of known integrity and competence with a minimum of twenty years of related experience in the field of oil, including the transportation thereof.

(6) The Member Gas shall be a person who holds an appropriate degree in the relevant field and is an experienced, eminent professional of known integrity and competence with a minimum of twenty years of related experience in the field of natural gas, including the transmission and distribution thereof.

(7) The Member Finance shall be a person who holds an appropriate degree in the relevant field and is an experienced, eminent professional of known integrity and competence with a minimum of twenty years of related experience in the field of corporate finance or accounting.

(8) Subject to Sub-section (9),-

- (a) The Chairman shall be appointed by the Federal Government for an initial term of four years and shall be eligible for reappointment for a similar term;
- (b) The Member Oil and Member gas shall be appointed by the Federal Government for initial terms of three years and shall be eligible for reappointment for a term of four years;
- (c) The Member Finance shall be appointed by the Federal Government for an initial term of two years and shall be eligible for reappointment for a term of four years."

(9) The Chairman and the other Members shall retire on attaining the age of sixty-five years.

Unquote

Chairman

Mr. Munir Ahmad is currently the Chairman of OGRA. He has 38 years experience of the petroleum sector. He holds a Master's Degree in Petroleum Geology and has attended a number of professional courses on gas tariffs, regulation, privatization etc. at home and abroad. Before joining OGRA he was Director General (Gas), Ministry of Petroleum and Natural Resources, GoP for 17 years. He has been a Director on the Board of several public sector companies in the petroleum sector for over 20 years. He also held the position of Managing Director, of Sui Southern Gas Company Limited in 1989 and of Sui Northern Gas Pipelines Limited in 1999. After completion of his first term of 4 years as Chairman OGRA, he has been reappointed by the by the Federal Government for the second tenure of 4 years effective September 7, 2004.

Annual Report 2003-04 Profile of the Authority

Member (Gas)

Mr. Jawaid Inam currently holds this position. He obtained a Bachelor's Degree in Fuel Science and Technology from the University of Leeds, UK and started his professional career as a Research Engineer at British Gas, UK. He joined SNGPL in 1966 and held important engineering and management positions including the Managing Director. He has received training at reputable universities such as Oxford, Chicago, Florida, Oklahoma and Texas in the fields of Engineering, Management and Utility Regulation.

Mr. Inam has also been designated as Vice Chairman to perform the duties of the Chairman during the latter's absence. After completing first tenure of 3 years, he has been re-appointed in September. 2003 for a second tenure upto 65 years of age i.e. December 19, 2006.

Member (Oil)

Mr. Rashid Farooq was appointed as Member (Oil) on October 09, 2002 for the first tenure of 3 years. He holds Bachelor's Degree in Chemical Engineering from University of the Punjab and Master's Degree in Energy Engineering from University of Surrey, UK. He has attended a number of relevant international seminars, conferences and training programmes and has also obtained post graduate certificates in Petroleum Management, Business Management and Environment, and Impact Assessment from reputed foreign institutions. He has 29 years' experience in regulatory and policy matters in the upstream and downstream petroleum sectors, mostly with the Ministry of Petroleum and Natural Resources, GoP. He was Director General (Oil) before joining OGRA. He has also been on the Board of Directors of a number of petroleum sector companies.

Annual Report 2003-04 Profile of the Authority

Member (Finance)

Mr. M H. Asif was appointed as Member (Finance) on March 29, 2004 for an initial term of 2 years. He is Fellow Member of the Institute of Cost and Management Accountants of Pakistan and also holds Masters Degree in Economics and Bachelors Degree in Commerce. He has to his credit over 41 years exposure in leadership positions in the fields of finance, management, marketing, planning, human resource development and professional education. He has been associated with gas sector, GoP and public sector autonomous bodies. He has also been a member of the management team of the Institute of Cost and Management Accountants of Pakistan for a long time in honorary positions including the President. He served for 2 years as Technical Advisor to the Public Sector Committee of the International Federation of Accountants which is developing International Accounting Standards for public sector entities. He has received training abroad on market-based free economy operations in gas and oil industry, gas chain concept and regulation of utilities.

2.2 Powers and Functions

The salient features of the Powers and Functions of the Authority as embodied in the Ordinance are as under:-

- **Exclusive power** to grant, amend or revoke licenses for regulated activities and enforce compliance of license conditions to promote efficiency, cost effectiveness, best practices,high safety and service standards etc. The regulated activities are:
  - **Natural Gas**
    - Construction or operation of pipelines or storage facilities or other installations
    - Transmission
    - Distribution
    - Sale
  - **OIL**
    - Construction or operation of refinery, pipelines, storage facilities, blending facilities and installations
    - Marketing and storage of refined products
  - **Liquefied Petroleum Gas (LPG)**
    - Construction or operation of pipelines, production or processing facilities, storage facilities and installations
    - Transporting, filling, marketing and distribution
  - **Compressed Natural Gas (CNG)**
    - Construction or operation of testing or storage facilities
    - Transporting, filling, marketing and distribution

- **Exclusive** power to employ officers, staff, experts, consultants, advisors and other employees on such terms and conditions as it may deem fit.
- **Exclusive** power to decide upon all matters in its jurisdiction.
- Develop and enforce performance and service standards
- Determine in consultation with the Federal Government and the licensees, a reasonable regime of return to the natural gas licensees.
- Prescribe procedures and standards for investment programmes of the gas utilities and oversee their capital expenditure to ensure prudence.
- Determine annually the revenue requirement of gas utilities covering the cost of gas, transmission and distribution cost and the guaranteed return.
- Resolution of complaints and disputes between a person and a licensee or between licensees.
- Enforce standards and specifications for refined oil products as notified by the Federal Government.
- Implement such policy guidelines of the Federal Government as are not inconsistent with the provisions of the OGRA Ordinance.

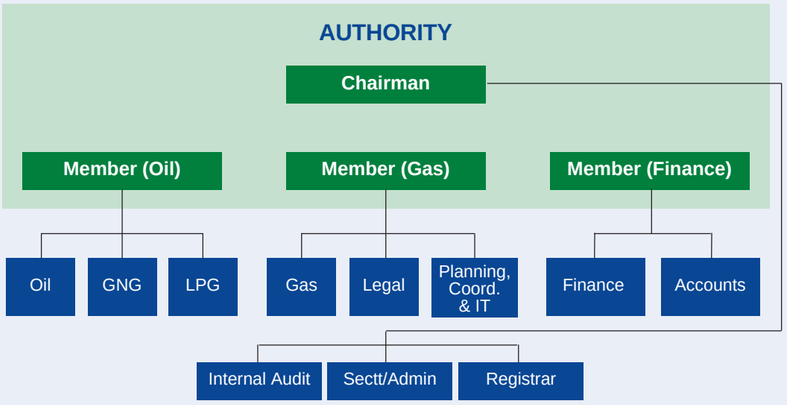
License in favour of Mari Gas Company Ltd. being handed over

2.3 Organization Structure

2.3.1 Organogram

The Authority is organized as reflected by Exhibit 2.1.

Exhibit 2.1



2.3.2 Human Resource

OGRA is a lean professional outfit with a flat structure where emphasis is on quality, efficiency and goal-orientation. The departments are essentially small teams of highly motivated professionals with the bare minimum support staff. The employee profile on June 30, 2004 was as under:

Exhibit 2.2

Engineers	16
Accountants / Financial Analysts	7
MBAs	2
Lawyers	4
Administrative Executives	7
Executive Secretaries	9
Support Staff	46
Total	**91**

The officers and staff are recruited strictly on “as required” basis on the terms and conditions as deemed appropriate, in exercise of the **exclusive** powers under the OGRA Ordinance. The appointments are made on merit through a transparent and competitive process keeping in view the provincial quotas. An elaborate system of written tests followed by interviews ensures selection of high calibre personnel.

2.3.3 Capacity Building

OGRA fully understands that any progressive, vibrant, learning organization pays serious attention to capacity building to ensure ever-improving quality and efficiency.

The regulatory literature and expertise in the petroleum sector is scarce in Pakistan. To fill this gap OGRA has designed a comprehensive capacity building programme spread over 4 years for which it has been able to obtain substantial funding from the World Bank.

OGRA has adopted a three pronged strategy to inculcate requisite expertise:

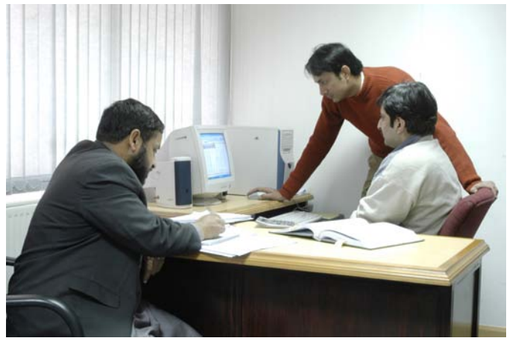
1. Studies on Key Regulatory issues in midstream and downstream petroleum sector.

2. Training aimed at providing OGRA’s professional human resource an opportunity to interact with experienced regulators and gain world class experience through participation in international regulatory capacity building programmes.

3. Training needs assessment of all employees and initiatives to develop them in appropriate areas.

This program will result in broad-based development of OGRA as an efficient and effective regulatory body enhancing its capability to meet the challenges lying ahead and play an important role in the development of the oil and gas sectors.

2.3.4 I.T. Orientation



The Authority is aiming at minimizing the paper load and achieving efficiency through intensive use of Information Technology. OGRA has established two Local Area Computer Networks (LAN) at its two office buildings. The Computer resource sharing concept has improved efficiency and reduced cost of equipment.

OGRA maintains web portal 'www.ogra.org.pk' which has been designed using latest and secure web development tools. It is user friendly and is updated regularly. Anyone can access it and reach OGRA Ordinance, Rules and Regulations made thereunder and its decisions, notifications, tender notices, job announcements, press releases, list of licensees etc. Internal communication, normally, is done electronically reducing paper load and promoting speed. To fulfill future requirements, installation of Wireless Wide Area Network (WAN) is under consideration.

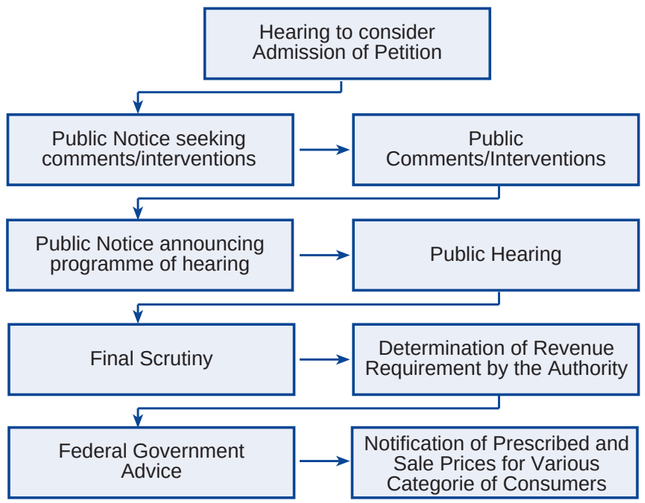
The Process

3. The Process

The Regulatory framework is quasi-judicial in nature. Therefore, OGRA is vested with the requisite legal powers to perform its assigned functions effectively viz, grant licenses for regulated activities, determine revenue requirement of gas utilities, set gas tariff, review decisions, hear appeals, resolve complaints, settle disputes, impose fines and penalties, issue directions, carry out inspections, obtain information etc.

The processing of petitions, interalia, involves examination by the Authority's professional staff and interaction with all stakeholders including consumers through public hearings or conferences. The petitioners are also afforded full opportunity of presenting their position on all issues. The Authority's decisions are guided by the objectives of the Ordinance particularly protection of the interests of the vast multitude of consumers who, by and large, do not have organized and effective voice.

The guiding principles of the process are accessibility, transparency, natural justice and fairness. To illustrate, a flow chart of the process of a relatively more important function of the Authority, namely: "determination of revenue requirement of a gas utility and notification of sale prices", is given below:-



Annual Report 2003-04 The Process

OGRA attaches utmost importance to expeditious disposal of all matters and has set for itself specific indicative time frame as under:-

- Application for license for construction or operation of pipelines for natural gas, transmission, distribution, or sale of natural gas in 6 months
- Application for LPG – related licenses in 2 weeks
- Application for CNG station licenses in one day
- Determination of gas utility's Revenue Requirement in 6 months
- Review Motion against Authority's decision in 8 weeks
- Public Complaint in 30 days
- Request for dispute resolution in 4-8 weeks
- Appeal against decision on a complaint of a Designated Officer in 90 days

All interested parties are provided full opportunity of presenting their respective points of view in all cases and if interest of public at large is involved, public hearings are organized after due notice in the print media.

Some shots from public hearings

Performance

4. Performance

4.1 Development of Rules and Regulations

Under Sections 41 and 42 of the OGRA Ordinance, 2002, the Authority may formulate rules with the approval of the Federal Government and regulations by notification to carry out its various functions.

The instruments already notified and under formulation or review are listed below:-

- Natural Gas Licensing Rules: Previously framed and approved by the Federal Government under the erstwhile Natural Gas Regulatory Ordinance and notified in February 2002, later protected under the OGRA Ordinance
- Natural Gas Tariff Rules, 2002
- OGRA (Uniform Accounting) Regulations, 2003
- Complaint Resolution procedure (for Natural Gas, LPG and CNG) Regulations 2003
- Budget Committee Rules: Draft sent to Federal Government for approval and notification
- Natural Gas Transmission (Technical Standards) Regulations, 2004
- Natural Gas Distribution (Technical Standards) Regulations, 2004
- OGRA Financial Regulations: Will be notified by January, 2005
- OGRA Service Regulations: Will be notified by January, 2005

- Fines and Penalty Rules: Draft under consideration
- Fee Rules: Draft under preparation
- Theft of Petroleum Rules: Draft under preparation

Preliminary work is also in hand to formulate rules and regulations on the following other subjects:-

- Dispute Resolution Procedure
- Promotion of fair competition
- Inspection and audit of regulated activities
- Access and inspection of the regulated activities
- Authority actions in the event of public emergency or escape of petroleum from a regulated activity
- Enforcement of the terms and conditions of licenses and decisions of the Authority
- Open access, common carrier and common operator
- Procedure for appeal against decision or order made by delegatees of Authority's powers pursuant to Section 10 of the OGRA Ordinance

4.2 Performance- Natural Gas Sector

Pakistan's primary commercial energy supplies consist of gas, oil, coal, hydro power, nuclear power and liquefied petroleum gas (LPG). During 2003-04, these supplies increased by 7.2% compared to 4.4% in 2002-03 and reached 50.5 MTOE. The share of natural gas is 43.8% of the total commercial energy consumption and this underlines its importance. Pakistan has a mature integrated infrastructure of transporting, distributing and utilizing natural gas. The country has around 9,400 KM of transmission pipelines and over 64,000 KM of natural gas distribution networks, supplying gas to about 4.3 million consumers. Pakistan is among the most natural gas dependent economies of the world. Pakistan's current gas reserves of 28.1 TCF are ranked sixth amongst the Asia Pacific countries. Presently, total gas production of the country is around 3.3 BCFD.

4.2.1 Determination of Revenue Requirement (RR) of Gas Utilities and Gas Tariff

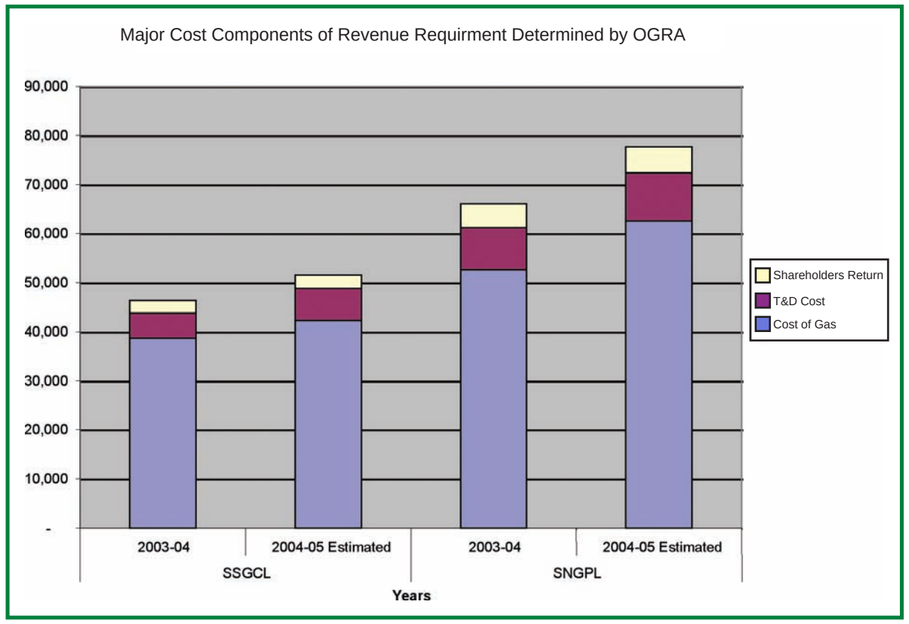
Under Section 8 of the OGRA Ordinance, the Authority is required to determine the RR and the prescribed price for each category of retail consumers in respect of each licensee carrying out the activities of transmission, distribution or sale of natural gas.

The RR is the sum of money which would enable a licensee to efficiently conduct its business and earn a reasonable return on its investment. The revenue requirement comprises of the following major components:

(i) Cost of gas(at wellhead prices)
(ii) Transmission and distribution cost including depreciation.
(iii) Prescribed return per Government's policy decision, which currently is, 17.5% in case of SNGPL and 17% in case of SSGCL, of the value of net fixed assets in operation.

The cost of gas (wellhead price) which constitutes over 80% of the total RR of the gas utilities is determined in accordance with the parameters contained in the Gas Pricing Agreements between the Federal Government and gas producers. Therefore, any change in cost of gas is practically a pass through amount. The scrutiny by the Authority consequently is more focussed on examining the operating revenues, operating cost and asset base. Exhibit 4.1 below highlights this aspect revenue requirement of the two gas utilities.

Exhibit 4.1



Under the OGRA Ordinance and Natural Gas Tariff Rules, 2002, the gas utilities are required to submit their Estimated Revenue Requirement (ERR) for each financial year by December 1 of the preceding year. These petitions are scrutinized, processed and decided in accordance with the Rules after due notice in the national press and giving full opportunity of being heard to all the stakeholders including the petitioner and general public. Later, during the financial year, the gas utility companies file review petitions for adjustment in revenue requirement to cater for changes in cost of gas, and other relevant factors viz. sales volume and sale mix. The companies may also file motion for review against any decision of the Authority under the relevant Rules.

During the year under review, the Authority has decided the following petitions of SNGPL and SSGCL, the two integrated gas utilities operating in Pakistan.

- Determination of the Total Revenue Requirement (DTRR) for FY 2002-03 after the close of this year

- Review of Estimated Requirement (RERR) for FY 2003-04. (Subsequently, total revenue requirement was determined in October/November, 2004)
- Determination of ERR for FY 2004-05

An important element in these determinations is a Federal Government policy guideline (issued on OGRA's suggestion) that the cost of gas of SSGCL and SNGPL should be worked out on overall average basis to keep this major input cost uniform. This adjustment ensures inter se equity between the two gas utilities because, under the current Federal Government policy, uniform sale price is to be maintained for each category of consumers throughout the country.

An Independent regulator is expected to balance the divergent interests of the consumers, investors and the Government. It is as difficult as a tight rope walk. Among these interested parties, consumers are the weakest and look toward the regulator for protection from possible exploitation, un-reasonableness and cost of inefficiency of other parties.

OGRA has taken a conscious decision to attach primary importance to protecting consumers' interest while remaining within the Government's policy framework and providing incentives to entities to perform optimally.

A specific measure to encourage improved operational efficiency of the gas utilities worth highlighting is that they have been directed to bring down the loss due to Unaccounted for Gas (UFG) to a predetermined targeted level with the condition that if they perform better, they can enhance their profits, and conversely any amount over the target shall be borne out of their profits and consumers will get the benefit. This measure alone has resulted in recurring cost reduction of Rs. 2.5 billion per annum. Exhibit 4.2 below provides historical perspective of the improvement in this important operational area.

Exhibit 4.2

UFG (LINE LOSSES) - Historical Perspective: Percentage to total Purchase net of Internal Consumption

	2000-01	2001-02	2002-03	2003-04	2004-05
SNGPL - Actual	8.87%	7.98%	8.19%	6.75%	
- Allowed	8.87%	7.98%	8.19%	*6.50%	*6.00%
SSGCL - Actual	8.36%	7.60%	7.57%	7.09%	
- Allowed	8.36%	7.60%	7.57%	*6.50%	*6.00%

**Target fixed by OGRA*

Note: In FY 2003-04 and 2004-05, the value of UFG above the pre-set mandatory target level has been disallowed benefiting consumers and this is motivating the gas utilities to redouble their efforts to improve operational efficiency.

Other similar measures to discourage imprudent, wasteful and unrelated expenditures have yielded a further perpetual cost reduction of about Rs. 2.5 billion. Exhibits – 4.3 and 4.4 below show item-wise behaviour of per MMBTU cost of major elements of the revenue requirements of SNGPL and SSGCL.

