

Pakistan's Hydrocarbon Consumption and Production: Closing the Gap

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Despite a meager per capita annual commercial energy consumption of 0.25 tonnes of oil equivalent, Pakistan imports one-third of its requirement. The daily oil consumption, presently, is around 250,000 barrels or 12.3 million tonnes a year. The indigenous production in the recent times touched a peak of 65,000 barrels/day before it fell back to 61,000 barrels (average of 1991-92).

The daily gas production at 1,500 million cubic feet is equal to 12 million tonnes of oil a year. About three-fourths of oil and its products are being imported. The current remaining proven reserves are 158 million barrels of oil and 24 TCF of gas. More need to be discovered and developed to avert an adverse change in the present import-local production ratio because of the annual consumption increasing by 8 to 9 per cent.

The present annual refining capacity is barely 6.5 million tonnes. The transportation and storage capacities also do not match the demand. Plans are now on the drawing board, or in hand, to increase the refining capacity to 16 million tonnes by the turn of century with proportionate expansion in import, storage and transmission capabilities.

The coal potential of the country has been estimated at some 20 billion tonnes which though of poor quality yet could form an indigenous resource to replace fuel oil in power generation.

ENERGY SUPPLIES

Oil and gas together meet three-fourths of Pakistan's primary energy need. Local oil constitutes barely 25% of oil consumption. The import of deficit takes up one-third of the country's export earnings. Natural gas which presently forms 35% of the energy consumption could replace a large part of imported oil especially in industry and power generation if large investment could be attracted into exploration and development of new fields and expansion of transmission and distribution networks.

The energy consumption in Pakistan over the last ten years has grown at an average annual rate of 8.5 per cent which is two to three per cent higher than the growth in GDP. Though Pakistan's per capita energy consumption per year is low even by the third world standards (it is 0.33

TOE in Thailand, 0.64 in Egypt and 0.92 in Malaysia) besides the cost (it was \$ 1.4 billion in 1991-92) the timely and economical import of oil products imposes a severe strain on the port handling facilities, storage, movement and distribution.

INDIGENOUS OIL AND GAS RESOURCES

Indus and Balochistan basins cover nearly 600,000 sq.km., almost three-fourths of the land area of the country. Another 216,000 sq.km. lie offshore. The basin types, extent of potential source and reservoir rocks, presence of traps and characteristics of the discovered reserves indicate adequate oil and gas potential. New discoveries in north Potwar and northern Sindh suggest a closer look at the geological setting of Indus basins.

The drilling, in all of 328 exploratory wells, has led to 47 oil and 35 gas discoveries. The drilling density is very low by world standards, yet the success rate is very high. The oil discoveries have been small though.

At present an area of about 200,000 sq.km. stands given out in concessions. Large risk capital and advanced technology make exploration dependent largely on foreign investment. At present 20 companies in addition to the state-owned OGDC are exploring, or producing, oil and gas. The petroleum policy declared in November 1991 seeks to provide a liberal and conducive environment for foreign investors and, at the same time, promises special dispensation to the local entrepreneurs to enable them to make their debut in this high-risk, high-gain field.

The daily indigenous oil production has risen to the present level from a mere 10,000 barrels ten years ago. The current production of gas ranges between 1500 and 1600 million cubic feet a day. The established reserves of natural gas are estimated at 31 trillion cubic feet of which one-fourth have been consumed. More than half of 389 million barrels of known recoverable oil has already been produced.

OIL AND GAS INFRASTRUCTURE

The existing oil and gas infrastructure facilities in Pakistan are shown in Figure 1. During the next five years,

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Table 1. POL demand projections.

Products	(Metric Tonnes)	
	1992-93	1997-98
HOBC/MS	1,095,000	1,438,668
JP-4	119,000	141,425
JP-I	535,000	685,693
SKO	629,000	733,990
HSD	4,838,600	5,992,015
LDO	325,000	405,630
FO	4,286,500	17,742,843
Asphalt	180,000	98,735
Lube	185,000	189,902
Others	35,000	36,785
Total	12,228,100	17,565,686

the oil demand would increase from the present 12.6 million tonnes to 17.5 million tonnes (Table 1). Similarly, there is a constant demand pressure for more gas supplies which needs the distribution system expanded.

