

Pre-Feasibility Study for  
**STEEL AND RELATED  
PRODUCTS**

May 2006



*Prepared by*  
**Management Advisory Center**

Study Commissioned by  
**Employment & Research Section,  
Planning & Development Division,  
Government of Pakistan, Islamabad.**

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*Quality Assured by*  
**National Management Consultants (Pvt.) Ltd.**  
1st Floor, PIDC House, MT Khan Road, Karachi  
nmc@super.net.pk

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Planning & Development Division,**  
Government of Pakistan, Islamabad.

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The purpose and scope of this Pre Feasibility Study is to introduce the Project and provide a general idea and information on the said Project including its marketing, technical, locational and financial aspects. All the information included in this Pre-Feasibility is based on data/information gathered from various secondary and primary sources and is based on certain assumptions. Although, due care and diligence have been taken in compiling this document, the contained information may vary due to any change in the environment.

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## ANNEXURE - 1 PAKISTAN - A PROFILE

## ACRONYMS

ASEAN	Association of South East Asian Nations
BOO	Build Operate Own
BOT	Build Operate Transfer
C&F	Cost and Freight
CAA	Civil Aviation Authority
CEO	Chief Executive Officer
DFI	Development Financing Institute
ECO	Economic Cooperation Organisation
EDB	Engineering Development Board
EIZ	Eastern Industrial Zone
FBS	Federal Bureau of Statistics
GCC	Gulf Cooperation Council
GDP	Gross Domestic Product
GNP	Gross National Product
GST	General Sales Tax
Hz	Hertz (cycles per second)
IPO	Initial Public offering
K	Kilo
Kg	Kilogram
Km	Kilometer
KPT	Karachi Port Trust
Kwh	Kilowatt hour
LDT	Light Displacement Tonnage
Mm	Millimeter
PNSC	Pakistan National Shipping Corporation
PTA	Pakistan Telecommunication Authority
PTCL	Pakistan Telecommunication Ltd.
Rs.	Rupees
SAARC	South Asian Association for Regional Cooperation
UAE	United Arab Emirates
WTO	World Trade Organization
\$	Dollar

## **EXECUTIVE SUMMARY**

### **INTRODUCTION**

Iron and steel provides the basic input in a range of industries comprising capital goods, consumer items, shipping, transport, housing and construction, energy distribution, infrastructural facilities, etc.

The objective of this study is to evaluate market and financial viability of setting up a project consisting of iron and steel scrap melting and re-rolling facilities.

### **MARKET**

World steel production crossed 1.00 billion tons for the first time in 2004 (1.06 billion tons) with annual growth rate of 5.7% per annum after 2000, the highest level of annual increase recorded. Global steel consumption has been spurred by rapid economic growth in China (8-10% pa) and India (7-8% pa).

Pakistan's per capita steel consumption was 14.3 kgs in 2003 when UAE ranked number one with 1,251.7 kgs followed by China (1,053.5 kgs), South Korea (984.6 kgs), Japan (803.2 kgs), USA (345.5 kgs) and Malaysia (281.4 kgs).

Pakistan Steel Mills has a capacity of 1.10 million tons per annum which has remained the same since its inception in 1983. Expansion of capacity has been in the news for a long time, however, in view of its imminent privatization the Government has not implemented any plan for capacity enhancement or replacement of equipment/ facilities. Its production in 2004-2005 was 1.125 million tons of billets and various finished products.

Total countrywide demand for iron and steel products is estimated at 4.653 million tons in 2004-2005 out of which 2.775 million tons (59.64%) is being supplied by Pak Steel and scrap melters, whilst the remaining quantum is filled by imports and ship breakers (1.878 million tons, or 40.36%).

Present demand of 4.653 million tons in 2004-2005 is expected to increase to 6.837 million tons in 2009-2010 (at 8% per annum growth), raising deficit from 1.903 million tons to 4.087 million tons.

## **TECHNICAL EVALUATION**

The project will produce billets in the melting section which will become the input for the re-rolling mills to produce a range of products (plain round bars, twisted bars, deformed bars, girders, beams, channels, sections, etc.)

Annual production capacity of the melting unit is planned to be 62,700 tons/year whilst the re-rolling mills will have a capacity of 65,000 tons per annum. High frequency induction heating furnaces will be installed which have several significant advantages over the relatively older process of arc furnaces.

A holding furnace of 5 tons capacity can be added alongwith a casting section for producing precision parts and components for the engineering goods industry and the industrial sector in general. Locally made furnace will cost Rs. 8.50 million plus Rs. 2.50 million for accessories (total Rs. 11.00 million) whilst Chinese origin furnace and accessories will cost about Rs. 143.00 million plus Rs. 25.00 million (total Rs. 168.00 million). At 100% capacity operations the casting section can produce parts, components valued at Rs. 300-400 million depending upon the size/weight of the items and materials used.

The project will need a 5 acre plot, 4,765 square meters of built-up area and imported machinery valued at US \$ 9.000 million (US \$ 1.500 million for the melting unit and US \$ 7.500 million for the re-rolling mill). Electric power requirement is placed at 8,500 kw (connected load). Total staffing of 461 persons includes professionals, skilled and unskilled workers.

Professional expertise, efficient corporate management and suitable systems and procedures are essential for profitable operation of the project.

## FINANCIAL APPRAISAL

Total project cost is estimated at Rs. 1,194.605 million including working capital of Rs. 141.480 million. Summarized financial operating results for the first five years of operation are shown below.

**TABLE - 1**  
**EARNINGS FORECAST**

(Rs. in 000)

Description	Year 1	Year 2	Year 3	Year 4	Year 5
Sales	1,233,581	1,606,842	1,828,728	2,043,07	2,055,932
Gross Profit	125,090	216,558	265,560	316,415	318,151
Operating Profit	106,680	195,943	242,027	290,652	290,845
Net Profit	30,934	88,143	119,251	151,895	155,261
Dividends:-					
Percent	-	10 %	15 %	25 %	25 %
Amount	-	59,730	89,595	149,326	149,326
Retained Ear.	30,934	28,413	29,656	2,569	5,935
Cum. Ret. Ear.	30,934	59,347	89,003	91,572	97,507

## CONCLUSIONS AND RECOMMENDATIONS

Iron and steel production capacity is inadequate to meet the country's demand of 4.653 million tons in 2004-2005 (deficit of 1.903 million tons in current year is expected to increase to 4.087 million tons by 2009-2010).

Production capacity can be increased through three available options:-

- Expansion in the capacity of Pakistan Steel Mills
- Establishment of a new steel mill based on indigenous iron ore (this is likely to take much time, however, this option deserves serious consideration)
- Setting up of new induction furnaces

Prospective investors, both Pakistani and foreign need to be motivated to invest in this sector.

# **CHAPTER 1**

## **INTRODUCTION**

### **1.1 OVERVIEW**

Iron and steel provides the basic input for development of a range of industries comprising capital goods, consumer items, shipping, transport, housing and construction, energy distribution, infrastructural facilities, etc. In view of its crucial importance for overall economic development the Government of Pakistan established an integrated steel mill at Pipri (30 km from Karachi) with technical and economic assistance from USSR.

Pakistan Steel Mills Limited has an installed production capacity of 1.10 million tons of steel and steel products per annum, which is being increased to 1.50 million tons/year. In view of the increasing demand for steel and steel products in the country and ambitious targets for industrial and economic growth, it is evident that domestic supply capability will be insufficient to cater to domestic demand in the coming years and additional production capacity needs to be implemented soon.