Exhibit 4.3

SUMMARY OF REVENUE REQUIREMENT HISOTIRCAL COMPARISON
SUI NORTHERN GAS PIPELINES LIMITED **Rs. Per MMBTU**

PARTICULARS	2002-03 ACTUAL	2003-04 ACTUAL	2004-05 ESTIMATE
Volume (BBTU)	324, 187	423, 636	473,400
Cost of gas	96.70	123.35	132.06
T&D cost and depreciation	25.75	20.19	20.75
Return on assets	31.62	11.32	11.36
Other income	(4.74)	(4.37)	(3.55)
Average Prescribed Price	131.33	150.49	160.62
Average Sale Price	140.81	150.66	161.09
Gas Development Surcharge	9.48	0.17	0.47

Exhibit 4.4

SUMMARY OF REVENUE REQUIREMENT HISOTIRCAL COMPARISON
SUI SOUTHERN GAS CMPANY LIMITED **Rs. Per MMBTU**

PARTICULARS	2002-03 ACTUAL	2003-04 ACTUAL	2004-05 ESTIMATE
Volume (BBTU)	249,064	310,628	323,698
Cost of gas	112.66	124.63	130.78
T&D cost and depreciation	20.84	16.40	19.91
Return on assets	10.26	8.23	8.36
Other income	(1.97)	(5.64)	(5.57)
Average Prescribed Price	141.79	143.62	153.48
Average Sale Price	145.20	152.45	160.17
Gas Development Surcharge	3.41	8.83	6.69

The cost of gas has been growing over these three years for three reasons. Firstly, the proportion of gas from new gas fields is increasing cost of which is pegged to the price of oil in the international market in terms of the gas pricing agreements between GoP and the producers, as compared to some of the major old fields like Sui whose production attracts a considerably lower price. Secondly the oil price in the international market has been mounting and, thirdly, the exchange value of Pak. Rupee to foreign currencies has been moving adversely.This increase in cost of gas, however, has been partly offset on account of decrease in T&D cost and return on assets because of effective regulation by OGRA.

Exhibit 4.5 below shows the total revenue requirement demanded by both the utilities and saving to consumers owing to OGRAs' intervention.

Exhibit 4.5

Summary of cost reductions benefitting Consumers

Rs. in million

	2003-04		2004-05	
	Demanded	Allowed	Demanded	Allowed
SNGPL	66,464	66,069	79,026	77,715
SSGCL	46,857	46,365	52,645	51,486
	Saving to consumers: Rs. 887 million (Rs. 1.20/MMBTU)		Rs. 2,470 million (Rs. 3.14/MMBTU)	

4.2.1.1 Determination of Total Revenue Requirement of SNGPL for FY 2003-04

The Exhibits below show comparison of OGRA determination (of October 28, 2004) with SNGPL's request in respect of various components of total revenue requirement for FY 2003-04.

Exhibit 4.6

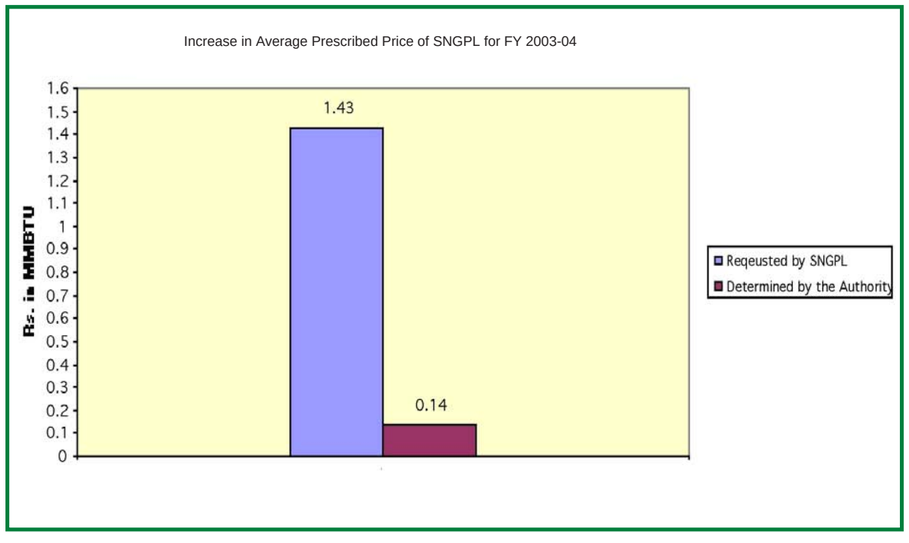
SNGPL's Request vis-a-vis OGRA Determination for FY2003-04

Rs. in million

Partifculars	SNGPL's request	OGRA determination	Difference
Cost of Gas	52,628	52,628	--
Transmission & Distribution Cost and Others	5,603	5,384	219
UFG disallowance	0	(78)	78
Depreciation	3,333	3,308	25
Return on net operating fixed assets	4,901	4,827	74
Total revenue Requirement	**66,464**	**66,069**	**396**

The Authority determined the increase in the average prescribed price of SNGPL at Rs. 0.14 per MMBTU as against the demand for increase of Rs. 1.43 per MMBTU, which shows decrease of Rs. 1.29 per MMBTU in average prescribed price, graphical representation of which is as under:

Exhibit 4.7



4.2.1.2 Determination of Total Revenue Requirement of SSGCL for FY 2003-04

The Exhibits below show comparison of OGRA determination (of November 10, 2004) with SSGCL's request in respect of various components of total revenue requirement for FY2003-04.

Exhibit 4.8

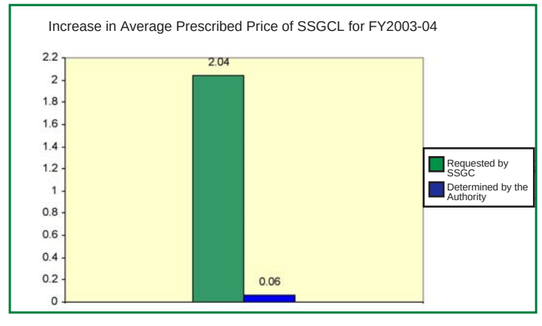
SSGCL's Request vis-a-vis OGRA Determination for FY2003-04

Rs. in million

Partifculars	SSGCL's request	OGRA determination	Difference
Cost of Gas	38,713.079	38,173.079	--
Transmission & Distribution Cost and Others	3,661.771	3,399.834	261.973
UFG disallowance	0	(226.535)	226.535
Depreciation	1,922.195	1,920.338	1.857
Return on net operating fixed assets	2,560.337	2,557.864	2.4733
Total revenue Requirement	**46,857.382**	**46.364.,58**	**492.838**

The Authority determined the increase in the average prescribed price of SSGCL at Rs. 0.06 per MMBTU as against the demand for increase of Rs. 2.04 per MMBTU, which shows decrease of Rs. 1.98 per MMBTU in average prescribed price, graphical representation of which is as under:

Exhibit 4.9



4.2.1.3 Determination of Estimated Revenue Requirement of SNGPL for FY 2004-05

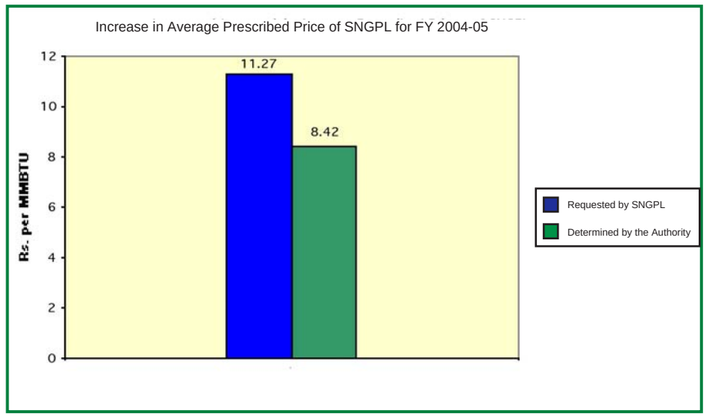
Exhibit 4.10

SNGPL's Request vis-a`-vis OGRA Determination for FY 2004-05 Rs. in million

Partifculars	SNGPL's request	OGRA determination	Difference
Cost of Gas	62,777	26,516	261
Transmission & Distribution Cost and Others	6,439	6,336	103
UFG disallowance	0	(326)	326
Depreciation	3,915	3,813	102
Return on net operating fixed assets	5,895	5,376	519
Total revenue Requirement	**79,026**	**77,715**	**1,311**

The Authority determined the increase in the average prescribed price of SNGPL at Rs. 8.42 per MMBTU as against increase of Rs. 11.27 per MMBTU requested by SNGPL to meet its revenue requirement for FY 2004-05, which shows decrease of Rs. 2.85 per MMBTU in average prescribed prices, graphical representation of which is given below:

Exhibit 4.11



4.2.1.4 Determination of Estimated Revenue Requirement of SSGCL for FY 2004-05

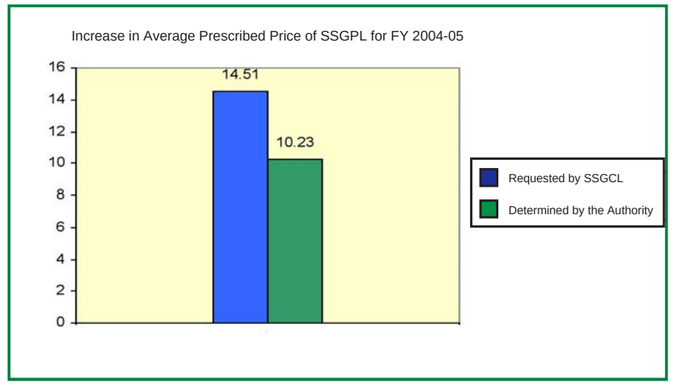
Exhibit 4.12

SSGCL's Request vis-a`-vis OGRA Determination for FY 2004-05 Rs. in million

Partifculars	SSGCL'S request	OGRA determination	Difference
Cost of Gas	42,649	42,33	316
Transmission & Distribution Cost and Others	4,397	4,363	34
UFG disallowance	0	(212)	212
Depreciation	2,423	2,295	128
Return on net operating fixed assets	3,175	2,707	468
Total revenue Requirement	**52,645**	**51,486**	**1,159**

The Authority determined the increase in the average prescribed price of SSGCL at Rs. 10.23 per MMBTU as against increase of Rs. 14.51 per MMBTU requested by SSGCL to meet its revenue requirement for FY 2004-05, which shows decrease of Rs. 4.28 per MMBTU in average prescribed prices, graphical representation of which is given below:

Exhibit 4.13



4.2.2 Notification of Prescribed and Sale Prices of Natural Gas

Under the OGRA Ordinance, the Authority is required to notify the Prescribed Prices for each category of consumers for natural gas of both the gas companies in order to enable each licensee to achieve the revenue requirement as determined by the Authority. During the year under review, the Authority issued 4 notifications of Prescribed Prices in respect of FY 2002-03, FY 2003-04 and FY 2004-05.

Pursuant to the provision of the OGRA Ordinance, the Federal Government advised the sale prices for various categories of consumers, after adjustment of Gas Development Surcharge in the Prescribed Prices determined by the Authority. The Authority notified these sale prices on July 01, 2003, which remained effective throughout FY 2003-04. The Authority also notified the sale prices on 30th June 2004, effective July 1, 2004.

4.2.3 Licensing (Natural Gas Sector)

1. **Sui Northern Gas Pipelines Limited (SNGPL)**
2. **Sui Southern Gas Company Limited (SSGCL)**

The Authority, after carefully considering all the circumstances including the view-points of interveners and the objectiv of the OGRA Ordinance, issued licenses to SSGCL and SNGPL on September 03, 2003 to carry out regulated activities as follows:

- Transmission of Gas
  - Construction and operation of pipelines for the purpose of transmission of natural gas; and
  - Transmission of natural gas through the transmission system of the licensee

- Distribution and Sale of Natural Gas

Construction and operation of pipelines for the purpose of distribution and sale of natural gas in their respective authorized areas, as under:-

SSGCL:- Provinces of Sindh and Balochistan

SNGPL: Provinces of Punjab and NWFP, the Federal Capital, FATA, AJK and

also those areas of the province of Sindh where the licensee operated natural gas distribution system prior to the date of issuance of the License.

The licenses are basically Non-Exclusive, but to protect the licensees' investments, limited exclusive rights have been granted in authorised areas to the extent that till June 30, 2010, they will exclusivly distribute and sell natural gas to their existing consumers and also such consumers as are connected to their respective distribution systems on or before June 30, 2005.

The grant of above licenses does not prohibit any other person to apply for a license for construction or operation of natural gas pipelines or transmission, distribution or sale of gas. Thus the Authority, while protecting the investments of the SNGPL and SSGCL, has opened avenues for competitors to make investments in the downstream natural gas sector, and thus, has balanced the interest of all stakeholders.

The licenses granted to SNGPL and SSGCL are valid for a period of thirty years subject to the terms and conditions as contained in the license, the salient features of which are as follows:-

SOME MAJOR OBLIGATIONS OF THE LINCENSEES:

- Rate of return linked to efficiency based benchmarks to control gas losses
- Adhere to technical, performance and service standards as approved by the Authority
- Ensure compliance with safety regulations
- Ensure continuity and reliability of supply
- Provision of service on non-discriminatory basis

4.2.3.1 Mari Gas Company Limited (MGCL)

After due process including public hearing, the Authority granted license to MGCL to undertake the regulated activity of sale of natural gas from Mari gas field (gate) located at Daharki, District Ghotki, Sindh Province to the following retail consumers:-

- Central Power Generation Company Limited (GENCO II)'s Plant at Guddu, Sindh
- Fauji Fertilizer Company Ltd's plant at Mirpur Mathelo, Sindh
- Fauji Fertilizer Company Ltd's plant at Goth Machi, District Rahim Yar Khan, Punjab
- Engro Chemical Pakistan Limited's Fertilizer Plant at Daharki, Sindh

- Any new retail consumer who enters into a gas sale agreement with the MGCL subject to its prior approval by the Authority
- The License is effective from March 28, 2002, and valid till March 27, 2032

4.2.3.2 Pakistan Petroleum Limited (PPL)

- The Authority, after due process including public hearing, granted license to PPL to undertake the regulated activity of sale of natural gas from Kandhkot gas field (gate) situated at Kandhkot District Jaccobabad in Sindh Province to Central Power generation Company limited (GENCO II)'s power Plant at Guddu Sindh
- The License is effective from March 28, 2002 and valid till March 27, 2032

4.2.3.3 Oil and Gas Development Company Ltd (OGDCL)

The Authority, after due process including public hearing granted three separate licenses to OGDCL to undertake the following regulated activities:-

1. Transmission and Sale of natural gas from Uch gas field to Uch Power Plant of Uch Power Limited
2. Sale of natural gas from Nandpur/Panjpir fields to Fauji Kabirwala Power Plant
3. Sale of natural gas from Bhal Syedan field to Altern Energy Power Plant
4. The licenses at No.1 and 2 above are effective from March 28, 2002 and valid till March 27, 2032. The licence at No. 3 above is effective from March 28, 2002 and valid till March 27, 2017

4.2.4 Uniform System of Accounts of Gas Utilities (USOA)

The Authority is obligated under the Ordinance to prescribe a USOA and accounting practices for natural gas licensees. This is necessary to enable reliable comparison of the performance of these companies in the country with each other and also with similar entities elsewhere. It will constitute accounting ring fencing of the segregated transmission and distribution activities which is a vital step in the context of privatization of these utilities also. Further, effective benchmarking on the basis of data of gas utilities in other countries could be relatively easier and more expeditious if the USOA are developed and implemented.

OGRA notified USOA Regulations on 17th February, 2004, prescribing July 01, 2005 as the date of applicability for all licensees engaged in the business of transmission, distribution and sale of natural gas. This, being a major change, SNGPL and SSGCL are engaged in system adjustment and improvement. The Authority is closely monitoring the process and is assisting them to ensure timely implementation.

4.2.5 Tariff Regulatory Regime

The Authority has been entrusted with the responsibility to determine for each licensee of natural gas a reasonable return in consultation with the Federal Government and the licensees. Under the existing regime, SSGCL and SNGPL are entitled to return of 17% and 17.5%, respectively of average net operating fixed assets. This regime is being evaluated in comparison with other options in search of a more rational basis.

Public Private Infrastructure Advisory Facility (PPIAF), a multi-donor international agency, has provided OGRA a grant of US $ 293,000 for development of a tariff regulatory regime for the natural gas sector in Pakistan. After a competitive bidding process M/s Economic Consultant Associates (ECA) of UK in collaboration with some local associates were appointed as the consultants for carrying out this study. It commenced in April 2003. The consultants have submitted the following deliverables to date:

- Inception report (Report I)
- Report on prevailing regime (Report II)
- Report on Capital Expenditure (Report III)
- Report on Operation and Maintenance(O & M) cost (Report IV)
- Report on Asset Valuation Techniques (Report V)
- Report on Benchmarking (Report VI)
- Report on Suggested Tariff Regime (Report VII)

- Draft Financial Model, and
- Training on use of Financial Model and Econometric Model

These outputs were sent to all the stakeholders and their comments have been provided to the consultants requesting them to amend reports III to VII and Financial Model to incorporate the changes suggested by the stakeholders and OGRA. The process is expected to be completed by June, 2005.

4.2.6 Approval of Agreements of Gas Utilities

Under the Natural Gas (Licensing) Rules, 2002 a licensee is obligated to:

- Enter into all contracts on an arms length basis and not to enter into any contract or other arrangement with its associated companies except with the prior written approval of the Authority
- Refrain from entering into or amending any supply contract of a quantity greater than 5 MMSCFD of natural gas unless it has been approved by the Authority
- Refrain from entering into or amending any contract material to a regulated activity with a producer of natural gas unless it has been approved by the Authority

The following agreements of the two gas utilities have been received and approved after due process:-

- Zamzama Gas Transportation Agreement between SSGCL and SNGPL
- Gas Supply Agreement between SNGPL and Rousch (Pakistan) Power Limited
- Gas Sales Agreement between SNGPL and Petroleum Exploration (Pvt) Limited for Hassan field (Block-22)
- Hassan (Block-22) Gas Transportation Agreement between SSGCL and SNGPL
- Supplemental Gas Sales Agreement for Sawan field between SSGCL and OMV (Pakistan) Exploration
- Agreement for change of delivery point of Ratana-2 gas between SNGPL and Orient Petroleum Inc
- Supplemental Agreement to the Gas Sales & Purchase Agreement for Qadirpur field between SNGPL and OGDCL
- Gas Sales Agreement for Mazarani gas field between SSGCL and PPL

- Waiver Agreement to the Amended and Restated Gas Supply Agreement dated March 31, 1996 between SSGCL and Habibullah Coastal Power Company Limited
- A side letter to Badin-1 GSA Supply Agreement dated November 28,1988 and Heads of Agreement dated December 30, 1999

4.2.7 Expansion in Transmission and Distribution Networks and Development of Projects in Gas Sector

SNGPL and SSGCL filed applications during the year under review seeking approval of the Authority under the Natural Gas Licensing Rules 2002, of their proposed infrastructure development projects. SNGPL was already completing its Project-VII, and while Project-VIII was in the planning phase, sought approval of its Project-VIII (Advance) comprising of priority works. Later, it also requested for approval of its comprehensive Project-VIII. SSGCL applied for approval of its Gas Infrastructure Rehabilitation and Expansion Project-II. The projects are briefly described below.

4.2.7.1 SNGPL's Gas Infrastructure Development Project VIII (Advance)

In September 2003, SNGPL sought approval for the following works under Project-VIII (Advance). The Authority after due evaluation granted the approval.

1. Uplifting and revalidating of old 16" diameter, 164 miles pipeline (Multan-Faisalabad segment) at an estimated cost of Rs. 89.250 million which had become redundant due to age and inefficiency.
2. Laying of 36" diameter, 20.5 miles pipeline from Sidhnai to Shorkot at a cost of Rs. 627.250 million to augment system capacity of the Qadirpur Rawan - Faisalabad section from 700 MMSCFD to 840 MMSCFD enabling injection of additional gas from new discoveries and to meet increasing demand by power plants on the Faisalabad-Lahore section.
3. Laying of 72 miles of 16" diameter uplifted pipe and 17 miles of 16" diameter new pipeline (Sahiwal - Lahore segment) at an estimated cost of Rs. 572.686 million to increase capacity on the segment from 180 MMSCFD to 300 MMSCFD.
4. Laying of 14.02 miles of 8" diameter pipeline between Khurianwala and Jaranwala at an estimated cost of Rs. 98.912 million to increase capacity from 5 MMSCFD to 24 MMSCFD.
5. Laying of 38 miles 16" diameter uplifted pipeline between Bhai Pheru and Dawood Hercules off-take point at an estimated cost of Rs. 275 million. This would add capacity of 80 MMSCFD and provide operational flexibility to enable provision of gas to WAPDA Power House at Baloki to the extent of 60 MMSCFD.

4.2.7.2 SNGPL's Gas Infrastructure Development Project - VIII

In February 2004, SNGPL applied for approval of its Project-VIII. The project aimed at creating additional capacity of 330 MMSCFD to be able to receive additional supply from existing and new gas fields e.g. Qadirpur, Sawan, Kandhkot, Rehmat etc. and to take it to the consumption centers. The conceptual design of P-VIII involves laying loop lines of assorted diameter, uplifting some segments and relocating some existing compressor packages. The total projected cost is Rs. 5,618.756 million including foreign exchange component of Rs. 1,360.213 million.