Oil Logistics

Port Facilities.— The oil handling at the ports during 1990-91 was 9.7 million tonnes straining the berthing and transportation capacity to the breaking point. To the two oil piers at Keamari, a new one would be added by 1994 raising the capacity to 13.2 million tonnes. Port Qasim presently has an improvised oil pier which can take vessels no bigger than 25,000 tonnes. The construction of a regular pier through a private party would raise the capacity of the two ports (not earlier than 1995) to 20-23 million tonnes. The imports are increasing at an annual rate of 9.5%. The piers added to the two ports would be able to cope with the projected volume of 22 million tonnes to the end of the century.

Refining Capacity.— The three refineries in the country (National, Pakistan and Attock) have a daily refining capacity of 140,000 barrels. Attock (at Rawalpindi) which is the smallest and the oldest, refines all the crude (upto 30,000 barrels) produced in Potwar region. The other two at Karachi can refine only a part of the Badin crude mixed with the imported crude because of its large wax content. About 7,500 barrels per day of local crude therefore have to be exported and a similar quantity is not produced because of the limited export handling facility.

During the 8th five-year plan (1993-98), it is proposed to establish a refinery at Multan and two on the coast with total annual capacity of 12 million tonnes. A hydrocracker with

an annual capacity of 1.6 million tonnes and a topping plant at Dhodak (100,000 tonnes) will also be established during the plan period. The expansion plans of Attock and Pakistan refineries are given in Table 2.

Table 2. Proposed expansion in PRL and ARL.

	(Million Tonnes/Year)	
		Completion by
PRL	0.49	1994-95
	0.17	1995-96
ARL	0.55	1994-95
	0.30	1996-97

The refineries at Karachi cannot take more than 26,000 barrels of local crude a day due to its waxy composition. Similarly, Attock's intake of crude will be about 36,000 BPD after its expansion. The surplus local crude in the South is being exported though at some loss. Surplus in the North will pose severe problem both of cost and transportation. To keep the excess crude in the ground thus is a better alternative till a new refinery comes up in the South and capacity of Attock is expanded.

Oil Imports.— All the deficit products were imported from Kuwait under term contracts till this reliable and economical supply line broke down during the Gulf War. The products since then are being imported through quarterly tenders which has its hazards. Some times small traders win the contracts but fail to perform giving rise to shortages. Recently, Kuwait has come back to supply one-fourth of country's 1992-93 requirement. Efforts to enter into similar long-term contracts for more quantities continue to reduce dependence on the spot market. The deficits of various products by the end of the 8th plan period are forecast to reach some 9 million tonnes (Table 3).

Table 3. Expected deficits of POL products by 1998 assuming all new refinery projects on-stream.

Products	Deficit in 1997-98 (Tonnes)
HSD	3,750,000
LDO	64,000
FO	4,789,000
Total:	8,922,000

Transportation.— In transporting oil from the port and refineries, 2.77 million tonnes, or 25%, is carried by pipelines, 18% by rail and the remaining 6.4 million tonnes or 57% by tank lorries. The capacity of PARCO pipeline (864 k.m. long, 16" in diameter) is planned to be raised from 2.9 to 4.5 million tonnes by 1994-95. The pipeline itself will be extended by 1995 from Multan to a point near Lahore via Faisalabad.

Storage.— The oil storage capacity presently is enough only for 18 days. The marketing companies and bulk users are being induced to raise it to 30 days by the end of the century. The reluctance of the marketing companies to invest in building storage in various parts of the country will be overcome with the linking of the product prices to the depots which is an article of the new policy.

Natural Gas Logistics

The purification, transmission and distribution of gas is done by Sui Northern (in Punjab and NWFP) and Sui Southern (in Sindh and Balochistan). The total production is about 1500 MMCFD of which 40% is consumed for power generation, 22% by Industrial Sector, 3% by Commercial Sector, 14% by Domestic; and 21% by Fertilizer Factories.