The Government of Pakistan is encouraging establishment of iron steel scrap melting mills (arc/induction furnaces) in the country in order to develop indigenous melting capacity to meet the shortage. This study evaluates the viability of setting up a scrap melting unit alongwith a re-rolling mill.

### **1.2 OBJECTIVES AND SCOPE OF STUDY**

The scope of this study covers the entire country since the project would procure raw materials from, and market its products all over the country. The main objective is to evaluate technical, market and financial viability of the proposed project.

## **1.3 METHODOLOGY**

### **1.3.1 DATA COLLECTION**

Data collection methodology adopted for this study is described below:

- Data from secondary sources was collected and analyzed. Government publications were consulted and relevant data compiled.
- Primary sources of data were identified and contacted for collection of unpublished information.
- Data was collected on costing inputs, selling prices, tariffs, etc. to compute cost of production and evaluate financial viability of the project.

### **1.3.2 PROJECT APPRAISAL TECHNIQUES**

The consultants have adopted industrial project appraisal techniques followed by the development financing institutions (DFIs) in the country which will facilitate procurement of financial assistance.

### **1.3.3 STUDY TEAM**

The study team consisted of a market analyst, technical expert and financial analyst who contributed their inputs, coordinated by the team leader. Support staff consisted of field surveyors, data tabulator and computer operator.

## CHAPTER 2

### NEED/MARKET ASSESSMENT

#### 2.1 BACKGROUND

Iron and steel is mainly used for the manufacture of industrial and agricultural machinery and equipment, transportation vehicles, rolling stock, earth moving equipment, ships / boats / vessels, durable consumer products and by the housing and construction sector. However, these are broad areas of usage, its actual application is so widespread that it would be difficult to list all specific uses and applications.

#### 2.2 GLOBAL PERSPECTIVE WORLD STEEL OUTPUT

World steel production has quadrupled in the last fifty years crossing the level of 1.0 billion tons for the first time in 2004. During the last five years the global steel industry has grown by 5.7 % annually, the highest level ever recorded.

**TABLE – 2**  
**WORLD STEEL PRODUCTION**

(in million tons)

<b>Year</b>	<b>Production</b>
1950	195
1960	372
1970	600
1980	725
1990	795
2000	980
2004	1,060

Source: International Iron and Steel Institute World Steel  
Figures – 2005

The years after 2000 have witnessed the highest growth rate of 5.7 % pa compared to rates between 1.5 % to 2.5 % during previous five year periods.

Global steel consumption has been spurred in large measure due to the robust economic growth taking place in China and India (China's GDP growth around 8-10 % pa and India's about 7-8 % pa). The two countries collectively account for about 36-38 percent of world population. Rapidly increasing iron/steel demand in these two countries has been a major factor causing rise in world steel prices.

Pakistan's per capita steel consumption of 14.3 kgs in 2003 is dwarfed by UAE (1,251.7 kgs), China (1,053.5 kgs) and South Korea (984.6 kgs). Comparative per capita consumption figures for selected countries is given below.

**TABLE - 3**  
**PER CAPITA STEEL CONSUMPTION (2003)**

Country	Per Capita Consumption (kgs)
UAE	1,251.7
China	1,053.5
South Korea	984.6
Japan	803.2
USA	345.5
Malaysia	281.4
India	33.4
Pakistan	14.3
World Average	165.6

Source: International Iron and Steel Institute

Pakistan's per capita consumption has increased substantially during 2004 (30 kgs) and 2005 (35 kgs) compared to earlier years when it was much lower (stagnating at the level of 13-14 kgs).

**TABLE - 4**  
**PAKISTAN'S PER CAPITA STEEL CONSUMPTION**

Year	Per Capita Consumption (kgs.)
1995	14.3
2000	12.3
2001	14.4
2002	13.0
2003	14.3
2004	30.0
2005	35.0

Source: Survey Estimates

### 2.3 IRON/ STEEL INDUSTRY PROFILE

The iron and steel industry consists of manufacturing facilities engaged in production of iron/steel billets and ingots and a variety of downstream products. A profile of the industry showing number of units engaged in production of various items is given hereunder.

**TABLE - 5**  
**PROFILE OF IRON AND STEEL INDUSTRY IN PAKISTAN**

Type	No. of Units
Integrated Steel Mills	1
Special Steel Mill	1
Foundries	450
Scrap Melters	82
Re-rolling Mills	334
Steel Pipe Mills	over 60

Source: Engineering Development Board Govt. of Pakistan

### 2.4 PRODUCTION CAPACITY

Pakistan Steel Mills, Pipri is the country's only integrated steel mill which produces steel from iron ore and coking coal through the blast furnace and

converter technology. Pak Steel's annual capacity of 1.10 million tons has remained constant from its commencement despite plans to expand it to 1.50 million tons and later on to 3.0 million tons. The Steel Mills has been privatized recently. The new owners have plans to increase the capacity to 1.5 million tons pa and to also set up another Steel Mill alongside having capacity of 2.0 million pa.

The coke oven battery finally closed down in mid-December 2005 and Pak Steel is now purchasing coke from foreign suppliers. Repair/replacement of the coke oven battery involves heavy investment and the Government is leaving it to the buyer (new owners) to undertake replacement, modernization, etc. of the mills.

Presently both cast and rolled products are produced as per international standards. It supplies rolled and cast billets, slabs and cobble plates to the re-rolling industry which uses these to produce profiles and wire rods. Pak Steel has a market share of only 20-24% in the country's long products market, this share being largely constant over the years owing to absence of any growth in the Mill's production capacity. Its product range and production capacity is given below.

**TABLE - 6**  
**PAK STEEL'S PRODUCTION CAPACITY**

(in tons)

Product	Specification	Production Capacity
Billets	50-100 mm x 100 mm; length upto 8 meters	400,000 - 450,000
Hot Rolled Sheets	Thickness 1.6-10 mm; width 80-1500 mm; length 2.5-6 mtr/coils	350,000 - 450,000
Cold Rolled Sheets	Thickness 0.3-2.5 mm; width 60-1500 mm; length 1-4 mtr / coils	100,000
Galvanised Sheets	Thickness 0.3-1.5 mm; width 700-1500 mm, length 1-4 meters	80,000
Formed Sections	Angles 80 x 80 mm 150 x 150 mm Length upto 12 meters Channels 140 x 60 250 x 80 mm	150,000
<b>Total Production Capacity</b>		<b>1,080,000-1,230,000</b>
Pig Iron		1,500,000
<b>Bye-Products</b>		
Coke		1,000,000
Ammonium Sulphate		25,000
Coal Tar		55,000
Granulated Slag		325,000

Source: Pakistan Steel Mills

Pak Steel's billet making capacity is given as a range from 400,000 tons to 450,000 tons per annum (depending upon the size and weight of billets produced). For purposes of estimating the country's billet production capacity Pak Steel's output is being taken at 425,000 tons per annum.

Peoples Steel Mills at Karachi produces special steels (high carbon steel, stainless steel, alloys, etc.), however, its output is not sold in the open market (being consumed by Pakistan Ordnance Factory and related organizations).

There are some 82 scrap melters/ furnaces in the country, mostly with small individual capacities ranging from 10,000 to 70,000 tons per annum. Approximately 56% of the electric furnace capacity in the country is accounted for by 46 independent “melters” (steel makers with no rolling mills, mostly located in Punjab) and the remaining 44 % by some 36 “semi-integrated” works (with both steel making and re-rolling facilities). Total raw steel making production capacity of the scrap melting sector is estimated at 2.4 million tons per annum.