182 miles of transmission lines are being constructed having diameter in the range of 16" to 36" and approximately 57 miles of transmission lines of 16" to 24" diameter are to be uplifted. The project will be completed in 21 months, from April 2004 to December 2005. The tasks to be undertaken are as follows;

i. 16.48 Miles of 36" diameter Pipeline from Bhong (AC1X) to Rahim Yar Khan offtake (AV7).
ii. 15.83 Miles of 36" diameter Pipeline from Uch Sharif (AC4) to Satluj Offtakes (AV15)
iii. 17.27 Miles of 36" diameter Pipeline from Shujabad (A6) to Sikandarabad (AV22)
iv. 17 Miles of 36" diameter Pipeline from Sikandarabad (AV22) to Multan (AC6)
v. 16.19 Miles of 36" diameter Pipeline from Qadirpur Rawan (AV29) to Kabirwala (A8)
vi. 5 Miles of 30" diameter Pipeline from Faisalabad (MP 160) to Galli Jagir (CC3)
vii. 13.35 Miles of 24" diameter Pipeline from Faisalabad (A11) to Khurianwala (BV3)
viii. 22 Miles of 16" diameter Pipeline Mubarak Injection Point
ix. 16 Miles of 16" diameter Pipeline from Burhan to Hattar (uplifted Pipe)

x. 33.55 Miles of 16” diameter Pipeline Kandhkot- Guddu Crossing.
xi. SCADA (Transmission).

P-VIII, being a massive project has been evaluated both in house as well as through an external consultant. It has been approved with certain modifications at a net cost of Rs.4,253.368 million.

4.2.7.3 SSGCL’s Gas Infrastructure Rehabilitation and Expansion Project-II

In May 2004, SSGCL applied for approval of its Gas Infrastructure Rehabilitation & Expansion Project –II (GIREP-II). The project envisaged transmission of 175 MMCFD additional gas from existing and new sources viz Khipro, Sanjhoro, Zarghoun, Miano & Sawan gas fields. This project would involve extension in distribution and transmission network by 305 kilometers. By effective utilization of indigenous gas, the project would result in saving annual foreign exchange of approximately US$ 140 million in terms of fuel substitution.

GIREP-II is a part of SSGCL’s five year core investment program. The cost of GIREP-II excluding cost of components under planning/conceptual stage is Rs. 5,888 million with foreign exchange component of Rs. 827 million. GIREP-II will be completed by June 2007 starting from July 2003.

GIREP-II comprises the following nine components:-

i. 30” diameter x 9 km bypass to 16” ILBP from HQ3 Hyderabad to SMS Sindh University
ii. 18” diameter x 14 km bypass of Quetta pipeline in Dingra Nallah
iii. 16” diameter x 15 km third Supply Main at Hyderabad
iv. 24” diameter x 116 km Sanghar – Hyderabad – Karachi pipeline, Phase - I
v. 24” diameter x 83 km Sanghar – Hyderabad – Karachi pipeline, P hase - II
vi. 12” diameter x 68 km Zarghoon Quetta pipeline
vii. SCADA/Telemetry
viii. 24” diameter x 86 km Sanghar – Hyderabad – Karachi pipeline, Phase - III
ix. 30” diameter x 200 km Downstream Bajara loop lines on IRBP

The first three segments have already been initiated and were also part of petition filed by SSGCL for determination of revenue requirements for the FY 2004-05. The next four projects are to be initiated immediately to meet the increasing gas demand and the last two projects are in the conceptual/planning stage.

GIREP-II has been evaluated in house and has been approved with certain modifications at a net cost of Rs. 3.309 million.

4.2.7.4 Evaluation of Projects by OGRA

OGRA ensures that capital investments by the gas companies meet the criteria of efficiency, economy and prudence, because these form part of the asset base qualifying for fixed return and therefore, have direct impact on gas price. The main aim is not to allow the financial burden of the inefficiencies of the public utilities to pass to the consumers.

4.2.8 Performance and Service Standards

Performance and Service Standards Regulations have been issued to the licensees. The service standards prescribe the licensees obligations in respect of maintaining quality of gas, reading meters, responding to consumer complaints, etc. The performance standards measure the licensees’ efforts in the areas of consumer satisfaction, safety, billing, providing connections etc. Some of the salient performance and service standards are as follows:

- Complaints on gas emergencies i.e. gas leakage, fire or other hazardous situation to be attended as quickly as possible, and, in any case within one hour in the case of uncontrolled escapes, and two hours for controlled escapes.
- Companies to promptly respond to all requests for service and issue the proposal letter, in any case, within 90 days, or any other period approved by the Authority on the request of the company.
- Consumers to receive a response within 5 working days of receipt of a communication.
- The company shall submit gas bills based on actual meter readings on 30 days basis, or a longer period not exceeding 45 days. Adjustments for price and tariff should be made proportionate to the number of days.

- The due date of payment shall be 15 days from date of issuance of bill. However, the company shall make arrangements for delivery of bills such that each consumer gets a minimum period of 7 days to make payments.
- Reconnection after payment shall be carried out within one working day.
- Refunds to consumers to be dispatched within 30 days.
- The company shall maintain adequate pressure in the transmission pipelines and distribution networks and upgrade the system where necessary to ensure supply of contractual volume and pressure to its consumers.

The licensee is required to conform to the performance and service standards as may be specified by the Authority from time to time in respect of any aspect of the licensee's performance including service, efficiency and safe operation of its regulated activities. The Authority has developed an effective monitoring system for this purpose.

4.2.9 Issue of Technical Standards

OGRA is obligated under the provisions of the Ordinance to prescribe technical standards of materials, equipment and other resources required for undertaking regulated activities, in consultation with the licensees.

The existing gas transmission and distribution companies generally followed standards and practices in vogue in the natural gas industry of the United States of America. However, over the years, the situation on the ground made it difficult for the gas companies to continue following these practices, hence there was a case for review of the technical standards in practice. The Authority initially formulated technical standards in-house and circulated to the two gas companies for their comments. Later, a consultant from the Canadian International Development Agency (CIDA) was associated. After extensive consultations between gas companies, the consultant and OGRA, the new standards for carrying out the regulated activities have been formulated and notified. Special attention has been given to the ground realities prevailing in the country, particularly from the point of view of practicability and enforceability of the standards. The following activities of natural gas transmission have been addressed:

- Design
- Construction
- Welding

- Material
- Test requirements
- Corrosion
- Leak detection
- Operation & maintenance
- Plastic (polyethylene) piping (for pipelines distribution)

4.2.10 Compliance Monitoring and Enforcement

SNGPL and SSGCL

The licenses granted to SNGPL and SSGCL on September 03, 2003 have laid down a number of obligations and responsibilities for them and consequently following improvements are taking place:-

- The licensees are working expeditiously to keep proper books of accounts and record separately for transmission, distribution and sale of natural gas from 1st July 2005
- The licensees have allocated appropriate resources for training, research and development
- The companies are responding to emergency calls within the time frame stipulated in the performance and service standards laid down by OGRA and licence conditions
- The licensees are continuously working to improve consumer complaint resolution systems to ensure expeditious action
- The licensees are providing the information about their installed and spare transmission capacity on their websites for the benefit of any interested persons
- SSGCL has reduced the waiting period for provision of gas connection SNGPL is making efforts in this direction
- Regarding compliance of Licence condition on "standard contract with retail consumers" the SSGCL has executed the agreements/contracts with all consumers except KESC's Bin Qasim plant for which negotiations are under way. SNGPL has also executed agreements/contracts with all

consumers except WAPDA and Fertilizer plants. Negotiations are being held with them

- During winter months the licensees launched intensive education campaign for the awareness of the consumers on safe aspects of use of gas.
- The licensees have submitted their policy and procedure in respect of gas theft. It has been thoroughly examined by the Authority with a view to develop rational, effective and uniform policy and procedure which will be finalized after consultation with the licensee.
- The standard contracts between the licensees and the domestic consumers have been reviewed in-depth by the Authority with a view to protect the interest of the consumers. After receipt of comments from the licensees the document will be finalized.

Enforcement team in session

PERFORMANCE - LPG, CNG AND OIL SECTORS

4.3 PERFORMANCE - LPG, CNG AND OIL SECTORS

4.3.1 Liquefied Petroleum Gas (LPG)

4.3.1.1 Regulation

The regulation of LPG activities was transferred to OGRA from Ministry of Petroleum and Natural Resources on March 15, 2003, empowering OGRA to exercise regulatory functions under the LPG (Production and Distribution) Rules 2001. The regulatory functions of OGRA are as under:-

- grant of license for construction of LPG production, storage and filling plants
- grant of marketing license for sale and distribution of LPG
- appointment of third party inspectors to verify conformity of LPG works in accordance with the laid down standards
- regular periodic inspection of LPG facilities to ensure their conformity with the laid down standards
- redressal of consumer complaints and resolution of disputes between or among the licensees

4.3.1.2 Licensing Procedure

License for construction of LPG production, storage and filling plants is granted under Rule 8(1) of the LPG (Production and Distribution) Rules 2001. A license is initially granted for a period of 2 years for construction of plants and thereafter where applicable marketing licence is issued for a period of 15 years based on satisfactory completion of LPG works under the Rules. A licensee is required to obtain all relevant NOCs from District Administration, Environmental Protection Agency and Explosive Department before start of construction of LPG plant. Any person can apply for grant of license to the Authority on the prescribed form available free of cost from OGRA as well as on OGRA website alongwith requisite fee of Rs.100,000 and other related documents as required under the Rules.

4.3.1.3 Investment in the LPG Sector

Oil and Gas Regulatory Authority played an effective role in attracting investment in the LPG supply and distribution infrastructure. During the year OGRA issued LPG production license to M/s Jamshoro Joint Venture for establishment of LPG extraction plant of 500 metric ton/day capacity at Jamshoro which involves estimated capital outlay of more than Rs. 2 billion. The plant is expected to be completed in early 2005 which shall enhance local supply of LPG by more than 50%. Another license for construction of LPG production plant of 50 tons/day was issued to M/s Bosicor Ltd for their refinery at Hub District Lasbella. Three licenses were issued for marketing of LPG to M/s Petrosin Gas Pakistan (Pvt) Ltd, M/s Prograss Pakistan Ltd and M/s Power Gas (Pvt) Ltd, while 39 licenses have been issued for construction of LPG storage and filling facilities at various locations. This will further attract a cumulative investment of Rs.1.5 billion.

4.3.1.4 Regulatory Enforcement

One of the objectives of OGRA is to ensure safe, reliable and efficient service to consumer for which the Authority has taken various steps to strengthen its regulatory mechanism to continuously monitor the activities of the LPG companies as per their license conditions. The Authority has requested the Federal Government for enactment of an appropriate law to check misuse of LPG in automotive vehicles to ensure uninterrupted LPG supply to domestic consumers. The assistance of Provincial Governments was also sought to check misuse of LPG in the automotive vehicles. In order to ensure compliance of LPG standards, continuous inspections of LPG supply infrastructure are being carried out through the third party inspectors and the licensees were advised for rectification of various deficiencies pointed out during the inspections. LPG companies were directed to strictly adhere to the LPG standards and maintain insurance coverage for proper safety arrangements. Accidents and investigation reporting formats were developed to have a uniform system of reporting in case of an accident. However, during the year, by the grace of God Almighty, no major accident has taken place.

4.3.2 Compressed Natural Gas (CNG)

4.3.2.1 Regulation

Government of Pakistan introduced CNG as an alternative automotive fuel in the country in 1992. CNG (Production & Marketing) Rules 1992 *inter alia* covering Safety Code of Practice, were notified for the construction and operation of CNG re-fuelling stations. The regulation of CNG Sector was transferred to OGRA on March 15, 2003. OGRA has facilitated the process for grant of license through simplification of procedure and provision of one window facility for the investors. The regulatory functions of OGRA are as under:-

- Grant of license for construction of CNG station which *inter alia* requires the licensee to obtain various NOCs from District Administration, Environment Protection Agency, Explosive Department etc., and construct/install CNG station in accordance with the laid down standards
- Grant of marketing license after conducting third party inspection on adherence to safety code of practice
- Regular periodic inspections to ensure conformity with the laid down standards
- Redressal of consumer complaints

4.3.2.2 Licensing Procedure

CNG License is granted in two phases:-

a) License for construction of CNG station
b) License for marketing of CNG.

Following procedure is adopted for grant of these licenses:

Any person can apply for grant of license to the Authority on the prescribed form available free of cost from OGRA as well as on OGRA website along with the requisite fee of Rs. 25,000 and other related documents as required under the Rules. The license for construction of CNG station is granted under Rule 6 of the CNG (Production & Marketing) Rules, 1992 initially for a period of two years during which the licensee has to acquire NOCs from the concerned departments like District Cooardination Officer, Environment Protection Agency, Explosive Department etc before starting construction of the CNG station. The licensee is required to meet the requisite safety and technical standards as prescribed in the CNG Rules 1992 for construction of CNG station and installation of equipment.

The Licensee, after completing construction of CNG station, requests the Authority for appointment of third party inspectors to verify conformity of his CNG works in the light of Standard Code of Practice of CNG (Production & Marketing) Rules 1992. The Authority appoints third party inspector which is currently HDIP. Marketing license is issued for a period of 15 years after satisfactory report of the third party inspector.

OGRA has simplified the procedures for grant of CNG license. The license is granted even in a single working day if the requisite documents are complete. Maximum processing time is one week. Investors are further provided comfort through establishment of a one window facility where prompt guidance and information is provided to the applicant.

4.3.2.3 Investment in CNG Sector

The CNG sector has shown tremendous growth in the past 3 years resulting in addition of 300 operative CNG stations thus bringing cumulative investment of more than Rs. 6 billion since its inception. As of 30th June, 2004, 546 CNG stations were operating in the country while 440 were at various stages of completion which will further bring an investment of Rs. 5.5 billion. During the year, the Authority has issued 347 licences for construction of CNG stations while 144 stations were completed and granted marketing licence after receiving satisfactory inspection report from third party inspectors.

4.3.2.4 Compliance Monitoring and Regulatory Enforcement

OGRA has given focussed attention on conducting effective third party inspections and standardization of CNG equipments to provide comfort to the investors to adhere to

the requirement of Safety Code of Practice. The new CNG Rules have also been drafted with the assistance of CIDA consultant to effectively regulate the sector in the light of the latest technological developments to ensure safe, reliable and competitive service to consumers. In order to ensure public safety, OGRA has put complete ban on grant of license for setting up CNG stations in residential areas.

The Authority is promoting competition by inducting new licensees to ensure reliable, efficient and cost effective service to consumers.

Pakistan has taken a lead role in developing the CNG infrastructure due to investor friendly policy and regulatory framework, and at present stands third in the international ranking after Argentina and Brazil in terms of vehicle conversion on CNG. As of 30th June 2004, about 550,000 CNG vehicles were operating in the country. Following Exhibits reflect the rapid growth of the sector:

Exhibit 4.14 No. of vehicles converted to CNG, year-wise

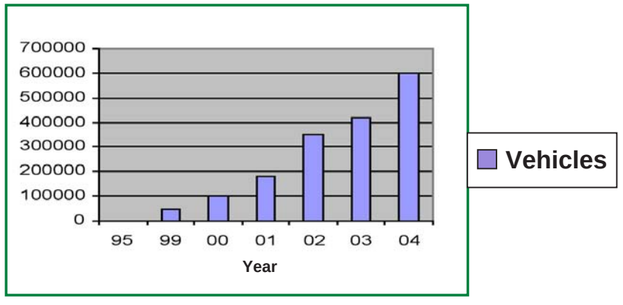
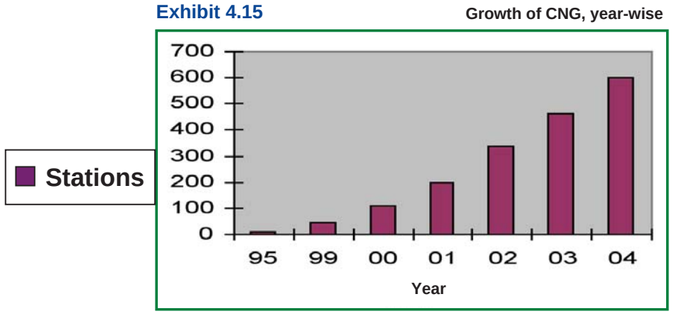


Exhibit 4.15 Growth of CNG, year-wise



Annual Report 2003-04 LPG, CNG AND OIL SECTORS

4.3.3 Midstream and Downstream Oil Sector

The Authority, during the year, completed its process of recruitment of officers & staff for dealing with the regulation of the mid & downstream oil sector. Renowned and experienced industry experts have been placed on OGRA panel of experts. The oil department will be further supported by the Finance, Legal and IT departments which are already functional. The Authority, after creating this capacity, invoked provisions of Section 23(3) and Section 44 of the OGRA Ordinance and advised Federal Government to issue notification for the transfer of the regulatory work. The Authority has drafted the Rules for regulating the mid & downstream oil sector which shall be circulated to all stakeholders after transfer of regulatory functions under the Ordinance.

Complaint Resolution

5. Complaint Resolution

5.1 Creation of Complaint Resolution Cell

The OGRA Ordinance and its subordinate legislation, entrust OGRA to safeguard the consumers' interest by resolving their complaints and disputes, and consumer care is the foremost in OGRA's perspective. OGRA has notified the Complaint Resolution Procedure, has created a Complaint Resolution Cell within OGRA and has informed the consumers of this service through media advertisements as well as placement on its website.

The complaint resolution procedure covers all matters relating to operations of all OGRA licensees. A complaint can be filed if a licensee (or his agent) violates any provision of the ordinance or rules and regulations made thereunder, or conditions of the license or a direction of the Authority, particularly in the following areas:-

(i) Billing
(ii) Connection and disconnection of service
(iii) Metering
(iv) Undue delay in providing service
(v) Safety practices
(vi) Quantity and quality of natural gas, LPG or CNG being supplied.

The Authority has nominated Designated Officers (DO) to deal with the complaints, who forward them to the licensee requiring a response, normally, within 15 days. The DO can also arrange a meeting between the complainant and the licensee or inspect the site or require additional information from the licensee or complainant before reaching the decision. Any party, not satisfied with the decision of the DO, may file an appeal with the Authority, within 30 days.

Most of the cases settled now, had been lying unattended earlier and have been disposed of in favour of the consumers by the entities as a result of OGRA intervention.

A summary of complaints received during the year is given below:-

Exhibit 5.1

Nature of Complaints	Complatints Received
Excessive gas billing	16
Theft / leakage of gas	2
Delay / non-provision of gas connections	19
Disconnection of gas supply	5
Low CNG / LPG pressure	7
Illegal / misuse of Authority	3
Unlawful arrears / connection / installments of bills	3
Enforcement of additional security by gas companies	2
CNG / LPG prices	1
Problems to commercial gas consumers	1
Environmental pollution	1
Misc. matters	9
Total	**69(*)**

(*) All the complaints have been resolved except 4 cases, which are subjudice.

In compliance of Authority's decision, a compensation claim of a widow has been settled by the entity at an amount of Rs. 200,000 in respect of death of her husband, who had unfortunately died during an LPG blast in September, 2001 at Kasur.

Anticipated Developments Next Year

6. Anticipated Developments Next Year

The anticipated developments next year are as follows:-

- The process of developing rules and regulations to strengthen the regulatory framework is continuing and some important legal instruments viz Service Regulations, Financial Regulations, Budget Committee Rules, Fine & Penalty Rules, Fee Rules, CNG Rules, and LPG Rules are projected to be issued during next financial year.

- The benchmark in respect of Unaccounted for Gas is already firmly in place and will be enforced during the next year at the level of 6%. Other benchmarks will be developed.

- The process of licensing to the entities which were carrying out regulated activities at the time of promulgation of the OGRA Ordinance will be completed next year with the issue of licences to the following entities:

  i) Fauji Fertilizer Company Limited.
  ii) Engro Chemical Limited
  iii) Central Power Generation Company Limited (GENCO-II)

- The process of determination of revenue requirement of gas utilities, prescribed and sale prices for different categories of consumers is well established and will continue in future

- The process of determination and notification of the wellhead prices under the provisions of the Ordinance will continue

- The work of regulation of midstream and downstream oil sector is expected to be transferred to OGRA by GOP. The draft of revised rules of oil blending, marketing and transportation is ready and will be finalized in consultation with the stakeholders, after the transfer of oil sector to OGRA

- The work of reviewing the guaranteed return regime for natural gas licensees will be carried forward

- Capacity building efforts will continue

- USOA will be implemented

Annual Report 2003-04

Part-II

State of the Regulated Segments of Pakistan's Petroleum Industry

Introduction

7. Introduction- State of Regulated Segments of Pakistan's Petroleum Industry

In general terms, Pakistan's economy continued to improve during FY2003-04-(FY2004), with all macroeconomic indicators demonstrating positive trends. Gross domestic product (GDP) grew by 6.4% during the year, against a target of 5.3%. This increased rate of growth was accompanied by a sharp pickup in industrial production, particularly large scale manufacturing.