Sui Northern Gas Pipelines Limited.— Sui Northern Gas Pipelines Limited (SNGPL) has a net-work 3,136 k.m. long main and loop lines and about 10,236 k.m. of distribution lines to serve nearly 1 million customers in 63 towns. In order to transmit additional gas from Pirkoh and Loti fields as well as the newly-discovered field of Qadirpur, the system capacity is being expanded from 450 to 880 MMCFD. The project envisages laying of 719 miles of high pressure pipelines of 16 to 30 inch diameter with compression facilities at an estimated cost of Rs. 12633 million (foreign exchange component Rs. 5751 million). The World Bank has provided US \$ 190 million for the project which is scheduled for completion by December 1996.

Sui Southern Gas Company Limited.— Sui Southern Gas Company Limited (SSGCL) serves about 8,00,000 customers in 42 towns through 1,870 k.m. long transmission and 7300 k.m. distribution lines. Under Sui Southern Gas System Rehabilitation and Expansion Project the newly-discovered Kandanwari gas field will be connected to the system and the old leaking pipelines replaced to reduce losses. The project will cost Rs. 10925 million (foreign exchange component of Rs. 4450 million). The Asian Development Bank has provided a loan of US\$ 180 million for the project which is scheduled to be completed

by 1996 and SSGC's system capacity will increase from 500 to 640 MMCFD.

Privatisation of Gas Companies.— Keeping in line with the privatization policy, the government has decided to sell its majority holdings in both gas companies to the public. SNGPL's 51% shares were offered to the public in July 1992. SSGC will follow suit in 1993.

Policy for New Towns.— The government has approved a plan for the supply of gas to 112 new towns 52 in Punjab, 46 in Sindh, 7 in Balochistan and 7 in NWFP. The rate of expansion of gas connections over the next four years would be 12.4% against 7.5% per annum in the past.

Commercialization of Compressed Natural Gas.— Compressed Natural Gas (CNG) as a motor fuel has been dispensed for some years by Hydrocarbon Development Institute of Pakistan through its two stations at Karachi and Islamabad. To commercialize the use of natural gas in vehicles, the government has permitted duty-free import of conversion equipment and is encouraging establishment of CNG stations in the private sector.

Liquefied Petroleum Gas.— Liquefied Petroleum Gas (LPG) replaces kerosene and firewood as household fuel. Its demand estimated at 200,000 tonnes a year is fast growing. The production presently is barely one-fourth of the demand and declining. It would increase by 130,000 tonnes per year when Dhodak and Badin fields are developed over the next three years. Its import, exempted from all kinds of levies, has begun on a small scale.

COAL: RESOURCE AND USES

The estimates of coal resource of Pakistan vary widely. The recent discovery of coal in Thar desert appears to be large. The Geological Survey of Pakistan (GSP) has estimated reserves of 7 billion tonnes in Sonda coal field; over one billion tonnes in Lakhra and over 10 billion tonnes in Thar. The proven reserves are barely 500 million tonnes. Large effort and investment is required to prove the economic feasibility and mineability of the resource.

Electricity from lignite, a known technology by now, has been neglected here due to availability of hydel power and natural gas. Only two small coal based turbines (7.5 MW each) were installed in Quetta in 1964. Presently 3x50 MW power plants based on Lakhra coal using fluidized bed technology are under construction.

CONCLUSIONS

The large and ever growing gap between the national energy resource and demand calls for:

1. Attracting foreign technology and investment in exploration of oil and gas.

2. Diverting local capital from real estate, trading and rudimentary industry like cotton spinning to petroleum exploration, sharing the risk in a small measure with the foreign investors to begin with.

3. Increasing gas production from the known fields and accelerating the development of new ones like Qadirpur and Kandanwari.

4. Raising the price of natural gas and liquefied petroleum gas to the level of imported fuel.

5. Building of an oil pier at Karachi port and another at Port Qasim to handle increasing imports.

6. Laying gas distribution system in the populated areas which also have potential of industrial growth.

7. Extending the oil pipeline from Multan to Faisalabad to Lahore and ultimately to Peshawar for economical and speedy transportation of petroleum products from the ports relieving pressure on rail and road.

8. Establishing a mid - country (Multan) refinery.

9. Replacing fuel oil/HSD in power generation with natural gas either by increased local production or by import of gas before the end of the century.

10. Creating facilities for the import and distribution of LPG at Port Qasim.

11. Developing coal deposits for power generation in lower Sindh.