In addition to the above, ship breakers have in the past provided a substantial quantity of ship plates, meltable scrap, shafts, non-ferrous metals, etc. to re-rolling mills. This sector has now become almost totally inactive due to import duties levied on scrap ships by the Government of Pakistan which were comparatively higher than the levies imposed by competing countries (mainly India and Bangladesh). Ship breakers from these countries could afford to pay higher prices for scrap ships compared to Pakistani ship breakers since duties were lower in their countries, and the landed cost of the ship and its products were therefore lower. The Government of Pakistan had imposed Import Duty of 15 % on scrap ships which was later reduced to 10 % and now to 5 % in order to revive this industry.

**TABLE - 7**  
**SUMMARIZED PRODUCTION CAPACITY**

(in tons)

Source	Production
Pak Steel	1,080,000 -1,230,000
Steel Melters	2,400,000
Ship Breakers	200,000 -300,000
<b>Total Domestic Production Capacity</b>	<b>3,680,000-3,930,000</b>

Source: Pak Steel, Industry Sources and Market Estimates

Note: Ship breaking fluctuates widely depending upon market conditions. Its production can be increased at short notice by beaching and dismantling more scrap ships.

## 2.5 PRODUCTION

### 2.5.1 PAK STEEL

Annual production of Pak Steel during 2004-2005 is shown below:

**TABLE - 8**  
**PRODUCTION OF PAKISTAN STEEL MILLS**

<b>Products</b>	<b>Quantity (Tons)</b>
Billets	450,000
Hot rolled coils / plates	525,000
Cold rolled coils / sheets	90,000
Galvanized sheets	60,000
<b>Total</b>	<b>1,125,000</b>
Pig Iron	1,200,000
<b>Other Products:</b>	
Coke	835,000
Coaltar	55,000
Ammonium Sulphate	18,000
Slag	190,000

Source: Pakistan Steel Mills Ltd.

### 2.5.2 SCRAP MELTERS/FURNACES

All the furnaces (melters) in the country put together reportedly produced about 2.1 million tons of iron and steel during 2004-2005 (industry estimate). There is no official compilation of countrywide production statistics by any Government organization.

Due to decentralization of records of the Sales Tax Department (which collects General Sales Tax from the melters), it is not possible to compile production as reported by the individual units to the Department. It is generally felt that “official production” as reported by the units to the Department is substantially lower than the level of 2.1 million tons due to under-declarations by the melters to avoid/minimize payment of GST.

Melters use iron and steel scrap as basic raw material, most of which is imported by scrap dealers and is available ex-stock locally. Quantity and value of imports during last three years is shown below.

**TABLE - 9**  
**IMPORTS OF IRON AND STEEL SCRAP**

(Quantity in Tons – Value in Rs. 000)

Year	Quantity	Total Value	Average Cost (Rs./ tons)
2002-2003	308,947	2,442,320	7,905
2003-2004	493,337	4,811,432	9,753
2004-2005 (9 month actual)	727,145	9,260,002	-
2004-05 (Full year estimate)	969,527	12,346,669	12,735

Source: Federal Bureau of Statistics, Government of Pakistan

Quantity imported increased by 214 % over the two year period whilst value rose by 406% reflecting a rise of 61 % in the average C&F price of imports. Sharp rise in imports has been caused by substantial increase in the production of items using iron and steel as raw material (cars, motor cycles, durable consumer goods, etc.).

Over 100 new furnaces have been ordered by melters in the recent past (ranging from 3 tons to 10 tons capacity) out of which about 80 have been installed and are operational. Increased demand for remeltable scrap is evident from the more than three fold increase in quantitative imports in the last two years. The rise in average import prices is due mainly to two reasons-higher prices in the international markets and import of better quality scrap. Shredded scrap from UAE and UK is favoured by melters and together these two sources provide the bulk of supplies.

Melters purchase imported scrap from traders who import and maintain ready stocks, whilst some dealers specialize in collecting scrap from local sources. Current prices of imported scrap is Rs. 20,000/- ton with locally generated scrap priced at Rs. 18,000/ ton.

### 2.5.3 IMPORTS

Pakistan imports substantial quantities of iron and steel billets and finished products to meet domestic demand which reflects insufficient local production capacity. From 1.099 million tons in 2002-2003 imports have consistently increased to 1.834 million tons in 2004-2005 (full year estimate) indicating an increase of 66.9 % over the two year period. With higher increase expected in the GDP rate in the ensuing years, demand for iron and steel and its products will rise even higher.

**TABLE - 10**  
**IMPORT OF IRON & STEEL FINISHED PRODUCTS**

(Quantity in Tons-Value in 000 Rs.)

<b>Year</b>	<b>Quantity</b>	<b>Value</b>
2002-2003	1,099,049	23,513,097
2003-2004	1,264,249	29,485,217
2004-2005 (9 months actual)	1,375,684	37,559,667
2004-2005 (Full year estimate)	1,834,245	50,079,556

Source: Federal Bureau of Statistics, Government of Pakistan

### 2.5.4 SHIP BREAKING

In the eighties and nineties Pakistan was rated as the foremost ship breaking nation in the world (with its facilities/operations based at Gadani beach, some 35 miles from Karachi city). It is now a nominal player in this field owing to, as reported by ship breakers, unfavourable Government policies. High level of Government levies have made the industry incompetent compared to neighbouring countries, where because of lower duties, they are able to bid higher prices for scrap ships. A nominal level of activity is still carried out, providing the re-rolling industry with some inputs in the form of steel plates/sheets, remeltable scrap, etc.

**TABLE - 11**  
**IMPORT OF SCRAP SHIPS**

<b>Year</b>	<b>Import (No. of Ships)</b>	<b>Value (Rs. 000)</b>	<b>Estimated LDT (Tons)</b>
2002-2003	6	459,300	19,138
2003-2004	7	758,678	31,612
2004-2005 (9 months actual)	2	998,668	41,611
2004-2005 (Full year estimate)	3	1,331,557	55,482

Source: Federal Bureau of Statistics, Government of Pakistan.

Note: LDT = Light Displacement Tonnage (weight of the vessel only, without cargo, bunker or ballast).

Present price of scrap ships is about US \$ 375–400 per ton (about Rs. 22,500 – 24,000 per ton). Annual value of imports have been divided by Rs. 24,000 to ascertain the tonnage of scrap ships imported for dismantling (tonnage data is not compiled, provided by Federal Bureau of Statistics).

Depending upon the age of the ship and the type of cargo it has carried, wastage in scrapping can vary from 8 to 20% of gross weight. Another 5-10 % of gross weight is extracted for various other materials such as non-ferrous metals, wood, rope, tarpaulin, etc. Assuming average wastage of 20 % (13 % plus 7 %) from the gross weight of imported scrap ships, an estimate of the quantity of iron and steel supplied by this sector is shown below.