Pakistan's principal energy supplies consist of gas, oil, coal, hydro and nuclear electricity, and liquefied petroleum gas (LPG). During FY2004, primary commercial energy supplies increased by 7.2%, compared to 4.2% in FY2003, and reached 50.8 MTOE[1]. This was primarily due to increases in the supply of natural gas, hydel power and coal of the order of 21%, 20% and 29%, respectively.

Traditionally, the Government of Pakistan (GoP) has exercised control over the country's oil sector and was fully involved in decision-making at all levels up to the year 1999. However, responding to domestic and global economic imperatives, the GoP has embarked upon a course of reducing these controls and initiating major reforms through deregulation, disinvestments of its shares and segregation of policymaking, ownership and regulation. The GoP aims to limit itself to the role of a policy maker while transferring its existing shares to the private sector, and has established a regulatory process to protect the interests of investors, consumers and the government under the new setup.

Pakistan can be termed as an 'under explored' country in terms of the exploitation of its fossil fuel resources. With a total sedimentary area of 827,269 km2 and an exploration density of one well per 1,532 km2, the success ratio stands at

1 Source: Hydrocarbon Development Institute of Pakistan (HDIP).

Annual Report 2003-04

Natural Gas Sector

one discovery for nearly every four wells drilled. While Pakistan's current gas reserves of 28.1 TCF are ranked sixth highest amongst Asia-Pacific countries, its oil reserves—at a modest 288.6 million US barrels—are inadequate to meet the country's growing requirements. In energy terms, natural gas constitutes 90% of the total oil and gas reserves available in the country. Pakistan thus has to depend upon imports of crude oil, furnace oil (FO) and high-speed diesel (HSD) in order to fully service its energy requirements.

With the recent integration of new gas fields, such as Sawan, Bhit, Zamzama and Khipro, and increased gas supply from Qadirpur to the national gas network, the share of gas supplies in the energy mix of the country showed a healthy increase of 5.7% in FY2004, replacing FO in power generation and other industry. The shares of hydel generation and coal increased marginally with the commissioning of the 1,450-MW Ghazi Barotha hydel power project and increased coal usage in the cement industry. The net impact of the additional gas supplies resulted in a decrease of 8.1% in the share of oil products in the country's energy supply mix. The energy supply mix of the country in FY2003 and FY2004 is illustrated in Exhibit 7.1 and Exhibit 7.2, respectively

Exhibit: 7.1
Pakistan Energy Supply Mix for FY 2003

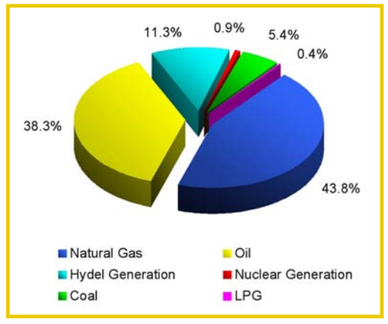
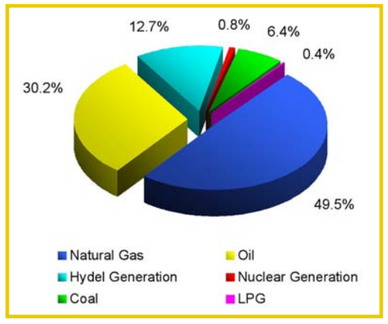


Exhibit: 7.2
Pakistan Energy Supply Mix for FY 2004



8. Natural Gas Sector

Pakistan is a significant producer of natural gas with potential for further growth in output, as there is a high likelihood of more reserves being discovered. The country has a long history of oil and gas explorationthe first gas field at Sui was discovered in 1952 and provided the basis on which Pakistan's extensive gas transmission and distribution network was subsequently built. Natural gas plays an important role in Pakistan's economy, meeting about 50% of the country's demand for commercial energy[2]. However, despite the healthy share of gas in the energy mix, piped gas is available to only about 18% of the population of the country. Pakistan is a net importer of crude oil and refined petroleum products, but is currently self-sufficient in terms of natural gas. As of July 1, 2004, Pakistan's total recoverable gas reserves were estimated at 28.1 Tcf, which are adequate for meeting the country's gas requirement for about 25 years at the current rate of production.

Almost all the identified oil and gas reserves are onshore. Newly discovered large gas-producing regions are located in the southern part of country. A major discovery at the Gurgari gas field, Tal Block, near Kohat was recently made in the Northwest Frontier Province (NWFP). The bulk of natural gas production in the province of Sindh is concentrated in and around the Indus River Basin.

8.1 Regulatory Regime Overview

The GoP has adopted a number of reform measures in both the upstream and downstream gas sectors during the past several years. These include the introduction of a new petroleum policy in the year 2001 with more attractive terms and conditions for exploration and production (E&P) companies, implementation of market-based wellhead pricing framework for the Sui field, expansion of the gas transmission infrastructure, the provision of greater managerial autonomy to sector entities, and the establishment of the Natural Gas Regulatory Authority (NGRA) under the NGRA Ordinance 2000 to regulate the transmission, distribution and sale of natural gas.

NGRA Ordinance was repealed and the Oil and Gas Regulatory Authority (OGRA) was established on March 28, 2002 under the OGRA Ordinance 2002 to regulate midstream and downstream oil and gas sector. OGRA was also entrusted with the powers/functions of licensing; formulation of rules, regulations and procedures; tariff determination and revision; dispute/complaints resolution; monitoring and enforcement of compliance with the rules; prescription of fines, increase private investment and ownership in the midstream and down stream petroleum industry, promote competition and protect public interest.

2 Source: Hydrocarbon Development Institute of Pakistan (HDIP).

Both the companies, Sui Northern Gas Pipelines Limited (SNGPL) and Sui Southern Gas Company Limited (SSGCL), have been granted licences to carry

out the regulated activities in respect of transmission of natural gas as follows:

- Construction and operation pipelines for the purpose of transmission of natural gas; and
- Transmission of natural gas through the transmission system of the licencee

In addition the companies have been granted licences to carry out the regulated activities in respect of distribution and sale of natural gas.

As a further step towards reforms in the gas sector and in order to make the gas market more competitive, the GoP has also decided to initially allow large consumers and producers to have non-discriminatory open access to the transmission and distribution network for a fee. The principle of third-party access to the transmission and distribution network was introduced for the first time in the Petroleum Policy, 2001. The OGRA Ordinance, 2002, empowered OGRA to determine the third-party access rules on the basis of guidelines provided by the GoP. While issuing transmission and distribution licenses to SNGPL and SSGCL, the OGRA has opened the gas markets to competition by diluting exclusivity in distribution and sale of gas by these utilities to new customers after June 30, 2005. The exclusive rights currently enjoyed by SNGPL and SSGC to distribute and sell gas will be phased out by 2010. These licences also require the utilities to provide third-party access to their transmission and distribution capacity to other buyers and sellers of natural gas, subject to the approval of OGRA.

Thus far, however, no contracts for capacity off-take have been entered into between the T&D companies and the producers or large consumers under this new open access regime. However Zamzama gas transportation and Hassan gas transportation agreements were entered between SNGPL and SSGCL. To date, these companies remain the sole buyers and sellers of gas to consumers, except for a few large fertilizer and power consumers situated in proximity to specific fields, where gas is being sold independently by the Mari Gas Company Limited (MGCL), the Oil and Gas Development Company Limited (OGDCL),

Pakistan Petroleum Limited (PPL) and Tullow Pakistan (Developments) Limited. Although the T&D companies have non-exclusive licenses to supply gas to consumers in their respective operational areas, they are nevertheless all set to enhance their transmission and distribution capacities further. This expansion work has already been started, and an investment totaling Rs 25 billion is expected to be made by the T&D companies within the next five years. Exhibit 8.1 shows the status of licenses issued to these companies by OGRA, which are valid for a 30-year period.

Exhibit 8.1: Status of Gas Transmission, Distribution and Sales Licenses

Company	Type of Licence	Date of Issue
SNGPL	Transmission, distribution, and sale of natural gas in the Punjab, NWFP, AJK, FATA and small part of Sindh	September 3, 2003
SSGCL	Transmission, distribution, and sale of natural gas in Sindh and Balochistan	September 3, 2003
MGCL	Sale of natural gas to ECPL,[a] FFC,[b] CPCc	August 11, 2004
PPL	Sale of natural gas to CPC	November 23, 2004
OGDCL	Sale of natural gas to FKPCL,[d] Uch Power and Altern Energy	December 30, 2004

a Engro Chemical Pakistan Limited
b Fauji Fertilizer Company (FFC-I, FFC-II, Goth Machi, Dist. Rahim Yar Khan and FFC, Mirpur Mathelo, Dist. Ghotki
c Central Power Generation Co. Ltd. (GENCO-II), Guddu Thermal Power Station, Dist. Jacobabad
d Fauji Kabirwala Power Company Limited

8.1.1 Profile and Stakeholding Status of the Gas Companies

The SSGCL and SNGPL are the main utility companies operating the gas transmission and distribution system in Pakistan. In addition to the high-BTU main transmission network, there exists an independent medium-BTU gas network such as the pipelines connected to the Mari, Sara, Suri, Uch, Nandpur, Panjpir and Kandhkot fields supplying gas directly to fertilizer and power plants, as mentioned earlier.

2 Source: Hydrocarbon Development Institute of Pakistan (HDIP).

Annual Report 2003-04 Part-II Natural Gas Sector

Sui Northern Gas Pipelines Limited

The SNGPL is the largest integrated gas company in the country and is engaged in the transmission and distribution of natural gas as well as the construction of high-pressure transmission and low-pressure distribution systems.

The SNGPL was incorporated as a private company in June 1963 and was converted into a public limited company in January 1964 under the Companies Act, 1913 (now Companies Ordinance, 1984), with the object of transmitting and distributing natural gas in the Punjab and NWFP, AJK, and a small part of Sindh.

Policy guidelines and overall management control of the company is vested in the elected Board of Directors, which includes representatives of shareholders as well as of creditors, as required under the Companies Ordinance, 1984. Presently, the SNGPL's Board comprises 14 members, ten of whom are nominees of the government and government-controlled institutions, with the remainder from the private sector. The GoP is the company's majority shareholder and the managing director/chief executive is therefore a nominee of the government who is delegated such powers and authorities as are necessary to effectively conduct the business of the organization. The details pertaining to the shareholders of the company and their respective shares in the ownership of the company are given in Exhibit 8.2.

Exhibit 8.2: Pattern of Shareholding in the SNGPL

Categories of Shareholders	Number of Shareholder	Number of Shares Held	Percert Shareholdin
Institutions			
Muslim Commercial Bank Ltd.	1	20,657,807	4.1
National Investment Trust	1	39,821,822	8.0
Investment Corp. of Pakistan	1	844,720	0.2
Executives	12	18,021	0.0
Banks, development finance institutions, etc.	189	97,673,483	19.6
Insurance companies	14	26,464,890	5.3
Modarabas[3] and mutual funds	31	6,652,834	1.3
GoP	1	179,717,373	36.0
Dawood Hercules Chemicals Ltd.	1	81,000,000	16.2
General Public			
Local	17,375	38,288,225	7.7
Foreign	789	1,077,891	0.2
Others	51	6,969,606	1.4
Total	**18,466**	**499,186,672**	**100.0**

Source: SNGPL Annual Report, 2004.

The SNGPL transmission system extends from Sui in Balochistan to Peshawar in the NWFP, comprising over 5,763 km of transmission lines. The distribution activities, covering 142 main towns alongwith adjoining villages in the Punjab, NWFP and some areas of Sindh and AJK are organized through eight regional offices. As of June 2004, the SNGPL distribution system comprised 38,284 km of network length.

During the FY 2004, the SNGPL successfully installed and commissioned 176 remotely operated mainline valves on its gas pipeline system. During the same period, 71 remote-controlled pressure control valves have also been commissioned at important Sales Meter Stations (SMS). Now the SNGPL's Gas Control Center can remotely isolate any affected main line segment during an emergency using its Supervisory Control and Data Acquisition (SCADA) system. Similarly, the pressure at any important SMS can also be changed remotely. These features of the SCADA system will be of great use for effective load management during any pipeline emergencies or transmission network disruption.

The SNGPL has 2.3 million consumers comprising of residential, commercial, general industry, fertilizer, power and cement sectors. Total gas sales to these consumers

3 Islamic mode of financing.

was 1,239 MMscfd during FY 2004. OGRA has granted non-exclusive licence for construction and operation of pipelines for the purpose of transmission of natural gas for 30 years with effect from March 25, 2002. OGRA has also granted a 30-year license to the SNGPL with effect from March 25, 2002 for construction and operation of pipeline for the purpose of distribution and sale of natural gas throughout the terriorities of the provinces of Punjab and NWFP, AJK, the Federal Capital, FATA and those areas where the licensee operated natural gas distribution system prior to the issuance of licence.

However SNGPL has been granted limited exclusive rights as follows:

"Distribution and sale of natural gas through the distribution system of the licensee within its authorized area, with an exclusive right till June 30, 2010 to distribute and sell natural gas to its existing consumers and such consumers as are connected to its distribution system on or before June 30, 2005".

The SNGPL has also made good progress towards the establishment of an effective Health Safety and Environment (HSE) management program for the promotion of a safety culture in order to prevent accidents and injuries as well as to ensure full conformance to legislative requirements. The newly established HSE Department is now fully functional and a company-wide HSE infrastructure is in place.

Sui Southern Gas Company Limited

The SSGCL is Pakistan's other leading integrated gas company and serves the provinces of Sindh and Balochistan. The company is also engaged in the business of transmission and distribution of natural gas besides construction of high-pressure transmission and low-pressure distribution systems.

Similar to the SNGPL, the SSGCL is managed by an autonomous Board of Directors with 14 members. The GoP is the company's majority shareholder, hence the managing director/chief executive is a GoP nominee and has been delegated with the necessary management powers to effectively conduct the company's business. Exhibit 8.3 details the current pattern of shareholding in the SSGCL.

The SSGCL transmission system extends from Sui in Balochistan to Quetta and to Karachi in Sindh, comprising over 2,980 km of high-pressure pipelines, ranging from 12 to 24 inches in diameter. The distribution activities, covering over 650 cities, towns and villages in Sindh and Balochistan, are organized through its regional offices. An average of about 872 MMscfd gas was sold in FY 2004 to over 1.6 million residential, commercial, general industry, fertilizer, power and cement industry consumers in these regions through a distribution network of over 23,416 km total length. OGRA has granted non exclusive license for construction and operation of pipelines for thre purpose of transmission of natural gas for thirty years to SSGCL with effect from March 20, 2002. OGRA has also granted a 30-year license to the SSGCL for construction

and operation of pipeline for the purpose of distribution and sale of natural gas throughout the terrorities of the provinces of Sindh and Balochistan.

With the SSGCL's vast gas transmission and distribution network across Sindh and Balochistan, telecommunications plays a vital role in maintaining smooth operations. The SSGCL has developed a highly advanced, state-of-the-art microwave telecommunication system, which provides both voice and data communications over the entire system. To ensure optimum gas flows, a modern SCADA system monitors transmission pipeline operations. The SSGCL has installed block valves at key pipeline locations to provide for remote actuation through the SCADA system, managed from the Gas Control Center at Karachi. In the event of an accident, the affected line can be isolated and shut off within two minutes to provide maximum operational security.

During FY 2004, detailed HSE audits and inspections of all facilities, operational activities, e.g., rights of way, compressor stations, SMS, overhead crossings, transmission pipelines, distribution network, pipeline construction activities, canteens, residential and other operational areas, were carried out. Standard operating procedures (SOPs) were also developed for solid waste management, emergency response, fire fighting, accident/incident reporting and investigation, work permitting, HSE risk assessment, contractor management and project camp management. Safety audits of all CNG stations were also conducted.

Exhibit 8.3: Pattern of Shareholding in the SSGCL

Categories of Shareholders	Number of Shareholder	Number of Shares Held	Percert Shareholdin
National Investment Trust (NIT) and Investment Corporation of Pakistan (ICP)	2	33,405,641	5.0
Directors, MD, and their spouses and minor children	2	79,120	0.0
Executives	26	84,309	0.0
Banks, development finance institutions, etc.	306	98,543,435	14.7
GoP	1	405,600,190	60.4
Individuals	36,673	130,451,136	19.4
Others	29	3,010,500	0.4
Total	**37,039**	**671,174,331**	**100.0**

Source: SSGCL Annual Report, 2004.

Mari Gas Company Limited

The MGCL is the sole owner and operator of the Mari gas field located at Daharki in the Ghotki district of Sindh. The MGCL sells medium-BTU gas to power and fertilizer plants in the region.

Esso Eastern Incorporated discovered the field in 1957 and the field was first developed in 1965. Esso Eastern operated the Mari Gas field as a joint venture, consisting of the Pak Stanvac Petroleum Project and the Government of Pakistan, until 1982 when it sold its interest in the venture to the Fauji Foundation. Fauji Foundation managed the field in a joint venture with the GoP till December 22, 1985. Under an agreement signed by Fauji Foundation, the GoP and the OGDCL, the Mari Gas Company was incorporated on December 4, 1984 as an unlisted public limited company. The shares of the company were held by Fauji Foundation, the GoP and the OGDCL in the ratio of 40:40:20, respectively. The company took over the assets and liabilities of the joint venture and commenced business under its own name on December 23, 1985. The GoP divested 50% of its shareholding in favour of the general public in 1994. Since then, Mari Gas has been listed on all the three stock exchanges of Pakistan. The category-wise current shareholding pattern is given in Exhibit 8.4.

The company holds the license for sale of gas to Engro Chemical Pakistan Limited, Fauji Fertilizer Company Limited, and the CPC and provided uninterrupted gas supply to all of its customers during the last year. The cumulative gas sales to these customers during FY 2004 were 435 MMscfd, compared to 428 MMscfd during FY 2003.

Exhibit 8.4: Pattern of Shareholding in the MGCL

Categories of Shareholders	Number of Shareholder	Number of Shares Held	Percert Shareholdin
National Investment Trust (NIT) and Investment Corporation of Pakistan (ICP)	4	3,151,350	8.6
Directors, MD, and their spouses and minor children	1	500	0.0
Executives	13	32,225	0.1
Banks, development finance institutions, etc.	15	1,101,025	3.0
Joint stock companies	44	272,207	0.7
Individuals	2,065	2,781,093	7.6
Shareholders with ten percent or more voting interest in the company	3	29,400,000	80.0
Others	5	11,600	0.0
Total	**2,150**	**36,750,000**	**100.0**

Source: MGCL Annual Report, 2004.

Pakistan Petroleum Limited

PPL was incorporated on June 5, 1950, whereby the company inherited the assets and liabilities of the Burmah Oil Company (BOC), and commenced operations on July 1, 1952. At the time of incorporation, BOC held a majority stake of 70%, with the GoP accounting for 29.4% and the balance held by private Pakistani shareholders. The BOC divested 6.09% of its shares to the International Finance Corporation (IFC) in 1982 and sold the remaining shareholding to the GoP in 1997. In July 2004, the GoP successfully concluded a 15% offer for the sale and initial public offering (IPO) of the company on the domestic stock exchanges at PKR 55 per share. The basic issue was for 10% shares with a green-shoe option of another 5%, and the entire issue was oversubscribed 3.7 times over. The details of the shareholding are given in Exhibit 8.5.

PPL operates a number of major oil and gas fields, including Sui, Kandhkot and Adhi, while its non-operated portfolio includes interests in the Qadirpur, Miano and Sawan fields. The company's exploration portfolio includes operated and non-operated joint ventures in ten onshore and two offshore blocks.

As part of the privatization program, the GoP has replaced PPL's 1982 Gas Price Agreement (GPA) with the 2002 GPA, pursuant to which the wellhead price of the Sui and Kandhkot fields will be determined by formulae based on the Petroleum Policy, 2001. The 2002 GPA allows for Sui and Kandhkot gas prices to be raised to 50% of the discount level of the price offered by the 2001 Petroleum Policy under a phased program over a period of five years, beginning July 1, 2002.

The company holds a licenses for the sale of natural gas at the field gate of Kandhkot gas field to the CPC. CPC itself transmit gas from the field gate of Kandhkot gas field to its plant through its own pipeline. The company sold 101 MMscfd gas to the CPC during FY 2004.

Exhibit 8.5: Pattern of Shareholding in the PPL

Categories of Shareholders	Number of Shareholder	Number of Shares Held	Percert Shareholdin
Joint stock companies	3	13,647	0.0
International Finance Corporation	1	41,758,167	6.1
GoP	1	640,213,985	93.9
Administrator of Abondoned Properties	1	83,725	0.0
Individuals	930	3,752,019	0.6
Others	2	30	0.0
Total	**938**	**682,069,524**	**100.0**

Source: PPL Annual Report, 2004.

Oil and Gas Development Company Limited

The OGDCL was created under an ordinance in 1961 to undertake a comprehensive exploratory program and promote Pakistan's oil and gas prospects.

In 1997, it was converted into a public limited company under the Companies Ordinance 1984. The OGDCL's shareholding pattern is shown in Exhibit 8.6.

The GoP off-loaded a portion of its equity, equivalent to 5% of the paid-up capital of the company, through an IPO in October 2003. The company is now listed on all three of the country's stock exchanges.

The OGDCL now holds the fifth-largest gas reserves among E&P companies and the largest share of oil and gas reserves in the country, i.e., 48% of total oil and 35% of total gas reserves.

The company also operates nine oil and gas processing plants, including a mini-refinery, sulfur recovery plant and LPG plants. In addition, the company has also established the Oil and Gas Training Institute, the first of its kind in Pakistan.

The company holds the licenses for the sale of gas from the Nandpur and Panjpir gas fields to the FKPCL, from the Uch gas field to Uch Power and from the Bhal Syedan gas field to Altern Energy power plant. The company sold 217 MMscfd gas to these consumers during FY 2004.

Exhibit 8.6: Pattern of Shareholding in the OGDCL

Categories of Shareholders	Number of Shareholder	Number of Shares Held	Percert Shareholdin
Investment companies	29	24,646,648	0.6
Modarabas and mutual funds	91	54,544,922	1.3
Joint stock companies	264	28,951,565	0.7
Foreign investors	20	4,343,432	0.1
Government of Pakistan	1	4,086,849,712	95.0
Cooperative societies	2	7,203	0.0
Charitable trusts	27	1,807,600	0.0
Individuals	33,817	91,412,012	2.1
Others	133	8,365,306	0.2
Total	**34,384**	**4,300,928,400**	**100.0**

Source: OGDCL Annual Report, 2004.

8.1.2 Financial Performance

Key financial indicators of the gas sector companies involved in the T&D business are discussed bellow.

Sui Northern Gas Pipelines Limited

The SNGPL made almost Rs 2.2 billion in profit after taxation in FY 2004. The company also paid almost Rs 1.3 billion in corporate taxes to the Government. Details related to the financial performance of SNGPL are given in Exhibit 8.7 and Exhibit 8.8 . The ratio of current assets less inventories to liabilities for SNGPL for FY 2004 was 1.3, indicating that it has sufficient current assets to meet its short-term obligations. In addition, the return on equity, measuring profitability during the year, was about 24% for FY 2004. The fixed asset turnover ratio, which measures efficiency of the fixed assets, was 1.7.

Exhibit 8.7: Income Statement Indicators of SNGPL

Indicator	Rs Million
Sales revenue	64,276
GDS	70
Cost of gas	52,627
Corporate tax	1,366
Profit after taxes	2,297
Earnings per share (Rs)	4.60

Source: SNGPL Annual Report, 2004.

Exhibit 8.8: Balance Sheet Indicators of SNGPL

Indicator	Rs Million
Issued and paid up capital	4,991
Fixed capital expenditures	36,935
Current assets	19,753
Current liablities	16,178

Source: SNGPL Annual Report, 2004.

Sui Southern Gas Company

The SSGCL showed an annual profit after tax of almost Rs 996 million in FY 2004. In addition, the company paid almost Rs 575 million as corporate tax to the GoP. With a asset-to-liability ratio of 1.2, the company is sound in terms of meeting its current liabilities. The company also showed a healthy return on shareholders' equity of about 10%. In terms of efficiency, the company reported a fixed asset turnover ratio of 2.8, about 64% higher than that reported by the SNGPL. Relevant income statement and balance sheet indicators are shown in Exhibit 8.9 and Exhibit 8.10**,** respectively.

Exhibit 8.9: Income Statement Indicators of SSGCL

Indicator	Rs Million
Sales revenue	54,444
GDS	2,555
Cost of gas	38,713
Corporate tax	575
Profit after taxes	996
Earnings per share (Rs)	1.49

Source: SSGCL Annual Report, 2004.

Exhibit 8.10: Balance Sheet Indicators of SSGCL

Indicator	Rs Million
Issued and paid up capital	6,711
Fixed capital expenditures	17,496
Current assets	13,995
Current liablities	11,254

Source: SSGCL Annual Report, 2004.

Mari Gas Company Limited

MGCL is primarily an exploration and production company and its downstream activities are restricted only to direct sales of gas to a number of fertilizers and power plants in the independent system. The gas transmission pipelines between MGCL's production facilities and its customers are owned by the respective customers. However, the annual financial data of MGCL are presented here on account of its gas sales to the largest independent system in the country.

MGCL showed an annual profit after tax of almost Rs 568 million in FY 2004. The company paid almost Rs 368 million in corporate taxes to the GoP. MGCL has an asset-liability ratio of 1.3, showing the company to be adequately placed in terms of meeting its current liabilities. The company showed a return on shareholders' equity of 24% in FY 2004.

Relevant income statement and balance sheet indicators are shown in Exhibit 8.11 and Exhibit 8.12, respectively

Exhibit 8.11: Income Statement Indicators of MGCL

Indicator	Rs Million
Sales revenue	14,089
Corporate tax	368
Profit after taxes	568
Earnings per share (Rs)	14.14

Source: MGCL Annual Report, 2004.

Exhibit 8.12: Balance Sheet Indicators of MGCL

Indicator	Rs Million
Issued and paid up capital	367.5
Fixed Capital Expenditures	3,731
Current Assets	7,058
Current Liablities	2,435

Source: MGCL Annual Report, 2004.

8.1.3 Customer Addition to the Gas Network in Various Categories

The total number of new gas connections provided to the residential, commercial and industrial sectors, and the cumulative number of consumers on the gas network in the SNGPL and SSGCL systems during FY2004, are shown in Exhibit 8.13 and Exhibit 8.14, respectively.

Exhibit 8.13 : Summary of New Gas Connections Provided During FY 2004

Sector	SNGPL		SSGCL		Total Country
	Punjab	*NWFP*	*Sindh*	*Balochistan*	
Industrial	224	54	254	1	533
Commercial	2,420	356	1,163	81	4,020
Residentail	110,222	18,408	59,421	7,643	195,694
Total	**112,866**	**18,818**	**60,838**	**7,725**	**200,247**

Source: SNGPL Monthly Report, June 2004, and SSGCL Activity Report, June 2004.

Exhibit 8.14 : Summary of Total Consumers FY 2004

Sector	SNGPL		SSGCL		Total Country
	Punjab	*NWFP*	*Sindh*	*Balochistan*	
Industrial	2,588	293	2,592	44	5,517
Commercial	31,973	6,869	16,596	1,480	56,918
Residentail	2,030,501	275,097	1,560,309	135,201	4,001,108
Total	**2,065,062**	**282,259**	**1,579,497**	**136,725**	**4,063,543**

Source: SNGPL Monthly Report, June 2004, and SSGCL Activity Report, June 2004.

8.2 Consumption of Natural Gas

The historical annual compound growth rate (ACGR) of gas consumption and the contribution of each sector to total gas consumption in the country from FY 1995 to FY 2004 are shown in Exhibit 8.15 and Exhibit 8.16, respectively.

The overall gas consumption in the country in the period from FY 2000 to FY 2004 has registered an ACGR equal to 10.0%, as opposed to 3.7% in the period from FY1995 to FY 1999. The power, general industry and transport sectors have mainly contributed to this growth with an ACGR of 18.4%, 9.3% and 67.4%, respectively.

Historically the power and general industry sectors have been receiving gas on a low priority basis. However, ever since the induction of new gas fields such as Qadirpur, Sawan, Miano, Bhit and Zamzama into the national gas grid, gas supply to these sectors has been improved significantly. The power sector's share in total gas consumption in the country has increased substantially from 33% in FY 1995 to 44% in FY 2004, mainly because of the substitution of fuel oil with natural gas in the major power plants of Bin Qasim, Muzaffargarh, Rousch and Jamshoro and the Kot Addu power stations.

The transport sector, although showing a very high growth rate of 67.4%, has a small share of 2% in the country's total gas consumption. The cement sector showed a decline in consumption during the FY 2000 to FY 2004 period as the cement industry shifted to coal-fired technology. The fertilizer sector's share in gas consumption also decreased during the FY 2000 to FY 2004 period.

Gas consumption in the residential sector increases considerably during the winter months of December and January, but the unconstrained requirements of other sectors remain stable over the year. To meet the increased demand from the residential sector, the utilities have had to cut gas supplies to power, industrial and fertilizer plants during the winter months.

Exhibit 8.15 : Annual Compound Growth Rate in Gas Consumption (Total Country)

Sector	ACGR	
	FY 94-95 to FY 98-99 %	FY 94-95 to FY 03-04 %
Residential	6.0	4.2
Commercial	6.6	3.0
General industry	4.3	9.3
Fertilizer	4.7	1.4
Cement	4.2	(2.3)
Power	0.6	18.4
Transport	–	67.4
Total Country	**3.7**	**10.0**

Source: SNGPL, SSGCL, and E&P companies.

Exhibit 8.16 : Percentage Share of Sectors in Overall Gas Consumption (Total Country)

Sector	Percentage Share			
	FY 1994-95 %	*FY 1998-99 %*	*FY 1999-00 %*	*FY 2004 %*
Residential	19	21	20	15
Commercial	3	3	3	2
General industry	20	21	21	18
Fertilizer	23	24	23	18
Cement	1	1	1	1
Power	33	29	31	44
Transport	0	0	0	2
Total Country	**100**	**100**	**100**	**100**

Source: SNGPL, SSGCL, and E&P companies.

The share of each province in the total gas consumed in the country during FY 2004 is shown graphically in Exhibit 8.17 and is tabulated in Exhibit 8.18. The Punjab is the largest consumer of gas, followed by Sindh, with shares of 50% and 40%, respectively.

Exhibit 8.17:
Province-wise Gas Consumption, FY 2004

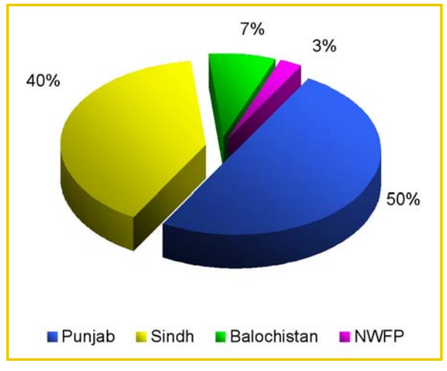


Exhibit 8.18: Table of Province-wise Gas Consumption, FY 2004

Province	Annual Average Daily Consumptio MMscfd	Annual Average Consumptio MMscfd
Punjab	1,436	524,200
Sindh	1,156	422,042
Balochistan	214	77,959
NWFP	74	27,086
Total Country	**2,880**	**1,051,286**

Source: SNGPL, SSGCL, and E&P companies.

Sector-wise annual average gas consumption in the country, broken down into the SNGPL, SSGCL and independent systems, is tabulated in Exbhiti 8.19. The share of each sector inExbhit 8.20 the total gas consumption in the country, the SNGPL and the SSGCL is shown graphically in Exbhit 8.21, and Exbhit 8.22, respectively.

Consistent with the trends observed in total countrywide gas consumption, the power sector contributed the most to the gas consumption in both the systems, followed by the general industry and residential sectors.

Exhibit 8.19: Table of Province-wise Sectoral Gas Consumption, FY 2004

MMSCFD

Sector	SNGPL System	SSGCL System	Independent System	Total Country
Residential	276	150		**426**
Commercial	47	20		**66**
General industry	286	246		**532**
Fertilizer	120	62	327	**437**
Cement	11	11		**296**
Power	465	373	443	**841**
Transport	35	9		**44**
Subtotal	**1,239**	**871**	**770**[a]	**2,880**
Own use and T&D losses	136	70		**206**
Total Gas Consumption	**1,375**	**941**	**770**	**3,084**

a Supply figures at field quality.

Source: SNGPL, SSGCL and E&P companies.

Exhibit 8.20:
Total Sectoral Gas Consumption, FY 2004

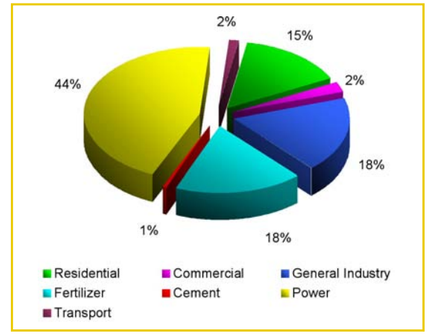


Exhibit 8.21:

SNGPL Sectoral Gas Consumption, FY 2004

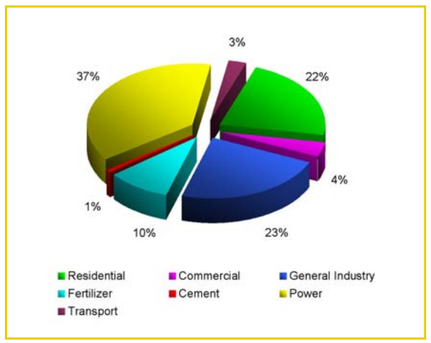
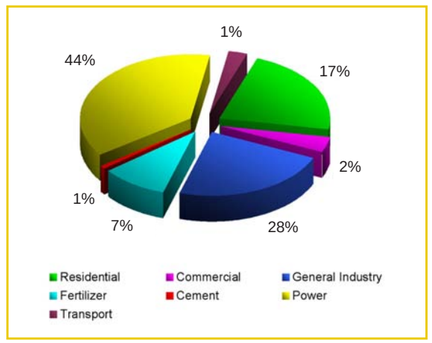


Exhibit 8.22:

SSGCL Sectoral Gas Consumption, FY 2004



8.3 Gas Production

In recent years, the production of natural gas in Pakistan has been increasing rapidly and a significant amount of gas reserves, totaling about 10 Tcf, have been added to the system during the last decade.

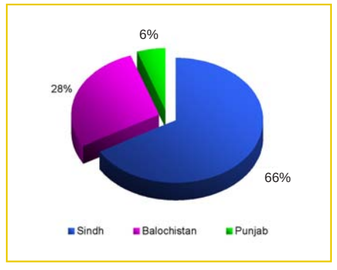
During the past five years, Sui, Qadirpur, Badin, Mari and the northern fields have contributed the most to gas production. Historically the Sui gas field has been one of the country's major producers and had remained central to gas supplies and infrastructure developments. However, sizeable gas discoveries like Qadirpur, Miano, Sawan, Bhit and Zamzama, with total production in the range of about 1 billion cubic feet per day (Bcfd), have changed the overall gas supply scenario in the country and have shifted the attention of gas utilities from the Sui field to the newly discovered gas fields in the south.

Gas production from Bhit, Sawan Phase-I and Zamzama Phase-I commenced in FY 2003, while production from Sawan Phase-II and the Khipro Block started in the second quarter of FY 2004. In addition, a number of newly discovered gas fields are expected to be integrated into the SNGPL and SSGCL systems during the period FY 2005 to FY 2008.

Province-wise gas production in the country during FY 2004 is shown graphically in Exhibit 8.23 and is tabulated in Exhibit 8.24. In contrast to the provincial shares in total gas consumption, most of the gas production in the country came from Sindh, followed by Balochistan. The Punjab, which is the country's biggest consumer of gas, has only a 5% share in the total gas production in the country. New fields have been discovered at Chanda and Gurguri in NWFP, production of gas from these fields will be started in second quarter of FY 2003-04. Actual sales gas supplied[4] by different fields supplying gas to the SNGPL, the SSGCL and independent gas networks during FY 2004 is given in Exhibit 8.25.

Exhibit 8.23:

Province-wise Gas Production, FY 2004



Source: SNGPL, SSGCL, and E&P companies

[4] 'Sales gas' represents processed gas only, supplied to utilities by the gas field.

Exhibit 8.24: Province-wise Gas Production, FY 2004 (Field Quality)

Gas Field	Calorific Value Btu/scf	Daily Supply MMscfd	Annual Supply MMscf
Balochistan			
Sui	950	609	222,285
Pirkoh and Loti	895/842	85	31,025
Uch	425	172	62,780
Sub total, Balochistan		**866**	**316,090**
Sindh			
Qadirpur	880	320	116,800
Zamzama	812	246	55,115
Sawan	990	242	61,685
Badin	1,063	200	73,000
Kadanwari/Miano	993	177	64,605
Daru	1,168	12	4,380
Bhit	953	252	91,980
Mazarani	1,010	10	3,650
Khipro	950	11	4,015
Mari	740	435	158,775
Kandhkot	835	101	36,865
Sara/Suri and Sara/Suri Deep	810	15	5,475
Hasan (Block 22)	708	16	5,824
Sub total, Sindh		**2,037**	**737,665**
Punjab			
Dhodak	1,019	38	13,870
Northern Fields	1,100	99	36,172
Nandpur/Panjpir	227	47	17,155
Sub total, Punjab		**184**	**73,021**
Total Country		**3,086**	**1,126,776**

Source: SNGPL, SSGCL, and E&P companies.

Exhibit 8.25: Company wise Gas Supplies FY 2004 (Field Quality)

Gas Field	Calorific Value Btu/scf	Daily Supply MMscfd	Annual Supply MMscf
SNGPL			
Sui	950	497	181,405
Pirkoh and Loti	895/842	85	31,025
Dhodak	1,019	38	13,870
Qadirpur	880	320	116,770
Northern Fields	1,100	99	36,172
Hasan (Block 22)	708	16	5,824
Zamzama	812	151	55,115
Sawan	990	169	61,633
Sub total, SNGPL		**1,375**	**501,814**
SSGCL			
Sui	950	112	40,880
Badin	1,063	200	72,981
Sawan	990	73	26,645
Kadanwari/Miano	993	177	64,426
Daru	1,168	12	4,380
Bhit	953	252	91,980
Zamzama	812	95	34,806
Mazarani	1,010	10	3,650
Khipro	950	11	4,122
Sub total, SSGCL		**941**	**343,869**
Independent System			
Mari	740	435	158,775
Uch	425	172	62,780
Kandhkot	835	101	36,865
Sara/Suri and Sara/Suri Deep	810	15	5,475
Nandpur/Panjpir	227	47	17,155
Sub total, Independent		**770**	**281,050**
Total Country		**3,086**	**1,126,776**

Source: SNGPL, SSGCL, and E&P companies.

8.4 Gas Infrastructure

This section briefly discusses the main features of the transmission networks, the total capacities and current utilization of the critical segments of the network, and major network augmentations undertaken by the SNGPL, the SSGCL, and OGDCL in FY2004.

8.4.1 SNGPL Infrastructure

The bulk of the supply to the SNGPL system comes from the fields in Sindh and Balochistan. This is introduced into the network at its southern end and then transmitted to the northern markets. In addition, there are many small gas fields in the Potwar region of the Punjab and NWFP that feed into the SNGPL network. The SNGPL transmission network extends from the Pirkoh gas field to Peshawar and can be divided into the following main legs:

- Leg A (Sui-Faisalabad)
- Leg B (Faisalabad-Jhelum)
- Leg C (Faisalabad-Nowshera)
- Leg V (Nowshera-Peshawar)
- Leg K (Nowshera-Saidu Sharif)
- Leg N (Multan-Sahiwal-Lahore)
- Leg E (Adhi-Galli Jagir)
- Leg J (Galli Jagir-Dhulian)
- Leg F (Dhulian-Daudkhel)

A schematic map of the SNGPL transmission system is shown in Exhibit 8.26. Since the incorporation of the SNGPL in 1963, the transmission network of the company has grown to a total length of 5,763 km. During FY 2004, the SNGPL laid down 295 km of new transmission pipelines under their expansion plan (Project VIII) and brought 290 km of decommissioned pipeline segments back online. In addition, a number of compressors were also relocated amongst the compressor stations in FY 2004 for optimal operation of the system following pipeline augmentations. Details of pipeline augmentations undertaken in FY 2004 are shown in Exhibit 8.27. Project VIII is still under implementation and its completion is scheduled for December 2005. A total of 506 km of additional pipeline will be laid down and 344 km of decommissioned segments will be uplifted under this project, as per projections of the SNGPL.

The major segments of the SNGPL transmission network are listed in Exhibit 8.28, along with their current capacity utilization. The current configuration of the SNGPL's compressor stations, as of September 2004, is indicated in Exhibit 8.29.