**TABLE - 12**  
**ESTIMATED IRON & STEEL SUPPLIED BY**  
**SHIP BREAKING INDUSTRY**

<b>Year</b>	<b>Gross Weight (LDT Tons)</b>	<b>Net Yield of Iron and Steel (Tons)</b>
2002-2003	19,138	15,310
2003-2004	31,612	25,290
2004-2005 (Full year estimate)	55,482	44,386

Source: Survey Estimates

Despite high prices of scrap ships in the international market, there is an upward trend in quantitative imports and availability of remeltable scrap to the melters and re-rolling industry due to rising domestic demand for iron and steel. The overall volume, however, is very small (less than one percent of country's demand being supplied through this source). Ship breakers complain of unfavourable Government policies for the decline of this sector. Pakistan was once ranked as the number two nation in terms of tonnage of ships dismantled annually (contributing 700,000-800,000 tons to the country's re-rolling industry during its boom years).

High rate of import duty on scrap ships (15 % previously, later reduced to 10 % and now to 5 % is expected to revive the ship breaking industry). In July 2005 the Government also announced reduction in Withholding Tax (from 3 % to 1 %) on the import of ships meant for dismantling.

Another factor for decline has been the abnormal rise in crude oil prices, which has increased the demand for bulk cargo vessels and large tankers. The demolition tonnage available in the international market has therefore declined substantially. Whatever tonnage comes to the market, ship breakers from Bangladesh and India out-bid the Pakistani ship breakers.

## **2.6 PRESENT DEMAND**

The country's demand for iron and steel products is being met through four sources of supply:

- Pak Steel
- Melters
- Ship Breakers
- Imports

By aggregating the quantum of supply from each of the four sources, iron and steel demand in the country can be ascertained. Two of these sources Pak Steel

and furnaces, are indigenous and their capacities are fixed in the short term, whilst the other two are flexible in their contributions, and of external origin i.e. dependant on imported supplies.

**TABLE - 13**  
**AVAILABILITY OF IRON AND STEEL PRODUCTS (2004-2005)**

(Quantity in 000 tons)

<b>Source of Supply</b>	<b>Quantity (Tons)</b>	<b>Share (%)</b>
Pak Steel	675,000	14.51
Melters	2,100,000	45.13
Imports	1,834,000	39.12
Ship Breaking	44,000	0.95
<b>TOTAL</b>	<b>4,653,000</b>	<b>100.00</b>

Source: Survey Estimates

Total availability of mild steel re-rolled products (synonymous with demand) is presently estimated at 4.653 million tons, out of which 2.775 million tons (59.64 %) is being supplied through domestic production of Pak Steel and scrap melters, and 1.878 million tons (40.36 %) through imports of various types of finished products and scrap ships.

## **2.7 PROJECTED FUTURE DEMAND**

Pakistan ranks amongst the countries with one of the lowest per capita consumption of steel in the world (estimated at 35 kgs per capita in 2005 compared to world average of 165.6 kgs. in 2003, when Pakistan's consumption was much lower at 14.3 kgs). Steel consumption is low due to non-development of engineering goods industries, consumer durable products, construction and housing sector and those industries which use iron and steel and its products as inputs.

A brief review of demand determinants is given below, and the recent upsurge which has raised Pakistan's per capita steel consumption from 14.3 kgs in 2003 to

30 kgs in 2004 and 35 kgs in 2005. Production data has been taken from Engineering Development Board, Ministry of Industries, Production and Special Initiatives, Government of Pakistan.

### **DEMAND DETERMINANTS AUTOMOBILES**

Heavily reliant on iron and steel, the production of automobiles increased from 40,088 units in 2002 to 62,073 in 2003, 98,461 in 2004 and 112,613 in 2005 (growth of 181 % in three years). High growth in the foreseeable future, as evident from long waiting periods for delivery of cars (5-8 months after booking) and the premium paid by users wanting immediate delivery, indicates increasing demand for iron and steel by this industry.

### **MOTOR CYCLES**

Production of motor cycles increased from 120,627 nos. in 2002 to 165,105 in 2003, 303,383 in 2004 and 379,040 in 2005 (214 % increase in the three year period). Demand for two wheelers is increasing sharply which points to higher requirements for iron and steel products by this sector.

### **REFRIGERATORS**

Total production of refrigerators was recorded at 233,000 nos. in 2001 which increased to 282,080 in 2002, 373,000 in 2003 and 587,531 in 2004 (152 % rise in three years). A consumer durable product which is becoming a part of more and more households, sustained growth of this industry indicates rising demand for iron and steel items.

### **DEEP FREEZERS**

Countrywide output of deep freezers was 120,000 nos. in 2001, increasing to 122,290 in 2002, 125,000 in 2003 and 156,050 in 2004 (30 % increase in a period of three years). An allied product of refrigerators, this item is also showing steady rates of growth.

## **AIR CONDITIONERS**

Total country's output placed at 80,000 units in 2002, rising to 150,000 in 2003, 300,000 in 2004 and 350,000 in 2005 (338 % rise in three years). Increasing demand emanating from offices, shops, commercial establishments and households, the phenomenal rate of increase points to sustained growth in coming years.

Other consumer durable products using iron and steel items have also increased in the last 2-3 years which explains the sudden rise in per capita steel consumption to 35 kgs in 2005. Pakistan's economic growth is expected to maintain a level of 6-8 % per annum which indicates higher demand for iron/steel and its products.

Industry and the housing, construction sectors have recorded robust growth rates in recent years. The industrial sector's growth was recorded at 12.5 % in 2004-2005 over the previous year, whilst construction increased by 6.2 % in the same period. Both are major users of iron and steel in the country and it is expected that demand will grow in line with the projected growth of the economy. Demand projections are made below on the basis of annual growth rates of 6% and 8% per annum.

**TABLE - 14**  
**PROJECTED DEMAND FOR MILD STEEL PRODUCTS**

(Quantity in Tons)

<b>Year</b>	<b>Future Demand</b>	
	<b>6 %</b>	<b>8 %</b>
2004-2005 (Base year)	4,653,000	4,653,000
2005-2006	4,932,180	5,025,240
2006-2007	5,228,111	5,427,259
2007-2008	5,541,797	5,861,440
2008-2009	5,874,305	6,330,355
2009-2010	6,226,764	6,836,784

Source: Survey Estimates

## 2.8 PROSPECTS FOR NEW CAPACITY

The iron and steel re-rolling industry in the country is facing shortage of billets, consequently a number of re-rolling mills have been compelled to import billets to meet their requirements. Supply of billets to the re-rolling industry is presently coming from three sources as shown below.

**TABLE - 15**  
**AVAILABILITY OF MILD STEEL BILLETS (2004-2005)**

<b>Source</b>	<b>Quantity (Tons)</b>
Pak Steel	450,000
Melters	2,100,000
Imports	200,000
<b>Total</b>	<b>2,750,000</b>

Source: Survey Estimates

Compared to estimated iron and steel demand of 4,653,000 tons in 2004-2005 the amount of billets being supplied to the re-rolling industry is 2,750,000 tons leaving a deficit of 1,903,000 tons. The quantity of finished iron and steel products imported into Pakistan during 2004-2005 was 1,834,000 tons which roughly tallies with the amount of shortage estimated at 1,903,000 tons. Imports roughly covered the deficit of 1.903 million tons in 2004-2005.

To meet the current level of deficit estimated at 1.903 million tons about 30 induction furnaces of 65,000 tons capacity each are needed in the country during the current year (2004-2005). The estimated deficit five years hence (in 2009-2010) is expected to increase to 3.48 million to 4.09 million tons (future demand projected at 6 % and 8 % pa).

Total installed capacity in the country for various iron and steel products is estimated at 2,750,000 tons per annum. This is compared below with projected demand in the next five years.