Exhibit 8.26 Oil and Gas Transmission System in Northern Pakistan

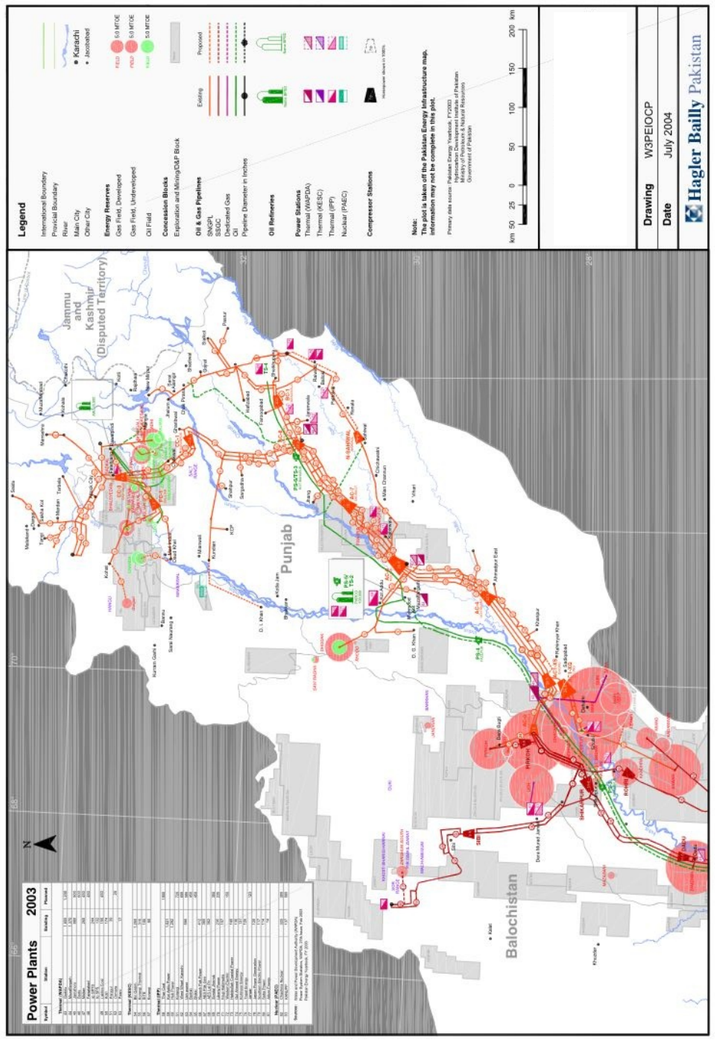


Exhibit 8.27: SNGPL Transmission System Augmentation in FY2004

Activity	Location	Description
Pipeline Additions		
AC1X-AV7 Line	Downstream Bhong	36-inch diameter, 26.52 km long
A6-AV22 Line	Upstream Kot Addu offtake	36-inch diameter, 27.80 km long
Sidhnai crossing (Ravi)-AC7 line	Downstream Sidhnai crossing (Ravi)	36-inch diameter, 33.26 km long
Khurianwala-Jaranwala		8-inch diameter, 22.57 km long
Sahiwal-MP55 Line	Downstream Sahiwal	16-inch diameter, 88 km long
MP55- Lahore Line		16-inch diameter, 55 km long
Shakardara-Daudkhel Line	Upstream Lahore	10-inch diameter, 42 km long
Pipeline Decommissioning		
AV22-AC6	Upstream Multan	18-inch diameter, 27.36 km long
AV29-AV31	Multan-Sidhnai crossing (Ravi)	2 lines of 16-inch diameter, 95 km in all
Sidhnai crossing (Ravi)-AC7	Downstream Sidhnai crossing (Ravi)	2 lines of 16-inch diameter, 64 km in all
A38-AV40	Downstream AC7	2 lines of 16-inch diameter, 105 km in all

Source: SNGPL Project VIII Plan.

Exhibit 8.28: Capacity Utilization of Major Segments of SNGPL Transmission System

Transmission Network Segment	Segment Length km	Pipeline Diameter Inch	Pipeline Diameter Inch	Capacity Utilization[d]
Leg A (Sui-Faisalabad)				
Sui-Bhong	84	18,24,30	795[a]	90%
Bhong-Multan	267	18,30,36	1,490[a]	82%
Multan-Faisalabad	233	16,18,24,30,36	875[a]	93%
Leg B (Faisalabad-Jhelum)				
Faisalabad-Lahore	119	16	300[a]	80%
Lahore-Jhelum	166	8,10,18	195[b]	84%
Legs C & V (Faisalabad-Peshawar)				
Faisalabad-Gali Jagir	266	10,12,16,30	280[a]	85%
Gali Jagir-Peshawar	169	8,10,16	390[b]	46%
Leg N (Multan-Lahore)				
Multan-Sahiwal-Lahore	290	16,18,24	244[c]	90%

a Source: SNGPL.
b HBP estimates based on system hydraulic simulations.
c HBP estimates, capacity without the planned intermediate Sahiwal Compressor Station.
d Based on January 2004 average flow; source SNGPL.

Exhibit 8.29: Compressor Stations in the SNGPL Transmission System

Compressor Station	Location	Installed Units Number	Total Installed Power bhpa
AC0	Sui Field	3	13,500
AC1XS	Bhong	5	26,340
AC1XQ	Bhong	6	29,620
AC4	Uch Sharif	7	28,500
AC6	Multan	6	26,620
AC7	Shorkot	4	16,000
AC8	Faisalabad	10	22,320
BC1	Mananwala	6	6,000
CC1	Haranpur	7	7,000
CC3	Galli Jagir	7	7,000
CC4[b]	Kamra	3	3,000
FC1	Dhullian	3	3,000
Total			**185,900**

[a] bhp: Brake horsepower.
[b] Currently inactive. Units to be shifted at Sahiwal Compressor Station.

Source: SNGPL Project VIII Plan.

In FY 2003, a 36-inch diameter loop line was laid from Bhong to Multan, the section that bears the maxmum flow in the system. Two remaining loops were completed in FY 2004. A new 16-inch diameter, 143-km long loop line was laid and commissioned from Sahiwal to Lahore in Leg N. The installation of a new compressor station at Sahiwal is also planned for the future. Seven compressors totaling 7,700 bhp capacity will be relocated from the AC8 compressor stations at Faisalabad and CC4 compressor station at Kamra to Sahiwal for this purpose. The augmented Leg N will relieve the Mulatan-Faisalabad-Lahore section of Leg A, from which additional gas flow will be diverted into Leg N.

Looping with a 24-inch diameter pipeline is planned at different sections of the Faisalabad-Lahore section in the year 2005, which is currently running at almost full capacity. With the expected commissioning of the Gurguri gas field in the Kohat district of the NWFP in early 2005, an additional gas supply of about 40 MMscfd into the system will release an equivalent amount of capacity in Leg C.

Note: The above information about infrastructure is based solely on the gas utility's plan of action and its inclusion in this report has no bearing whatever on OGRA's decisions about inclusion of planned assets after completion in the rate base.

Annual Report 2003-04 Natural Gas Sector

8.4.2 SSGCL Infrastructure

A schematic map of the SSGCL transmission system is shown in Exhibit 8.30. The SSGCL transmission network consists of the following three main legs:

- A 16-inch diameter pipeline from Sui to Karachi along the left bank of the Indus River, hence called the Indus Left Bank Pipeline (ILBP)
- An 18-inch and a 20-inch diameter pipeline from Sui to Karachi along the right bank of the Indus River, hence called the Indus Right Bank Pipeline (IRBP)
- A 24-inch diameter pipeline from Kadanwari to Nawabshah and a 20-inch diameter pipeline from Hyderabad to Karachi, collectively called the Kadanwari Pipeline.

The total length of the SSGCL transmission network currently stands at 2,980 km. There was no significant pipeline addition in the SSGCL transmission system in FY 2004. A compressor station was installed at Hyderabad to cater for increased flow in the Kadanwari Pipeline from the Sawan and Miano Gas Fields. The rehabilitation of the 16 inch ILBP includes the replacement of undersized valve assemblies and low-pressure pipeline segments. The rehabilitation is expected to finish by the end of December 2004, after which the ILBP's capacity is expected to increase to about 100 MMscfd. The main segments of the SSGCL transmission network and their current capacity utilization are shown in Exhibit 8.31 while their compressor stations are listed in Exhibit 8.32.

Spare capacity was available in the Sui-Dadu section of the IRBP as the share of gas from Sui to the SSGCL was reduced and diverted to the SNGPL under the GoP's new gas allocation scheme which is being utilized through reverse flow of Zamzama gas from Dadu to Sui, for SNGPL. The current flow of gas from Sui to the SSGCL mainly caters to the Quetta, Shikarpur and Dadu region. The Dadu-Karachi segment of the IRBP, the Nawabshah-Karachi segment of the ILBP and the Kadanwari Pipeline are currently under capacity. With the recent finalization of the Zamzama Phase-II gas sales agreement with the SSGCL, a 24 inch diameter pipeline from Bajara to Karachi in the IRBP is being planned that will transmit the full potential supply from the Zamzama Phase-I, Zamzama Phase-II and Bhit gas fields to Karachi. Similarly, a 24-inch diameter pipeline from Hyderabad to Karachi is being designed to cater for the transmission of gas from new discoveries like Naimat and Sinjhoro along the ILBP.

Exhibit 8.30: Oil and Gas Transmission System in Northern Pakistan

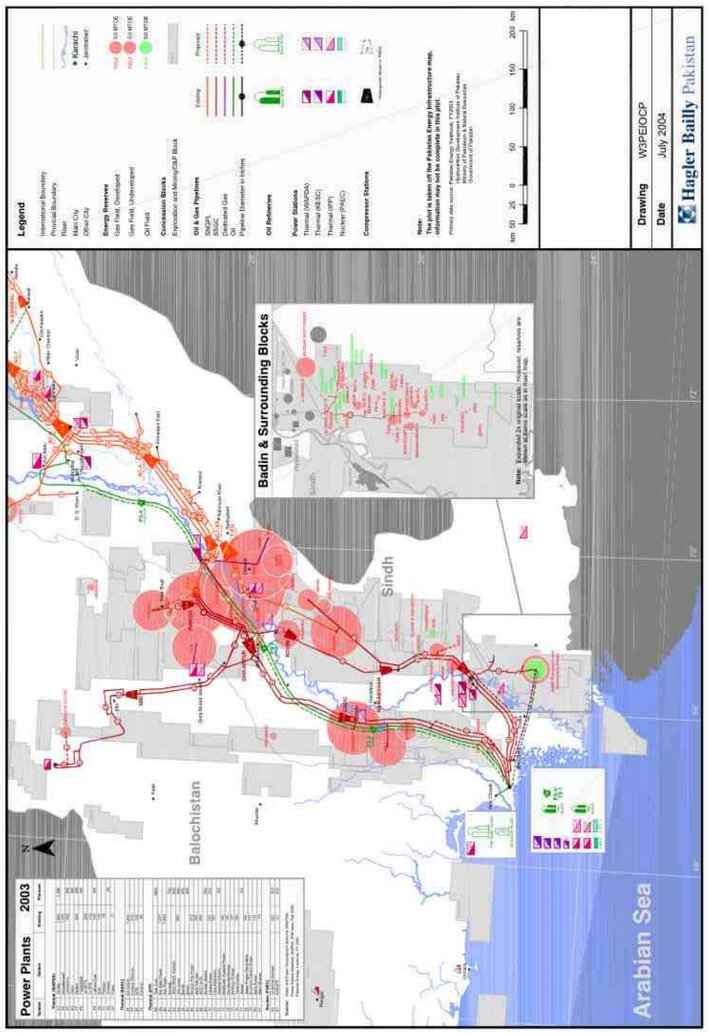


Exhibit 8.31: Capacity Utilization of the Major Segments of the SSGCL Transmission System

Transmission Network Segment	Segment Length km	Pipeline Diameter Inch	Flow Capacity MMscfd	Capacity Utilization[d]
IRBP				
Sui-Shikarpur	97	18	130[b]	85%
Shikarpur-Dadu	170	18	170	25%
Dadu-Karachi	272	18,20	400	99%
Dadu-SNGPL (Zamzama northward)	266	20	180[c]	75%
ILBP				
Nawabshah-Karachi	260	16	75	98%
Nawabshah-Sukkur-SNGPL (northward flow)	270	16	40	32%
Kadanwari Pipeline				
Kadanwari-Nawabshah	150	24	290	88%
Nawabshah-Hyderabad	132	20	205[d]	92%
Hyderabad-Karachi	151	20	220[e]	80%
Badin-Hyderabad Pipeline	100	18	210	75%
Quetta Pipeline	306	12,18	90	86%

a Based on January 2004 average flow.
b Based at supply pressure of 950 psig from Sui.
c Based on intermediate compression at Shikarpur and delivery pressure of 750 psig to SNGPL.
d Based on a delivery pressure of 650 psig at Hyderabad.
e Based on an inlet pressure of 975 psig at Hyderabad and delivery at 450 psig at Bin Qasim.

Source: HBP estimates based on system hydraulic simulations and verified by SSGCL.

Exhibit 8.32: Compressor Stations in the SSGCL Transmission System

Compressor Station Location	Installed Units Number	Total Installed Power bhp[a]
Active		
Sibi		
Hyderabad	3	27,700
Shikarpur	2	9,800
Dadu	2	9,800
Pirkoh	2	9,800
Inactive		
Rohri	4	4,400
Nawabshah	4	4,400
Total		65,900

a bhp: Brake horsepower.
Source: SSGCL.

8.4.3 Independent Pipeline Transmission Systems

As mentioned earlier, number of natural gas customers in the country are supplied with gas through independent and dedicated pipelines. These customers include fertilizer plants as well as power plants and, in general, are connected to fields with low gas quality, i.e., of high nitrogen content and low calorific value. Details of such pipelines connecting the gas fields to their respective consumers are given in Exhibit 8.33.

Exhibit 8.33: Independent Transmission Pipelines

Pipeline Operator	Source and Destination	Pipeline Diameter Inch	Length Km
FFC	Mari-Fauji Fertilzer 1	16	45
FFC	Mari-Fauji Fertilizer 2	14	45
FFC	Mari-Fauji Fertilzer Mirpur Mathelo	16	15
ECPL	Mari-Engro Chemical 1	10	10
ECPL	Mari-Engro Chemical 2	12	10
CPC	Mari-Guddu Thermal Power Station	20	60
CPC	Kandhkot-Guddu Thermal Power Station	16	50
OGDCL	Uch field-Uch Power Plant	26	47
OGDCL	Nandpur Panjpir-FKPCL	12	16
		16	5
Tullow	Sara/Suri Field to WAPDA Pipeline near Mari Well No.6	8	33

Source: Gas producers and consumers.

8.4.4 SNGPL and SSGCL Distribution Mains and Service Lines

The two main utility companies provide gas to their residential, commercial and industrial customers through their distribution networks. The distribution network of each area or city takes gas at high pressure from the transmission network and disburses it to all the customers in the area through its distribution mains and service lines. Every year, the utilities extend their network to new locations to service a growing customer base. In the last year, the SNGPL extended its distribution network by 7% to a cumulative total length of 38,258 km. Similarly, in the last year, the SSGCL extended its distribution network by 4% to a cumulative total length of 24,339 km. Exhibit 8.34 shows the region-wise breakdown of the SNGPL and SSGCL distribution networks as of June 2004.

Exhibit 8.34: Capacity Utilization of the Major Segments of the SSGCL Transmission System

SNGPL		SSGCL	
Region	**Length Km**	**Region**	**Length Km**
Punjab		**Sindh**	
Multan	4,301	Karachi	11,422
Bahawalpur	1,047	Hyderabad	4,011
Faisalabad	5,041	Nawabshah	1,362
Lahore	10,047	Sukkur	1,703
Gujranwala	4,588	Larkana	1,732
Islamabad	7,519		
Subtotal, Punjab	**32,543**	**Subtotal, Sindh**	**20,230**
NWFP		**Balochistan**	
Peshawar	4,535	Quetta	4,109
Abbottabad	1,180		
Subtotal, NWFP	**5,715**	**Subtotal, Balochistan**	**4,109**
Total SNGPL Distribution Network	**38,258**	**Total SSGCL Distribution Network**	**24,339**

Source: SNGPL and SSGCL.

8.5 Consumer Gas Pricing

The government fixes consumer gas prices and maintains them at a uniform level throughout the country. The two utilities, SNGPL and SSGCL, supplying gas to consumers in their operational areas are not required to maintain or provide a breakdown of costs of service delivery for different segments of the transmission and distribution system or for supplying gas to different consumer categories. The cost of supplying gas to customers at various locations is not accounted for and, regardless of the difference in cost due to location, all consumers within the same category pay a uniform price. Gas tariffs and the prescribed prices determined by the OGRA for the SNGPL and SSGCL for various consumer segments for FY 2004 are given in Exhibit 8.35.

The consumer price of natural gas in Pakistan comprises (a) the prescribed price for the gas companies and (b) a Gas Development Surcharge (GDS). OGRA fixes the 'prescribed price' for the gas utilities through public hearings where relevant stakeholders are consulted.The prescribed price includes the following elements:

- Producer gas prices, which are linked with international prices of crude oil and HSFO
- Excise duty
- Transmission and distribution costs
- Depreciation
- Minimum return to the gas companies as stipulated in the World Bank/ADB loan covenants

The prescribed price is designed to enable the two T&D companies to achieve fixed returns on assets; the difference between consumer tariffs and prescribed prices is the GDS.

The federal government determines the consumer prices after adding or subtracting GDS to the prescribed prices, and advises OGRA for notification in the Official Gazette of Pakistan.

Annual Report 2003-04 Natural Gas Sector

Exhibit 8.35: Consumer Gas Tariff Breakup, FY 2004

Consumer Category	Prescribed Prices		Consumer Prices
	SNGPL Rs/MMBtu	SSGCL Rs/MMBtu	July 2003 Rs/MMBtu
A. Residential (cubic meters per month**)**			
First Slab	69.31	69.31	69.31
Second Slab	104.42	104.42	104.42
Third Slab	167.06	167.06	167.06
Fourth Slab	217.32	217.32	217.32
Bulk Meters	104.42	104.42	104.42
Minimum Monthly Charges (Rs)	_	_	351.52
B. Commercial/Ice factories	193.82	163.86	193.82
Minimum Monthly Charges (Rs)	_	_	914.97
C. Industrial			
i. General Industry/Pak Steel	172.26	163.86	172.26
Minimum Monthly Charges (Rs)	_	_	5,808.51
ii. Cement	209.78	161.97	209.78
Minimum Monthly Charges (Rs)	_	_	7,073.66
iii. CNG Stations	172.26	161.97	172.26
Minimum Monthly Charges (Rs)	_	_	5,808.51
D. Fertilizer			
Pak-American Fertilizer Ltd.			
Feed Stock	36.77	_	36.77
Fuel	172.26	_	172.26
Pak-Arab Fertilizer Ltd.			
Feed Stock	67.26	_	67.26
Fuel	172.26	_	172.26
Dawood Hercules Chemicals Ltd.			
Feed Stock	67.26	_	67.26
Fuel	172.26	_	172.26

Continues.....

.....Continued

Consumer Category	Prescribed Prices		Consumer Prices
	SNGPL Rs/MMBtu	SSGCL Rs/MMBtu	July 2003 Rs/MMBtu
Pak-China Fertilizer Ltd./Hazara Phosphate Plant			
Feed Stock	71.38	_	71.38
Fuel	172.26	_	172.26
Minimum Monthly Charges (Rs)	_	_	5,808.51
FFC Jordon Fertilizer			
Feed Stock	_	36.77	36.77
Fuel	_	161.97	172.26
Engro Chemical			
Feed Stock	_	_	13.09 & 66.31
Fuel	_	_	172.26
Fauji Fertilizer Company			
Feed Stock	_	_	66.31
Fuel	_	_	172.26
D. POWER			
WAPDA/ KESC	172.26	161.97	172.26
Minimum Monthly Charges (Rs)	_	_	5,808.51
WAPDA Nishatabad Faisalabad	172.26		
Fixed Monthly Charges (Rs)	390,000	_	172.26
Liberty Power Limited	222.99[a]	_	975,000
Minimum Monthly Charges (Rs)	_	_	235.77[b]
F. Direct Sale To GENCO, Guddu			6,987.65[c]
Kandkot	_	_	166.41
Mari	_	_	161.85

a. Prescribed sale price for the first six months was 235.77
b. Sale price was revised to Rs 226.78 per MMBtu on January 2004
c. Fixed monthly charges were revised to Rs 6,721 per month on January 2004

Annual Report 2003-04 Natural Gas Sector

8.6 Future Outlook for the Gas Sector

The demand for gas has been growing at a rapid rate of nearly 10% during the FY 2000 to FY 2004 period to reach 2.6 Bcfd (950 Btu/scf) in FY 2004. The largest use of gas is 44% in power generation, followed by 18% each in the general industry and fertilizer sectors and 15% in the residential sector. The cement, transport and commercial sectors account for the remaining 5% of the gas consumption in the country.

8.6.1 Natural Gas Demand

FY 2004 was the 'base year' for this study. The base year figures represent the actual consumption and not the demand in the system. Figures for FY 2005 and beyond show unconstrained gas demand projections, assuming fuel substitution and growth in the market.

The following assumptions were used in preparing the forecasts for gas demand:

- GDP was assumed to grow annually at 6.5%.
- Capacity additions for power generation in hydel, coal, nuclear and natural gas were assumed according to the long-term plans of the utilities.
- Gas demand in the residential and commercial sectors was calculated on the basis of the number of new connections that will be added to the SNGPL and SSGCL systems and consumption per customer.
- Gas demand for general industry and the fertilizer and cement sectors was based on their sectoral contributions to the GDP.
- All the existing cement plants connected to the gas network were assumed to continue receiving gas during the study period.
- Gas demand in the transport sector was based on the vehicle conversion rates to CNG and number of vehicles on the road.

Exhibit 8.35 summarizes gas demand projections in the country. A calorific value of 950 Btu/scf was assumed for accounting purposes. The total gas demand was projected to increase from 2,900 MMscfd in FY 2005 to 5,300 MMscfd in FY 2015 and 9,000 MMscfd in FY 2025, an almost threefold increase over 20 years. Total gas demand, including the additional demand resulting from further fuel substitution in the general industry and cement sectors, is also given in Exhibit 8.36.