**TABLE - 16**  
**DEMAND / SUPPLY COMPARISON**

(Quantity in 000 Tons)

<b>Year</b>	<b>Demand</b>	<b>Supply</b>	<b>Deficit</b>
2004-2005	4,653	2,750	1,903
2005-2006	5,025	2,750	2,275
2006-2007	5,427	2,750	2,677
2007-2008	5,861	2,750	3,111
2008-2009	6,330	2,750	3,580
2009-2010	6,837	2,750	4,087

Source: Survey Estimates

Note : Demand projections for the next five years have been taken at 8 % per annum.

The deficit is expected to increase from 1.903 million tons in the current year (2004-2005) to 4.087 million tons in 2009-2010. The current shortfall is being met by imports and supplies by ship breakers and unless new production capacity is developed, imports will more than double, thereby further deteriorating the adverse balance of payments position of the country.

The United Nations and various donor agencies/countries are implementing reconstruction and rehabilitation programs for Afghanistan, which seeks to mobilize international aid for constructing roads, bridges, houses, civic amenities, infrastructural facilities, etc. Considerable quantities of iron and steel will be needed in Afghanistan and owing to close proximity of its eastern and north-eastern regions, Pakistan can supply Afghanistan's needs promptly and economically. This would constitute as exports from Pakistan and earn foreign exchange for the country.

## **2.9 COMPETITION**

The iron and steel re-rolling industry also has an informal sector which produces small items such as wire rods, small profiles, sections, etc. These units generally purchase billets and ingots from melters who are allowed to pay Rs. 500 per ton as

sales tax, whereas large re-rolling mills which purchase their requirements of billets from Pakistan Steel Mills pay about Rs. 5,200 per ton in levies.

This causes pricing problems for large re-rolling mills because the raw material purchased by them is priced higher. This sales tax anomaly should be rectified and according to reports the trade body of re-rolling mills and some of the large mill owners are negotiating with the Government to solve this problem.

## 2.10 TARIFF STRUCTURE

Applicable rates of duties, levies on import of machinery and equipment for a scrap melting unit, a re-rolling mill and import of iron/steel scrap is given below:-

**TABLE – 17**  
**TARIFF STRUCTURE**

Description	Import Duty (on C&F value)	General Sales Tax (on duty paid value)	Income Tax (on Duty paid value)
Machinery and Equipment for a Scrap Melting Plant	25 %	15 %	6 %
Machinery and Equipment for a re-rolling mill	5 %	15 %	6 %
Iron and Steel Scrap	10 %	15 %	6 %

## CHAPTER 3

### TECHNICAL EVALUATION

#### 3.1 LOCATIONAL ANALYSES

There are certain pre-requisites in the form of infrastructural facilities, availability of professionals, etc. for the implementation of this project as enumerated below:

- Professionals
- Pool of skilled, semi-skilled workers
- Electric power
- Water
- Transport network
- Telecommunication facilities
- Proximity to source of raw materials
- Proximity to market for finished goods
- Availability of banking and financial services
- Socio-economic facilities for the large pool of staff (educational institutions, hospitals/health facilities, recreational/entertainment facilities, etc.)

A number of large cities, urban centres qualify as suitable locations for the project on the basis of the above parameters.

**TABLE – 18**  
**POTENTIAL SITES FOR LOCATION**

City	Population (million)	
	1998 (Census)	2005 (Estimate)
Karachi	9.27	13.94
Lahore	5.14	7.23
Faisalabad	2.04	2.65
Rawalpindi	1.41	1.86
Multan	1.20	1.48
Hyderabad	1.17	1.45
Gujranwala	1.13	1.40
Peshawar	0.99	1.30

Source: Population data for 1998 based on Census figures Population for 2005 estimated at average growth rates

All the above cities possess the necessary infrastructure and facilities and may be considered as suitable locations. A prospective investor may opt for any of the above cities, or even a different location depending upon his preference.

### **3.2 PRODUCT RANGE**

The proposed project will be an integrated facility consisting of iron/steel scrap melting plant and a re-rolling mill. The scrap melting unit will produce billets, which becomes the raw material for the re-rolling mill, from which various re-rolled products will be made depending upon market requirements (mild steel plain bars, twisted bars, deformed bars, girders, beams, channels, sections, etc.).

### **3.3 PRODUCTION CAPACITY**

Annual production capacity of the melting unit is placed at 62,700 tons. The project will have two furnaces, each furnace of 5 tons capacity requiring 60-70 minutes for a complete cycle per heat or pour resulting in 18-20 heats per 24 hours of operation. For the purpose of this study 19 heats per furnace per day has been assumed (2 x 19 heats = 36 pours of 5 tons each, or 190 tons per day).

Furnaces of this type normally operate for 350 days in a year, however, on a conservative basis only 330 working days have been assumed per year (190 tons x 330 days = 62,700 tons per annum). The molten steel will feed a two strand continuous billet caster which has a nominal capacity of 65,000 tons per annum.

### **3.4 CASTING OF PARTS AND COMPONENTS**

Production of parts and components through the casting process is an avenue of diversification which is available to investors of this project. This can be achieved by installing a holding furnace of 5 tons capacity and setting up a separate section for casting of parts and components in line with market demand.

The normal procedure in business relating to casting is that the customer provides the moulds if the order size is relatively small, and in case of large and recurring

orders the manufacturer prepares the moulds (having worked the cost of moulds into the pricing structure and total business volume expected).

The investors have the option to purchase a locally made holding furnace of 5 tons capacity (costing about Rs. 8.50 million) or a Chinese origin facility estimated to cost US \$ 1.50 million (landed cost inclusive of duties, GST, import related expenses, etc. of Rs. 143.00 million). Accessories including ladles, etc. for locally fabricated equipment will cost about Rs. 2.50 million whilst imported equipment, accessories, etc. will cost about Rs. 25.00 million (landed cost).

The project will possess the capacity to produce precision parts and components through the casting process for the engineering goods industry and for the industrial sector in general. The capacity (in terms of weight) and annual sales revenues generated from this section will depend upon the size/weight of parts and components produced and the materials used.

Price per unit can vary substantially depending upon the material used and the size/weight of parts, components produced. However, as a rough approximation, it is estimated that the project can produce parts and components valued at Rs. 300-400 million per annum (at 100% capacity operations).

In implementing this project the investor will need to assess the viability of including a casting section in the plant and decide accordingly. This will raise the investment level and not all investors may decide to include casting facilities in the project.

## **3.5 MANUFACTURING PROCESS**

### **3.5.1 TECHNOLOGY OPTIONS**

Three types of furnaces are generally operating in the country:

- Main frequency (low frequency) furnaces
- Arc furnaces

- Induction heating furnaces (high frequency)

Very few main frequency furnaces are seen in operation (old models still in operation). The number of arc furnaces is substantial, but not being added wherever new capacity is being implemented. The preference for high frequency Induction furnaces is clearly evident amongst melters, since new furnaces of this type are being ordered and installed owing to their comparative advantages (given later in this chapter).

High Frequency Induction furnaces have a wide range of applications for melting of both ferrous and non-ferrous metals and alloys like Mild Steel, Carbon Steel, Alloy Steel, Grey Cast Iron, Malleable Iron, High Alloy Steel, Stainless Steel, Copper, Brass, Bronze, Aluminium, Zinc, Lead, Tin, etc. Specially designed furnaces are being used for surface hardening of parts, heating of billets from forging and pressing for a range of uses, applications.

### **3.5.2 PRINCIPLE OF INDUCTION HEATING**

When an object is placed near or inside a coil carrying an Alternate Current conductor, a current is induced (by transformer action) in the object. When this induced current in the object is large enough, it causes heating of the object and if this heating is for sufficient duration and intensity, it can melt the said object.

### **3.5.3 DESCRIPTION OF PRODUCTION PROCESS**

Scrap is checked for carbon content, processed if necessary, weighed and then charged into the furnace. Melt sample is taken out for chemical testing. Accordingly alloy additions are made or more charge is put into the furnace as indicated by the melt sample. One batch takes about 60-70 minutes for melting and pouring.

When molten steel comes into contact with the walls of the water cooled mould a thin solid “skin” forms. However, due to the physical characteristics of steel and

owing to thermal contraction, the skin separates from the mould wall shortly after solidification. The thickness of the skin increases due to the action of the water sprays as the casting moves downward and eventually the entire section becomes solid.

The use of oscillating moulds that move up and down for pre-determined distances at controlled rates during casting have practically eliminated sticking of the casting in the mould.

Conservation and control of temperature of the molten steel requires the use of pre-heating of the tundish. Small ladles may even be fired to compensate for heat loss. The molten metal is poured into the tundish from either a stoppered or tilting ladle. The tundish is equipped with one or more nozzles that feed the metal into the moulds.

#### **3.5.4 ADVANTAGES OF INDUCTION FURNACES**

Induction furnaces have a number of advantages compared to Arc and main frequency furnaces, as enumerated below:

- Induction is suitable both for Ferrous and Non-Ferrous metals and alloys and there is no metal or alloy which cannot be melted and cast through induction furnaces.
- Faster melting and more output is achieved with a given amount of energy compared to other systems because very little exposed area reduces loss of power due to heat radiation.
- Regular induction stirring of the metal helps in production of metals of uniform chemical composition and temperature, whereas in case of main frequency furnaces excessive stirring leads to oxidation of alloys.
- In induction furnaces the consumption of alloying elements is low because oxidation of these alloys is not possible from small exposed areas of metal.

- High quality melting is obtained, as electrical melting does not need any type of fuel. Thus there is no risk of Carbon, Sulphur and Phosphorous contaminating the metal.
- It is possible to maintain precise control over furnace temperature during the melting process to suit various metals, alloys and other metallurgical requirements.
- Changeover from Ferrous to Non-Ferrous metals is possible on charge to charge basis which demonstrates the versatility of the furnace.
- Low maintenance cost and little down time, particularly with solid state design.
- Refractory cost is considerably lower compared to other furnaces. High stirring in main frequency furnaces leads to faster erosion of furnace lining (replacement of which is expensive).
- Energy and space requirements are considerably lower for same output of required metal. In case of main frequency the kwh consumption is more by about 200-250 kwh per ton of metal (650 kwh per ton of metal produced in induction furnaces compared to 850-900 kwh for other furnaces).
- Special techniques like vacuum melting to produce pure metal is possible with Induction furnaces.
- Improved working conditions in induction furnaces where lesser heat losses from the furnace prevents air pollution since no smoke, dirt or ashes are discharged.

### **3.5.5 SPECIFICATIONS OF HIGH FREQUENCY INDUCTION FURNACE**

- High frequency is defined as anything between 500-3,000 cycles per second
- Any object placed in the interior coil through which a high frequency alternating current is passed becomes heated the heat being actually generated in the object itself.
- If a crucible is placed inside such a coil and filled with steel scrap, this scrap may actually be melted by the heat generated in the pieces.

- The HF induction furnace consists of a refractory holding vessel encircled by a stout, hollow water cooled copper coil, the ends of which are connected to the terminals of a high frequency motor.
- A current alternating at some 1,000 cycles per second and amounting to about 400 amps at 2,000-3,000 volts passes through the coil. At these high frequencies of alternation, this voltage is not dangerous to human life.
- Melting temperature ranges between 1,600-1,800 degrees celsius.
- Power consumption in HF-IF is about 650 kwh per ton of metal produced.
- One cycle of heating (upto pouring) takes about 60-70 minutes. Approximately 18-20 heats per 24 hours of operation can be achieved.
- Molten metal stirs itself under the action of the high frequency current, a deep turning over movement being set up from the top to the bottom.
- Recent technological developments in USA and Europe offer HF induction furnaces with the following features:-

#### **METALS**

All ferrous metals

All non-ferrous metals

Precious metals

#### **APPLICATIONS**

Small to medium sized foundaries

Batch melting

Vacuum melting

#### **SIZES**

3 kgs to 2,000 kgs

Solid state to 2,200 KW

#### **POWER SUPPLIES**

Solid state converters

1 KHz to 10 KHz

#### **TYPES**

Transite type

Steel case

Lift coil (truck type)

Lift coil (swing type)

Table top

## **3.6 RAW MATERIALS**

### **3.6.1 INPUTS**

Scrap melting has become an integral part of the country's steel industry in order to augment steel production. Raw material for both processes (induction and arc) are the same. All grades of scrap (excepting cast iron turnings) can be melted in Induction Furnaces to produce mild steel (MS) ingots or billets once they are free from rust and dust. Production cost of Induction furnaces is somewhat less on account of:

- Low melting loss because the loss of Fe in the form of FeO is negligible
- Metal is not exposed to Arc (3,000 degrees Celsius) thereby minimizing the oxidation of metal
- No loss of metal during slag removal
- Lower power consumption

The main raw material is iron and steel scrap. At 100 % capacity utilization the project will need 67,089 tons of scrap (inclusive of 7% wastage) to produce 62,700 tons of billets. In addition it will also require other inputs:

<b>Mineral / Chemical</b>	<b>At 100 % Capacity</b>
Ferro Silicon	160 tons
Aluminium	35 tons
Laboratory Chemicals	
Consumables (wood, furnace oil, jute rags, etc.)	

### **3.6.2 SPONGE IRON AS RAW MATERIAL**

After considerable research and development efforts, sponge iron-making technology, in particular coal based sponge iron making, has become an established iron making process in both developed and developing countries. Sponge iron manufacturing is expanding rapidly owing to the following reasons:-

- Sponge iron has become an accepted substitute for scrap.
- Sponge iron is a high quality metallic product produced from iron ore having low amount of tramp elements.
- The use of alternative iron has started exceeding 20% of the charge used in secondary steel making worldwide.
- Generation of reduced scrap quantities in integrated plants due to continuous casters and other modern techniques.
- Coal based sponge iron processes have low capital requirements and comparatively a simpler technology.

As far as Chemical composition is concerned, even if Mild Steel scrap is of an assorted type and the opening carbon content varies from low to high, it can be easily controlled/adjusted within the limits by using Sponge iron. There are no tramp elements in Sponge Iron, therefore, the steel made by using sponge iron is of better quality.

Current international prices of sponge iron range between US \$ 250-280 per ton, C&F Karachi. The landed cost is estimated at Rs. 20,250 to Rs. 22,680 (assuming Rs. 60.00 per dollar and total duty incidence of 35% including import related expenses). This is nominally in excess of the price of imported scrap (Rs. 20,000 of ton) being offered by importers (from ready stocks maintained at local warehouses). Presently melters seem to prefer shredded scrap imported from UK and UAE.

### **3.7 FACILITIES / UTILITIES REQUIRED FOR PROJECT**

#### **3.7.1 LAND**

The project's land requirement is estimated at 5 acres.