Exhibit 8.36: Summary of Net Gas Demand[a]

MMSCfd (950 Btu/cft)

Region	*FY04*[b]	*FY05*	*FY06*	*FY07*	*FY08*	*FY09*	*FY10*	*FY11*	*FY12*	*FY13*	*FY14*	*FY15*	*FY16*	*FY17*	*FY18*	*FY19*	*FY20*	*FY21*	*FY22*	*FY23*	*FY24*	*FY25*
SNGPL																						
Residential	276	309	332	356	379	403	428	454	481	509	537	567	597	629	661	694	728	762	798	835	872	911
Commercial	47	51	54	58	62	66	70	74	79	83	88	93	98	103	108	113	119	125	131	137	143	149
Industrial	286	317	341	369	400	436	476	515	557	603	652	704	759	818	880	946	1,017	1,092	1,173	1,258	1,349	1,446
Fertilizer	120	125	135	135	135	135	143	143	240	240	240	242	253	253	253	253	253	253	253	253	253	253
Cement	11	28	30	33	36	39	44	47	52	56	61	66	70	77	82	90	95	102	111	120	130	141
Power	465	576	585	591	588	565	629	576	613	661	706	686	689	682	683	1,029	1,161	1,291	1,479	1,454	1,587	1,751
Transport	35	42	47	54	61	69	78	88	98	110	124	139	156	175	197	221	248	278	312	350	392	439
Subtotal, SNGPL	**1,239**	**1,447**	**1,525**	**1,596**	**1,661**	**1,713**	**1,868**	**1,897**	**2,119**	**2,262**	**2,408**	**2,496**	**2,622**	**2,737**	**2,865**	**3,347**	**3,621**	**3,905**	**4,256**	**4,406**	**4,726**	**5,089**
SSGCL																						
Residential	150	157	162	168	174	180	187	193	200	207	215	223	231	239	247	256	265	275	284	294	304	315
Commercial	20	20	21	22	23	23	24	25	26	27	28	29	30	31	32	33	35	36	37	38	40	41
Industrial	246	267	288	311	337	367	401	434	470	509	550	593	640	689	742	798	857	921	988	1,060	1,137	1,218
Fertilizer	62	62	62	62	62	62	62	62	62	62	62	115	115	115	115	115	169	169	169	169	169	169
Cement	11	11	12	12	12	13	13	14	15	16	17	18	21	21	25	26	30	33	36	38	42	45
Power	373	454	481	467	508	600	665	729	781	860	966	1,051	1,133	1,223	1,313	1,101	1,085	1,123	1,137	1,200	1,235	1,280
Transport	9	11	12	14	15	18	20	22	25	28	32	35	40	45	50	56	63	71	79	89	100	112
Subtotal, SSGCL	**871**	**981**	**1,038**	**1,056**	**1,132**	**1,264**	**1,372**	**1,480**	**1,579**	**1,709**	**1,869**	**2,065**	**2,210**	**2,364**	**2,524**	**2,386**	**2,504**	**2,627**	**2,730**	**2,888**	**3,026**	**3,180**
Independent System																						
Fertilizer	255	257	257	257	309	315	333	333	333	333	333	333	430	430	430	430	430	526	526	526	526	526
Power	274	270	270	270	270	270	376	352	345	281	280	280	248	232	224	200	193	199	194	199	191	202
Subtotal, Independent	**529**	**527**	**527**	**527**	**579**	**584**	**710**	**685**	**678**	**614**	**614**	**613**	**677**	**662**	**654**	**629**	**622**	**725**	**720**	**725**	**717**	**728**
Total Country	**2,639**	**2,955**	**3,089**	**3,178**	**3,372**	**3,561**	**3,949**	**4,062**	**4,377**	**4,586**	**4,891**	**5,175**	**5,510**	**5,763**	**6,043**	**6,362**	**6,747**	**7,256**	**7,706**	**8,020**	**8,468**	**8,997**
Total Country[c]	**2,639**	**3,041**	**3,196**	**3,307**	**3,527**	**3,731**	**4,136**	**4,267**	**4,602**	**4,831**	**5,160**	**5,468**	**5,831**	**6,113**	**6,425**	**6,778**	**7,200**	**7,750**	**8,243**	**8,604**	**9,104**	**9,695**

a Net Demand is the end-consumer demand, exclusive of transmission and distribution losses.
b Figures for FY2004 represent actual supplies.
c Total country demand assuming FO substitution with gas in general industry (up to 95% of gas use into industrial fuel mix) and cement sectors.

Source: Hagler Bailly Pakistan.

8.6.2 Natural Gas Supply

Forecasts for the supply of gas from the existing fields were developed on the basis of current information and forecasts obtained from industry and government sources. The supply from existing fields includes all the producing fields, those already contracted with the utilities and those for which reserve certification has been completed. The new discoveries include fields already discovered that are not yet contracted and are passing through the phase of reserve certification and investigative studies. In line with the trends observed in the past, the estimates of anticipated supplies from future discoveries were developed assuming a reserve addition of 9.77 Tcf per decade in the future, or a constant rate of 0.97 Tcf per year in the forecast period. A calorific value of 950 Btu/scf was assumed for accounting purposes, and gas supply was projected to increase from 3,700 MMSCFD in FY 2005 to a maximum of 4,100 MMSCFD in FY 2008, and then expected to decline gradually to 2,500 MMSCFD by FY 2025. The gas production profiles of existing and anticipated gas discoveries are presented in Exhibit 8.37.

Exhibit 8.37: Gas Supply Forecast

MMSCfd (950 Btu/cft)

	Calorific Value, (Btu/scf)	FY04[a]	FY05	FY06	FY07	FY08	FY09	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25
Main Transmission System																							
Existing Gas Supplies																							
Sui	950	609	570	524	494	468	444	415	390	365	346	330	312	291	268								
Pirkoh	895	47	60	52	47	42	33	24	19	14													
Loti	842	31	28	24	19	18	15	13	11	7	4	3											
Dhodak	1,019	40	86	86	86	86	86	86	86	86	86	86	86	64	48	38	43	30	21	15	11	8	3
Qadirpur	880	296	506	506	506	506	506	506	506	506	506	463	417	343	278	222	176	139	102	65	28	23	19
Badin (BP)	1,063	224	214	214	198	160	130	102	78	60	44	31	26	17	8	6	2						
Daru	1,168	15	6	5	4	2																	
Northern Fields		104	214	216	210	203	193	184	171	160	151	141	133	124	119	111	104	88	48	43	38	32	25
Hasan (Block 22)	708	12	22	22	22	16	12	10	8	7	6	5	4	4									
Kadanwari/Miano	993	184	221	257	247	239	213	187	164	146	6	4											
Bhit/Bhadra	953	253	301	301	301	301	293	270	199	139	94	63	42	27	18	14	6	6	5	5	5	4	4
Sawan	990	252	354	354	354	354	354	354	319	287	258	232	209	188	169	152	137	123	111	100	90	81	73
Zamzama	812	211	260	260	260	270	270	290	287	288	270	270	270	270	270	270	269	257	247	87	78	71	63
Mazarani	1,010	10	12	12	12	13	12	10	6	5	4	3											
Khipro/Kausar	950	11	50	75	75	75	75	75	75	50	20	15											
Subtotal, Existing		**2,300**	**2,904**	**2,907**	**2,835**	**2,752**	**2,636**	**2,525**	**2,319**	**2,120**	**1,795**	**1,646**	**1,499**	**1,328**	**1,178**	**814**	**738**	**644**	**534**	**315**	**250**	**219**	**187**
New Discoveries																							
Badar	600		10	8	6	4																	
Southern Fields (OGDCL)			19	78	75	61	52	44	38	34	27	21	14	9	6	4	1						
Manzali/Gurgari	950		50	50	100	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200

Continued.....

	Calorific Value, (Btu/scf)	FY04	FY05	FY06	FY07	FY08	FY09	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25
Mubarak	1,025				65	65	65	65	65	49	37	28	21	15									
Zarghun South	930			22	22	22	22	22	22	22	16	14	12	10	8	7	6	5	4				
Mehr	1,025					76	76	76	76	76	76	76	76	76	76	68	62	55	50	45	40	36	33
Subtotal, New Discoveries			**79**	**157**	**268**	**428**	**415**	**407**	**401**	**381**	**356**	**339**	**323**	**310**	**290**	**280**	**269**	**260**	**254**	**245**	**240**	**236**	**233**
Total Main Transmission System		**2,300**	**2,984**	**3,064**	**3,103**	**3,180**	**3,051**	**2,932**	**2,720**	**2,501**	**2,151**	**1,985**	**1,822**	**1,638**	**1,468**	**1,093**	**1,006**	**904**	**788**	**560**	**490**	**455**	**420**
Independent Supplies																							
Mari	740	340	389	389	389	389	389	389	389	389	389	389	389	389	389	389	389	389	389	389	389	389	389
Mari Deep	740			47	47	47	47	47	47	47	47	47	47	41	32	24	20	15					
Uch	425	77	89	89	89	89	89	89	89	89	89	89	89	89	89	89	89	89	89	89	89	89	89
Kandhkot	835	89	145	167	167	167	163	152	138	120	101	89	80	68	59	47	36	31	27	24			
Sara/Suri and Sara/Suri Deep	810	13	63	47	47	40	38	38	38	38	38	38	30	21	21	21	21	21	21	21	21		
Sari Hundi	860		2	2	1	1	1																
Chachar plus Chachar upgrade	780		25	25	25	25	22	27	31	22	22	22	22	22	22	18	13						
Nandpur Panjpir	227	11	14	14	14	14	14	14	14	14	13	13	12	11	10	9	8	7	5	4	3	2	1
Subtotal, Independent Supplies		**529**	**727**	**780**	**779**	**772**	**763**	**756**	**746**	**719**	**700**	**687**	**670**	**642**	**623**	**597**	**577**	**552**	**532**	**527**	**502**	**480**	**479**
Subtotal, Anticipated Discoveries[b]					**97**	**193**	**290**	**387**	**483**	**580**	**677**	**774**	**870**	**967**	**1,064**	**1,160**	**1,257**	**1,354**	**1,450**	**1,547**	**1,644**	**1,644**	**1,644**
Total Supplies		**2,829**	**3,710**	**3,844**	**3,979**	**4,145**	**4,104**	**4,075**	**3,950**	**3,800**	**3,528**	**3,446**	**3,362**	**3,246**	**3,155**	**2,851**	**2,840**	**2,810**	**2,770**	**2,634**	**2,636**	**2,579**	**2,543**

a. Figures for FY 2004 represent actual deliveries.

b. Supply from "Anticipated Discoveries" includes estimated production from additional reserves associated with ongoing and expected exploration activities.

Source: Hagler Bailly Pakistan.

8.6.3 Supply-Demand Gap

To work out the supply-demand gap, gross demand was calculated by adding transmission and distribution losses and compression fuel usage to the net demand. These losses and compression fuel usage were assumed to be at 8.0% during the study period. Both supply and demand forecasts were normalized to a gas calorific value of 950 Btu/scf for accounting purposes.

The forecasted gross demand for gas, the supply, and the projected gap or surplus in the market are tabulated in Exhibit 8.38 and are shown graphically in Exhibit 8.39 The supply forecast is based only on onshore gas discoveries and does not take into account any import of gas or offshore potential.

The gap in the market appearing from FY 2010, adjusted for surplus supplies available during the FY 2005-FY 2009 period, is also given in Exhibit 8.38 Under this adjustment in the gas supply forecast, the gap in the market is expected to be about 160 MMscfd and 7,100 MMscfd during FY 2010 and FY 2025, respectively.

Indigenous gas supplies are expected to fall short of the demand after FY 2009 and the alternatives available for filling this shortfall, as well as issues associated with each, are summarized below.

- Imports of crude-oil refined products, particularly furnace oil, could be increased to meet the shortfall. This would not be advisable as the country is already heavily dependent on imported oil.
- The country has a well-developed infrastructure for the transmission and distribution of gas, which is a more efficient fuel better suited for use in the power and industrial sectors than oil. In order for the continued and full utilization of the infrastructure available in the country, the government should encourage and induce local as well as foreign oil and gas companies to increase their investment in the exploration activities in the country so that the decline in local production can be met through new discoveries.
- In addition to encouraging oil and gas exploration efforts in the country, and given Pakistan's proximity to major gas reserves in the Middle East and Central Asia, the import of gas through transnational pipelines from these gas-rich regions should also be considered.

- Liquefied Natural Gas (LNG) is another alternative to meet the shortfall in gas supplies. The import of LNG will involve establishing facilities for the de-liquefaction of gas, and developing cost-efficient, specialized transport systems for use over long distances where pipeline routes are not feasible.

The GoP will have to seek alternative sources of gas and energy to meet the expected shortfall in gas supply from FY 2009 onwards. With the exception of a significant discovery in the offshore prospects, the country will continue to depend on imported energy to meet shortfalls in gas and energy.

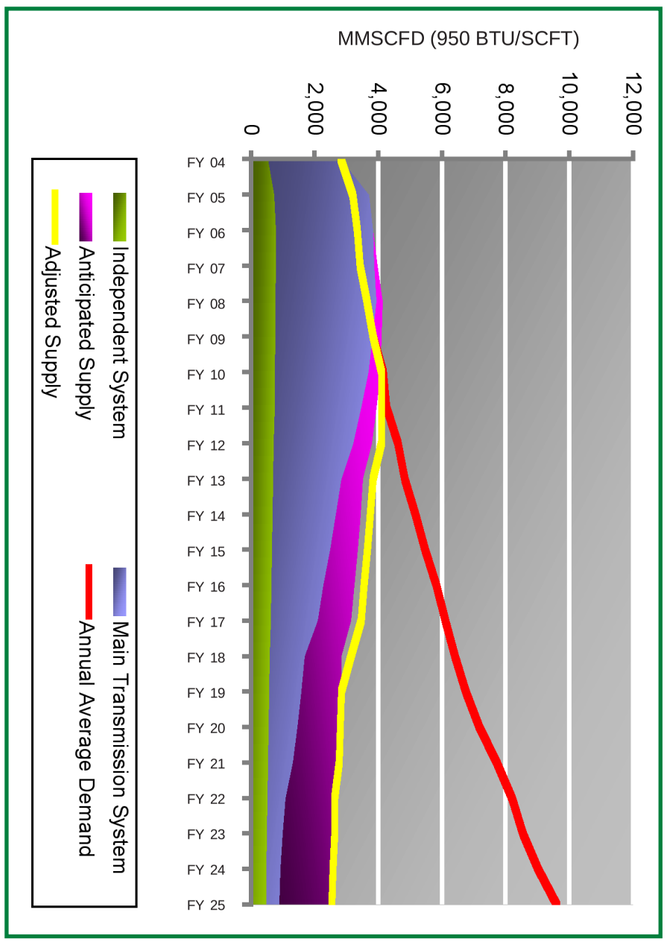
Exhibit 8.38: Gas Supply-Demand Gap for the Country

MMscfd (950) Btu/cft)

	FY04[a]	FY05	FY06	FY07	FY08	FY09	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25
Gas Demand																						
Net Demand	2,639	2,955	3,089	3,178	3,372	3,561	3,843	3,955	4,271	4,479	4,785	5,068	5,403	5,656	5,936	6,256	6,641	7,150	7,600	7,913	8,362	8,891
UFG and T&D Losses	190	236	247	254	270	285	307	316	342	358	383	405	432	453	475	500	531	572	608	633	669	711
Gross Demand	2,829	3,775	3,942	4,061	4,288	4,527	5,028	5,159	5,536	5,794	6,181	6,519	6,910	7,216	7,554	7,946	8,406	9,003	9,558	9,919	10,461	11,110
Gas Supply																						
Main Transmission System	2,300	2,984	3,064	3,103	3,180	3,051	2,932	2,720	2,501	2,151	1,985	1,822	1,638	1,468	1,093	1,006	904	788	560	490	455	420
Independent System	529	727	780	779	772	763	756	746	719	700	687	670	642	623	597	577	552	532	527	502	480	479
Anticipated Discoveries				97	193	290	387	483	580	677	774	870	967	1,064	1,160	1,257	1,354	1,450	1,547	1,644	1,644	1,644
Total Supply	2,829	3,710	3,844	3,979	4,145	4,104	4,075	3,950	3,800	3,528	3,446	3,362	3,246	3,155	2,851	2,840	2,810	2,770	2,634	2,636	2,579	2,543
Gap/(Surplus)																						
Annual Average Demand		(519)	(508)	(546)	(503)	(258)	190	437	928	1,424	1,837	2,226	2,704	3,069	3,676	4,031	4,477	5,067	5,688	6,025	6,567	7,174
Gap/(Surplus)- *Adjusted for Supply Surplus*																						
Annual Average Demand		–	–	–	–	–	162	283	623	1,120	1,532	1,922	2,400	2,765	3,371	4,031	4,477	5,067	5,688	6,025	6,567	7,174

Source: Hagler Bailly Pakistan.

Exhibit 8.39: Gas Supply-Demand Gap for the Country



Compressed Natural Gas

Annual Report 2003-04

9. Compressed Natural Gas

The CNG market, currently at 44 MMscfd, accounts for about 1.7% of the total natural gas market. However, the year-wise consumption of CNG has increased by 50% over the past three years, and this trend is expected to continue at least into the near future.

Historically, the GoP has encouraged the use of CNG in automotive vehicles as an alternative to liquid petroleum fuels. In 1997, the Government introduced a number of measures to shift consumer preferences towards the use of CNG as an automotive fuel. OGRA's role in the CNG industry has helped the increased use of natural gas in the transport sector. Procedures for the application and grant of licenses, approval of CNG equipment, imports and safety compliance by the CNG stations have been greatly streamlined to facilitate private sector investment. Investment promotion incentives have included duties and sales tax exemption on imported machinery, equipment, conversion kits, cylinders, etc. for a period of five years since 1997. Already, Pakistan is considered to be the third-largest CNG user in the world after Argentina and Brazil.

9.1 Vehicles Converted to CNG

The policies mentioned above have had substantial success, with an almost fivefold increase in the number of vehicles operating on CNG between FY 2000 and FY 2004. According to the Economic Survey of Pakistan, there were about 450,000 vehicles operating on CNG in FY 2004 making up about 35% of the motorcars, vans and taxi-cabs on the road as compared to 85,050 vehicles on CNG in FY 2000.

In recent years, the introduction of new vehicles factory-fitted with CNG kits has increased, which has improved the safety standards of CNG use.

9.2 CNG Stations in Operation

A breakdown of CNG stations in operation in each province as of June 2004 is shown graphically in Exhibit 9.1. A comparison with the previous year, as given in Exhibit 9.2, indicates that there has been substantial growth in the number of CNG stations set up in the current fiscal year, especially in the NWFP.

Exhibit 9.1:

Province-wise Distribution of CNG Stations

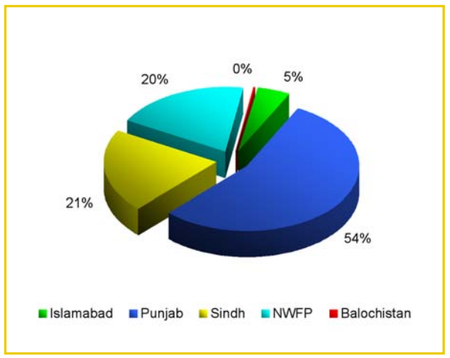


Exhibit 9.2: Province-wise Growth in Number of CNG Stations

Pronince	CNG Stations in Poeration in FY 2004	CNG Stations in Poeration in FY 2003	Percent Incresase Between FY 2003 and FY 2004
Islamabad	25	22	14%
Punjab	293	221	33%
Sindh	111	81	37%
NWFP	105	69	52%
Balochistan	1	1	0%
Total	535	394	36%

About 61% of the total installed CNG stations are located on independent premises and the remainder are co-located within petroleum filling stations owned by oil marketing companies (OMCs).

9.3 CNG Stations in Pipeline

In addition to the stations already in operation, OGRA had also issued about 347 provisional licenses for CNG stations in different parts of the country by June 30, 2004.

9.4 CNG Licenses and Operating Rules

OGRA is responsible for issuing licenses under the Production and Marketing Rules, 1992. These Rules were earlier notified by the GoP under Section 2 of the Regulation of Mines and Oilfields and Mineral Development (Government Control) Act, 1948 (XXIV of 1948), before the inception of OGRA. The standard term of the license is 15 years from the date it is granted.

A CNG licensee is required to locate, construct and operate his pipeline and all works connected with the CNG refueling station, as well as install CNG equipment in automobiles in accordance with the license granted by the Chief Inspector of Explosives under the Mineral Gas Safety Rules, 1960, and strictly comply with the provisions of the Petroleum Rules 1937 and the Gas Cylinder Rules, 1940, to avoid any danger to public health or safety.

To ensure correct and consistent measurement at CNG stations, OGRA has recently made it mandatory for all CNG operators to install mass-flow meters at their premises.

9.5 CNG Prices

In addition to the incentives discussed in the section above, there also exists a policy of maintaining a substantial disparity between the prices of gasoline and CNG to benefit CNG consumers. Consumer prices are uniform across the country and are determined by market forces. It is important to note that both the input gas price and the final consumer price are fixed for the individual operator, and the profit or 'Operator's Margin' is based on a 'netback' principle calculated by subtracting the input gas price, taxes and other expenses from the fixed consumer price.