#### **3.7.2 BUILDINGS AND CIVIL WORKS**

Production area requirement estimated at 3,500 square meters whilst admn. block, stores, laboratory and ancillary structures will have a built-up area of 1,265 square

meters (total 4,765 square meters). Alongwith internal lanes, gates, etc. total cost of buildings and civil works is estimated at Rs. 42.000 million.

### **3.7.3 MACHINERY AND EQUIPMENT**

Machinery and equipment proposed to be imported for the project is given in Annex-1. Cost of machinery can vary widely depending upon origin of supply. Scrap melting plant of Italian origin will cost US \$ 2.500 million whilst Chinese origin machinery can be procured for US \$ 1.500 million. Locally fabricated furnaces are now available at comparatively lower prices (Rs. 8.50 million for a furnace of 8 tons capacity equivalent to about US \$ 142,000). Project cost estimates have been based on Chinese machinery and equipment.

The melting unit's power requirements are estimated at 5,200 KW (connected load) with the re-rolling mill needing an additional 3,300 KW (total 8,500 KW). Power consumption and expenses for the first five years of operation are shown in the earnings forecast.

### **3.7.4 WATER**

In an induction furnace the cooling water is re-circulated after passing through a cooling tower, therefore the only losses which can occur are windage, spillage and evaporation loss. Alongwith requirements for human consumption, general cleaning, gardening, etc. water requirements are estimated at 150,000 litres a day (49,500,000 litres rounded off to 50.0 million litres per year).

## **3.8 PROJECT IMPLEMENTATION SCHEDULE**

The project is expected to be implemented in 22 months as estimated below by main activities.

<b>Activity /Stage</b>	<b>Time Required (months)</b>
Preparatory activities (preparation of feasibility study, application for financial assistance, etc.)	3.0
Sanctioning of financial assistance.	3.0
Fulfillment of post-sanction formalities, allocation of funds, legal documentation, tendering for machinery & equipment, opening of L/C, award of civil works contract.	4.0
Arrival of machinery at site, completion of civil works, procurement of electric power connection, water supply, etc.	8.0
Erection and installation of machinery, equipment, finalization of administrative and production arrangements, etc.	13.0
Trial Operations	1.0
<b>Total</b>	<b>22.0</b>

## **CHAPTER 4**

### **GOVERNANCE AND MANAGEMENT STRUCTURE**

#### **4.1 CORPORATE STATUS OF PROJECT**

The project will be owned and operated by a public limited company to be incorporated in Pakistan under the Companies Act 1984. The sponsors have the option to contribute to the extent of 50 % or more of paid-up capital with the remaining amount to be offered to the general public through public flotation of shares subsequent to procurement of the consent of the Controller of Capital Issues.

#### **4.2 MANAGEMENT STRUCTURE/ ORGANOGRAM**

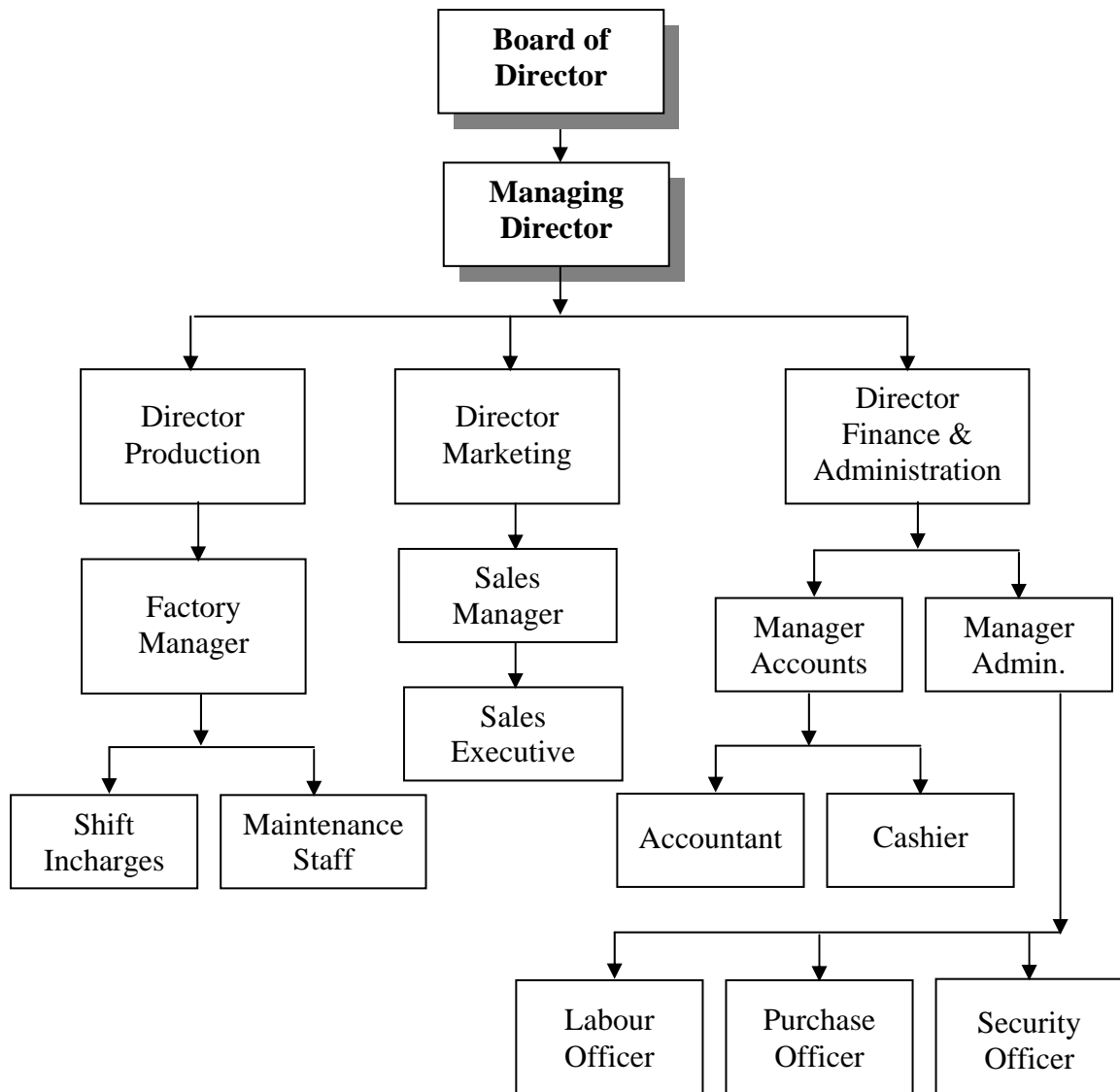
The project involves large investment in manufacturing facilities and related assets, a substantial portion expected to come from the general public through Initial Public Offering (IPO) of shares through the stock markets, and a sizeable chunk as financial assistance from financial institutions. Professional management in all spheres and at all levels is essential to ensure high productivity, efficiency and profitability. The proposed management structure is described below and subsequently depicted in the form of an organogram.

##### **4.2.1 BOARD OF DIRECTORS**

The apex body presided by the Chairman, it is elected by shareholders at the Annual General Meeting, and is mandated to formulate policies, review operations and perform various functions as laid down in the Companies Act 1984 in conjunction with the Memorandum of Association and Articles of Association of the Company.

In order to ensure that the project is professionally and competently managed, it is imperative that Directors on the Board of Directors should be from the steel sector with appropriate qualifications and experience.