9.6 CNG Demand Projections

The demand for CNG has been projected as part of the overall demand for gas as shown in Section 8. The projections for CNG requirements in the country are shown in Exhibit 9.3. It was assumed that 60% of cars and taxicabs and 20% of buses on the road would be converted to CNG by the end of FY 2025. According to these projections, CNG demand is expected to increase more than twofold by FY 2010. By FY 2025, the demand for CNG is expected to rise by more than ten times the current level.

Exhibit 9.3: Demand Projections for CNG

MMscfd (950) Btu/cf)

Region	FY04[a]	FY05	FY06	FY07	FY08	FY09	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25
SNGPL	35	40	46	53	60	68	77	87	97	108	121	136	152	170	190	212	237	269	305	346	392	443
SSGCL	9	10	12	13	15	17	20	22	25	28	31	35	39	43	48	54	60	69	78	88	100	113
Total	**44**	**50**	**58**	**66**	**75**	**85**	**97**	**109**	**122**	**136**	**152**	**171**	**191**	**213**	**238**	**266**	**297**	**338**	**383**	**434**	**492**	**556**

[a] Figures for FY2004 represent actual consumption reported by the SNGPL and SSGCL.

Liquefied Petroleum Gas

10. Liquefied Petroleum Gas

LPG is important in the energy mix of developing countries like Pakistan as it provides a cleaner alternative to biomass, especially in locations where natural gas is not available. LPG currently accounts for about 0.4% of the total primary energy supply in the country. This low penetration in the total energy market is mainly due to local supply constraints, the higher price of LPG in relation to competing fuels such as kerosene and fuel wood and the generally higher prices of imported LPG, coupled with limited port handling and storage infrastructure.

Given the de-regulated environment in the LPG sector, OGRA has simplified LPG licensing procedures, thereby strengthening the supply infrastructure and promoting an environment conducive to competition. OGRA's regulatory structure requires monitoring of the activities of the LPG marketing companies to ensure sufficient supplies all over the country, especially in remote locales, and maintain uninterruptible supplies to domestic customers. As of June 30, 2004, there were 21 LPG marketing companies operating in the country and about 53 licenses for the construction of storage and filling facilities had been issued.

10.1 LPG Licenses and Operating Rules

OGRA is responsible for issuing licenses to establish LPG production, processing, storing, filling, or distribution facilities under the Liquefied Petroleum Gas (Production and Distribution) Rules 2001 (LPG Rules). These rules were notified by the GoP under Section 2 of the Regulation of Mines and Oilfields and Mineral Development (Government Control) Act, 1948 (XXIV of 1948). The license is granted in two tiers for an overall period of 15 years. A provisional license is granted for two years for the construction of the LPG facilities. Once the installation is complete, the license is extended for the remaining period.

In addition, an LPG licensee is required to locate, construct, maintain and operate his work connected with storage, filling and transportation of LPG in accordance with a license granted by the Chief Inspector of Explosives under the Petroleum Rules 1937, and is also required to comply with the Gas Cylinder Rules 1940 so as not to endanger the public health and safety.

So far, a total of 61 licenses for construction of LPG facilities, 26 licenses for marketing and 8 licenses for production/extraction of LPG have been issued.

10.2 LPG Consumption

Exhibit 10.1 gives a sectoral consumption summary of LPG for FY 2004 in the country. LPG consumption grew by about 8% compared to last fiscal year.

Annual Report 2003-04 Liquefied Petroleum Gas

Exhibit. 10.1: LPG Sectoral Consumption, FY 2004

Sector	Daily Tonnes	Annual
Domestic	769	280,725
Commercial	155	56,506
Others	39	14,345
Total	**963**	**351,576**

Source: Pakistan Energy Yearbook 2004

Although LPG is mainly meant for use in the domestic and commercial sectors, it is also being increasingly consumed in the automotive sector owing to the price/cost advantage over motor gasoline. This illicit use has prompted concerns over the safety ramifications of the increasing fuel substitution in vehicles. OGRA has already requested the provincial governments to prevent the use of LPG in the automotive sector, but proper legislation is required. For this purpose, OGRA has requested the federal government, Ministry of Petroleum and Natural Resources (MPNR) to enact a law so that an effective mechanism is developed to ensure the implementation of the directive.

Another issue confronting the authorities is the handling of LPG by dealers who carry out illegal decanting and shifting of LPG from one vessel to another manually and without any safety considerations. OGRA, in conjunction with the local authorities, has also pressured LPG marketing companies to ensure that any unsafe practices be curbed.

10.3 LPG Production

Currently, LPG supplies are being met through three sources: refineries, gas producing fields and the deficit imported by LPG marketing companies operating in the country. The actual supply from refineries, producing fields and imports for FY 2004 is presented in Exhibit 10.2 and the respective share of each supply source in the total countrywide supply is shown in Exhibit 10.3.

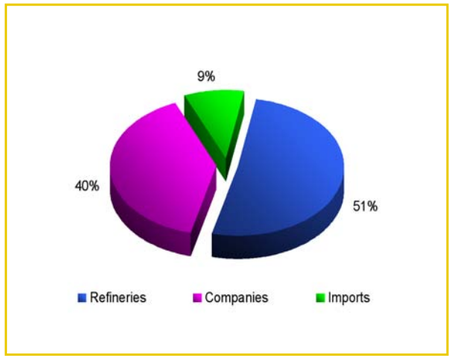
Exhibit 10.2: LPG Supply During FY 2004

Sector	Daily Tonnes	Annual
Attock Refinery	20	7,277
Pakistan Refinery	144	52,431
National Refinery	49	17,797
Pak-Arab Refinery	405	147,894
Subtotal, Refineries	**618**	**225,399**
Field		
Meyal	25	9,074
Dhurnal	10	3,601
Adhi	62	22,559
Dakhni	8	3,047
Dhodak	181	65,947
Kunnar	17	6,202
Pariwali	26	9,372
Pindori	76	27,768
Turkwal	2	575
Dhulian	12	4,323
Bhangali/Ratana	7	2,434
Subtotal, Fields	**424**	**154,903**
Imports	**96**	**35,000**
Total Supply	**1,138**	**415,302**

Source: Pakistan Energy Yearbook 2004

Exhibit 10.3:

Share of Each LPG Supply Source During FY 2004



Source: Pakistan Energy Yearbook 2004

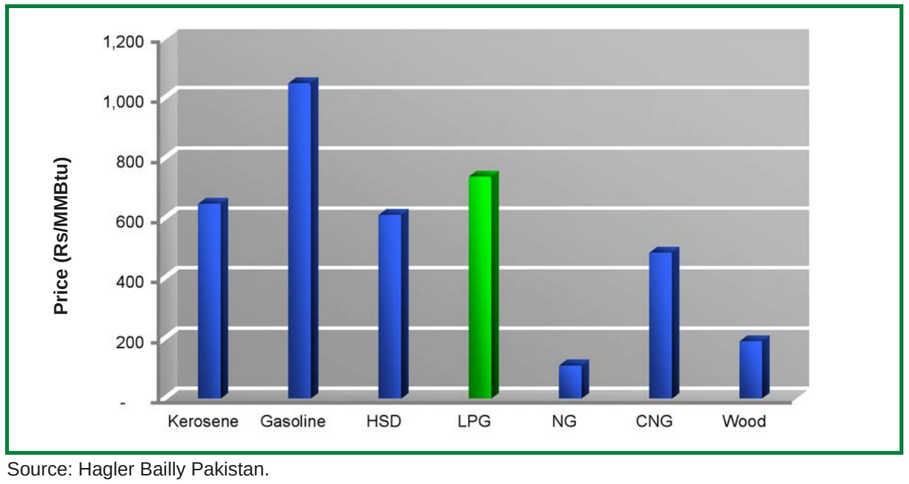
Annual Report 2003-04 Liquefied Petroleum Gas

10.4 LPG Consumer Prices

The GoP deregulated LPG prices in August 2000, freeing companies to fix their own prices. Further, LPG producers agreed upon and adopted long-term arrangements on LPG pricing terms. As a result, the oil refineries contracted a 15-year sale-purchase agreement with public sector LPG marketing companies, while other LPG producers signed the agreements for 10 years on the basis of an international pricing formula. Under this pricing criterion, the LPG price was linked with the monthly contract price for propane and butane published in the *International Propane-Butane Newsletter* (announced by Saudi Aramco), Middle East Economic Survey, in the ratio of 60:40. This was then averaged for the first six months of the seven-month period immediately preceding the relevant Price Notification Period (PNP) and a freight element not exceeding US$ 12.5/tons was added. OGRA, under Rule 18(2) of the LPG Rules, has the right to intervene in the public interest and determine LPG prices in accordance with the prevailing policy of the federal government.

Exhibit 10.4 compares LPG price with the prices of competing fuels. This price comparison illustrates that LPG is, by far, the most expensive fuel being used in the residential sector at the moment. This makes LPG unattractive as a heating fuel because of the availability of cheaper substitutes. It is, however, used as a cooking fuel because it is cleaner and more convenient than kerosene and fuel-wood.

Exhibit 10.4: Comparison of Fuel Prices



Source: Hagler Bailly Pakistan.

10.5 LPG Projections

Sectoral projections for the LPG demand and supply in the country were developed using a moderate demand scenario for the period FY 2005 to FY 2025. The following analysis presents the projected demand and supply scenario and the overall country balance.

10.5.1 Demand Projections

Using the GDP growth rates, population projections and variables such as percentage of middle- and high-income households using purchased (as opposed to self collected) wood and the percentage of households not connected to the natural gas network in urban areas, an estimate of potential demand for LPG was calculated for the country. In the urban areas, only consumers of purchased wood as a cooking fuel who were not connected to the natural gas network were included in the potential consumer base. In the rural areas, all middle- and high-income users of commercial wood as a cooking fuel were considered a potential base by FY 2025. The potential demand was calculated by assuming complete displacement of purchased wood as cooking fuel in the urban areas and a maximum of 50% displacement of purchased wood used for cooking in the rural areas. The potential demand indicates the level of demand that could be achieved if the price of LPG was reduced so that all middle- and high-income users of purchased wood would switch to LPG.

The demand for LPG based on current consumption patterns for the existing market base for the FY 2005-FY 2025 period was estimated using a growth-based econometric model. The input variables in this model included projected income growth rates, projected growth rates for the price of LPG, projected growth rates for the prices of competing fuels and income and price elasticities.

Exhibit 10.5 provides a summary of the LPG demand in the country. For FY 2004, potential demand for LPG was estimated at about 613,000 tonnes in the country and is expected to increase to 2.7 million tonnes by FY 2025. However the market-based demand is projected to increase from about 427,000 tonnes in FY 2005 to 2.4 million tonnes in FY 2025.

10.5.2 Supply Projections

Projections of indigenous LPG supplies from field plants and refineries for FY 2005 to FY 2025 are given in Exhibit 10.6 and Exhibit 10.7. Projections of supply of LPG from field plants were based on the existing and projected reserve sizes and expected decline in production from the fields. New oil and gas discoveries expected to take place in the

Annual Report 2003-04 Liquefied Petroleum Gas

forecast period were also taken into account. An additional supply from the Bobi and Chanda fields of the OGDCL and the Naimat Field of the OPI and the Jamshoro Joint Venture Limited (JJVL) project is also included in the forecasts. Projections of refineries were based on the estimated current and future production capacities of existing and new refineries based on historical trends reflecting the amount of LPG that each refinery is capable of producing.

10.5.3 Supply and Demand Balance

The overall country demand and supply balance for LPG is given in Exhibit 10.8 and Exhibit 10.9. A supply surplus can be expected to a level of 134,000 tonnes as a result of the projected increase in LPG supply, provided the current consumption and pricing trend continue in the near term. However, if the market expands to the households using commercial fuel wood for cooking purposes in the urban or rural areas, it is expected that the indigenous LPG supply will experience a shortfall that may prevail throughout the study period.

Exhibit 10.5: Demand for LPG

Year	FY04[a]	FY05	FY06	FY07	FY08	FY09	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25
Demand: Thousand Tonnes																						
Potential Demand	613	744	872	998	1,087	1,181	1,275	1,332	1,389	1,463	1,538	1,615	1,707	1,801	1,898	1,999	2,127	2,250	2,333	2,418	2,541	2,669
Market Based	415	427	489	552	620	696	780	871	971	1,080	1,199	1,300	1,408	1,520	1,639	1,762	1,890	2,011	2,122	2,220	2,302	2,388
Demand: Tonnes Per Day																						
Potential Demand	1,680	2,039	2,388	2,734	2,977	3,236	3,493	3,649	3,805	4,008	4,214	4,423	4,676	4,935	5,201	5,476	5,828	6,164	6,391	6,625	6,962	7,311
Market Based	1,138	1,170	1,340	1,511	1,700	1,908	2,136	2,387	2,660	2,959	3,284	3,563	3,857	4,166	4,489	4,827	5,179	5,511	5,814	6,082	6,307	6,542

a Figures for FY2004 represent actual LPG demand.
Source: Hagler Bailly Pakistan.

Exhibit 10.6: Indigenous Supply of LPG

Thousand Tonnes

Year	FY04[a]	FY05	FY06	FY07	FY08	FY09	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25
Refineries																						
Attock Refinery	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
Pakistan Refinery	52	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51
National Refinery	18	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19
Pak-Arab Refinery	148	148	148	148	148	148	148	148	148	148	148	161	161	161	161	161	161	161	161	161	161	161
Bosicor Refinery	0	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14
New Refinery	0	0	0	0	0	0	0	0	0	0	0	32	32	32	32	32	32	32	32	32	32	32
New Refinery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	44	44	44	44	44	44
Subtotal	**225**	**240**	**240**	**240**	**240**	**240**	**240**	**240**	**240**	**240**	**240**	**285**	**285**	**285**	**285**	**285**	**329**	**329**	**329**	**329**	**329**	**329**
Field Plants																						
Meyal	9	15	12	10	8	6	5	4	3	3	2	2	2	1	1	1	1	1	0	0	0	0
Dhurnal	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Adhi	23	14	14	13	12	12	11	11	10	10	9	9	9	8	8	7	7	7	7	6	6	6
Dakhni	3	3	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Dhodak	66	61	59	58	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	42	41	40
Kunnar	6	4	4	4	4	4	4	4	4	3	3	3	3	2	2	2	2	2	2	1	1	1
Pariwali	9	7	6	6	5	5	4	4	4	3	3	3	2	2	2	2	2	1	1	1	1	1
Pindori	28	37	35	32	30	28	26	24	22	21	19	18	17	16	15	14	13	12	11	10	9	9
Turkwal	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dhulian	4	6	6	5	5	5	5	4	4	4	4	3	3	3	3	3	2	2	2	2	2	2
Bhangali and Ratana	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1
Bobi	0	14	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18
Chanda	0	0	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23
Khipro	0	0	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27
Others	0	0	8	47	91	143	179	189	267	304	340	398	428	464	506	540	583	612	645	666	694	719
Subtotal	**155**	**163**	**218**	**248**	**285**	**330**	**361**	**365**	**438**	**471**	**502**	**555**	**582**	**614**	**653**	**684**	**724**	**751**	**781**	**799**	**825**	**847**
JJVL	0	41	164	164	164	164	164	164	164	164	164	164	164	164	164	164	164	164	164	164	164	164
Total, Country	**380**	**444**	**622**	**652**	**689**	**734**	**764**	**769**	**842**	**875**	**906**	**1,004**	**1,031**	**1,064**	**1,103**	**1,133**	**1,217**	**1,244**	**1,274**	**1,292**	**1,318**	**1,340**

a Figures for FY2004 represent actual LPG produced.
Source: Hagler Bailly Pakistan.

Exhibit 10.7: Indigenous Supply of LPG

Tonnes Per Day

Year	FY04[a]	FY05	FY06	FY07	FY08	FY09	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25
Refineries																						
Attock Refinery	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
Pakistan Refinery	144	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140
National Refinery	49	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52
Pak-Arab Refinery	405	405	405	405	405	405	405	405	405	405	405	441	441	441	441	441	441	441	441	441	441	441
Bosicor Refinery	0	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39
New Refinery	0	0	0	0	0	0	0	0	0	0	0	87	87	87	87	87	87	87	87	87	87	87
New Refinery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	120	120	120	120	120	120
Subtotal	**618**	**657**	**657**	**657**	**657**	**657**	**657**	**657**	**657**	**657**	**657**	**780**	**780**	**780**	**780**	**780**	**901**	**901**	**901**	**901**	**901**	**901**
Field Plants																						
Meyal	25	41	33	27	22	18	14	12	10	8	6	5	4	3	3	2	2	2	1	1	1	1
Dhurnal	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Adhi	62	39	37	35	34	32	31	29	28	27	26	24	23	22	21	20	19	19	18	17	16	16
Dakhni	8	7	7	6	6	5	5	4	4	4	4	3	3	3	3	2	2	2	2	2	2	2
Dhodak	181	166	162	158	154	150	147	144	142	139	136	133	131	128	126	123	121	118	116	114	111	109
Kunnar	17	11	11	11	11	11	11	10	10	9	9	8	7	7	6	6	5	5	4	4	4	3
Pariwali	26	19	17	16	14	13	12	11	10	9	8	7	7	6	5	5	5	4	4	3	3	3
Pindori	76	101	95	89	82	77	71	66	62	57	53	50	46	43	40	37	34	32	30	28	26	24
Turkwal	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Dhulian	12	17	16	15	14	13	12	12	11	10	10	9	9	8	8	7	7	6	6	6	5	5
Bhangali and Ratana	7	6	6	6	6	5	5	5	5	4	4	4	4	4	3	3	3	3	3	3	3	2
Bobi	0	38	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
Chanda	0	0	63	63	63	63	63	63	63	63	63	63	63	63	63	63	63	63	63	63	63	63
Khipro	0	0	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75
Others	0	0	22	129	248	391	491	517	731	834	931	1,089	1,172	1,271	1,387	1,479	1,598	1,677	1,768	1,824	1,902	1,969
Subtotal	**424**	**448**	**596**	**681**	**780**	**903**	**988**	**999**	**1,199**	**1,290**	**1,375**	**1,522**	**1,593**	**1,684**	**1,790**	**1,873**	**1,984**	**2,056**	**2,139**	**2,189**	**2,260**	**2,321**
JJVL	0	113	450	450	450	450	450	450	450	450	450	450	450	450	450	450	450	450	450	450	450	450
Total, Country	**1,042**	**1,217**	**1,703**	**1,787**	**1,887**	**2,010**	**2,094**	**2,106**	**2,306**	**2,397**	**2,482**	**2,752**	**2,824**	**2,914**	**3,021**	**3,104**	**3,335**	**3,407**	**3,490**	**3,540**	**3,611**	**3,672**

[a] Figures for FY2004 represent actual LPG produced.

Source: Hagler Bailly Pakistan.

Exhibit 10.8: Indigenous Supply of LPG

Thousand Tonnes

Year	FY04[a]	FY05	FY06	FY07	FY08	FY09	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25
Gross Demand LPG																						
Existing Market Based	415	427	489	552	620	696	780	871	971	1,080	1,199	1,300	1,408	1,520	1,639	1,762	1,890	2,011	2,122	2,220	2,302	2,388
Potential Demand	613	744	872	998	1,087	1,181	1,275	1,332	1,389	1,463	1,538	1,615	1,707	1,801	1,898	1,999	2,127	2,250	2,333	2,418	2,541	2,669
Indiginous LPG Supply	380	444	622	652	689	734	764	769	842	875	906	1,004	1,031	1,064	1,103	1,133	1,217	1,244	1,274	1,292	1,318	1,340
Deficit/(Surplus)																						
Existing Market Based	35	(17)	(132)	(101)	(68)	(37)	15	103	129	205	293	296	377	457	536	629	673	768	848	928	984	1,047
Potential Demand	233	300	250	345	398	447	511	563	547	588	632	610	676	738	796	866	910	1,006	1,059	1,126	1,223	1,328

[a] Figures for FY2004 represent actual LPG demand and supply.

Source: Hagler Bailly Pakistan.

Exhibit 4.9: LPG Demand and Supply Balance

Tonnes Per Day

Year	FY04[a]	FY05	FY06	FY07	FY08	FY09	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25
Gross Demand LPG																						
Existing Market Based	1,138	1,170	1,340	1,511	1,700	1,908	2,136	2,387	2,660	2,959	3,284	3,563	3,857	4,166	4,489	4,827	5,179	5,511	5,814	6,082	6,307	6,542
Potential Demand	1,680	2,039	2,388	2,734	2,977	3,236	3,493	3,649	3,805	4,008	4,214	4,423	4,676	4,935	5,201	5,476	5,828	6,164	6,391	6,625	6,962	7,311
Indiginous LPG Supply	1,042	1,217	1,703	1,787	1,887	2,010	2,094	2,106	2,306	2,397	2,482	2,752	2,824	2,914	3,021	3,104	3,335	3,407	3,490	3,540	3,611	3,672
Deficit/(Surplus)																						
Existing Market Based	96	(47)	(363)	(276)	(187)	(102)	42	281	355	562	802	811	1,033	1,252	1,469	1,724	1,843	2,104	2,324	2,542	2,696	2,870
Potential Demand	638	822	685	947	1,091	1,226	1,399	1,543	1,499	1,611	1,732	1,671	1,852	2,022	2,181	2,372	2,493	2,757	2,901	3,085	3,351	3,639

[a] Figures for FY2004 represent actual LPG demand and supply.

Source: Hagler Bailly Pakistan.