**CHART - 1**  
**MANAGEMENT STRUCTURE**



**4.2.2 MANAGING DIRECTOR (CHIEF EXECUTIVE OFFICER)**

The CEO performs his functions in accordance with the MA/AA and as per policy guidelines laid down by the board, to which he is accountable. The CEO must be a qualified, experienced professional in the field of metals, metallurgy in order to exercise effective control on the organization.

#### **4.2.3 DIRECTORS (PRODUCTION, MARKETING, FINANCE AND ADMINISTRATION)**

These senior level executive positions need to be filled by professionally competent persons. Job descriptions should be prepared for this hierarchy of executives, and also for lower levels (down to the lowest level of managerial positions).

#### **4.2.4 MANAGEMENT TEAM**

This is a body of senior executives comprising CEO and all three Directors who collectively take executive decisions and exercise supervisory control. The Managing Director is assisted by his senior colleagues on issues of corporate significance. It normally meets once a week (scheduled) or as and when necessary.

### **4.3 MANPOWER REQUIREMENTS**

The project will need to employ 461 persons of various skills and experience including a substantial number of un-skilled workers.

<b>Staff Category</b>	<b>No. of Persons</b>
Factory Admin.	71
Production Supervisory	28
Production Staff	301
Workshop, maintenance	21
Kitchen, Canteen	10
Head Office (Admin., Sales, Accounts, etc.)	30
<b>Total</b>	<b>461</b>

### **4.4 SYSTEMS AND PROCEDURES**

An organization's performance is largely dependant upon the formulation of appropriate systems and procedures to cover all organizational aspects, such as:-

- Materials Procurement
- Finance and Accounts

- Inventory Management
- Quality Control
- Marketing
- Delegation of Authority
- Human Resource Management

Due importance must be given to this management aspect by the board of directors and senior executives in order to ensure organizational efficiency.

#### **4.5 TRAINING**

Some technical positions such as that of metallurgist, chemist, finance, marketing, etc. will be filled by persons possessing requisite qualifications and experience. Middle and junior level employees need to be trained regarding organizational matters, at times on operations/maintenance of machinery and equipment, etc. In the present day competitive environment companies need to provide specific skills training to staff alongwith refresher courses to enable them to keep up with technological progress and advancements.

## CHAPTER 5

### FINANCIAL APPRAISAL

This chapter evaluates various financial aspects of the project (cost of project, earnings forecast, rates of return, payback period, cash flow, balance sheet, etc.). Wherever calculations, workings, etc. are voluminous, a summarized version is presented in this chapter and detailed calculations are given in the relevant Annex.

#### 5.1 COST OF PROJECT

Total project cost is estimated at Rs. 1,194.605 million as shown below in summarized form.

**TABLE – 19**  
**COST OF PROJECT**

(Rs. in 000)

Description	Local Currency	Foreign Currency	Total
Land	183,750	-	183,750
Buildings and Civil works	42,100	-	42,000
Machinery and Equipment	-	540,000	540,000
Import Related Costs	202,950	-	202,950
Erection and Installation	27,000	-	27,000
Sub-station, Electrification	20,000	-	20,000
Fixtures, Fittings, etc.	3,000	-	3,000
Vehicles	5,675	-	5,675
Prelim & Pre-op. Expenses	8,750	-	8,750
Contingencies	20,000	-	20,000
<b>Fixed Cost</b>	<b>513,125</b>	<b>540,000</b>	<b>1,053,125</b>
Working Capital	141,480	-	141,480
<b>TOTAL PROJECT COST</b>	<b>654,605</b>	<b>540,000</b>	<b>1,194,605</b>

## 5.2 FINANCIAL PLAN

The project is proposed to be financed through a combination of equity and Ijara/Lease financing in the ratio of 50:50 respectively. The financial assistance (Ijara/ Lease) will carry a profit markup rate of 9 percent per annum payable over a period of ten years.

**TABLE - 20**  
**FINANCIAL PLAN**

(Rs. in 000)

Source of Finance	Share	Local Currency	Foreign Currency	Total
<b>1) Financial Assistance</b>				
Ijara/Lease Financing	50 %	-	597,303	597,303
<b>Sub-Total (1)</b>	<b>50 %</b>	<b>-</b>	<b>597,303</b>	<b>597,303</b>
<b>2) Equity</b>				
Sponsors	25 %	298,651	-	298,651
Public	25 %	298,651	-	298,651
<b>Sub-Total (2)</b>	<b>50 %</b>	<b>597,303</b>	<b>-</b>	<b>597,303</b>
<b>TOTAL (1) + (2)</b>	<b>100 %</b>	<b>597,303</b>	<b>597,303</b>	<b>1,194,605</b>

## 5.3 PROFIT AND LOSS ACCOUNT

A summarized version of the projected profit & loss account is given below.

**TABLE - 21**  
**PROJECTED PROFIT AND LOSS ACCOUNTS**

(Rs. in 000)

Description	Year 1	Year 2	Year 3	Year 4	Year 5
Sales	1,233,581	1,606,842	1,828,728	2,043,07	2,055,932
Cost of Goods Sold	1,108,491	1,390,284	1,563,168	1,726,592	1,737,781
Gross Profit	125,090	216,558	265,560	316,415	318,151
Operating Expenses	18,410	20,615	23,533	25,763	27,306
Operating Profit	106,680	195,943	242,027	290,652	290,845
Markup & Amort.	55,507	50,131	44,755	39,379	34,03
WPPF + WWF	3,582	10,207	13,809	17,589	17,979
Profit before Taxes	47,591	135,605	183,463	233,684	238,863
Provision for Taxes	16,657	47,462	64,212	81,789	83,602
<b>NET PROFIT</b>	<b>30,934</b>	<b>88,143</b>	<b>119,251</b>	<b>151,895</b>	<b>155,261</b>

Description	Year 1	Year 2	Year 3	Year 4	Year 5
<b>DIVIDENDS:</b>					
Percent	-	10 %	15 %	25 %	25 %
Amount	-	59,730	89,595	149,326	149,326
Retained Earnings	30,934	28,413	29,656	2,569	5,935
Cum. Ret. Earnings	30,934	59,347	89,003	91,572	97,507

## 5.4 RATES OF RETURN

On the basis of the earnings forecast and related projections, rates of return for the project are calculated below:

**TABLE - 22**  
**RATES OF RETURN**

(in percentages)

Description	Year 1	Year 2	Year 3	Year 4	Year 5
Gross Profit to Sales	10.14	13.48	14.52	15.49	15.48
Operating Profit to Sales	8.65	12.19	13.23	14.23	14.15
Net Profit to Sales	2.51	5.49	6.52	7.43	7.55
Net Profit to Equity	5.18	14.76	19.97	25.43	25.99

## 5.5 PAYBACK PERIOD

Payback period for the project, both in terms of owner's equity and total investment, is calculated below:

Total Investment	=	Rs. 1,194.605 million
Equity	=	Rs. 597.303 million

(Rs. 000)

Year	Net Profit
1	30,934
2	88,143
3	119,251
4	151,895
5	155,261

Payback period for Equity	=	5.35 years
Payback period for total investment	=	9.20 years

## 5.6 CAPITAL: OUTPUT RATIO

Capital output ratio, representing the production potential of the project in relation to the investment involved in its establishment, are calculated below:

**TABLE – 23**  
**CAPITAL: OUTPUT RATIO**

(Rs. in 000)

Description	Year 1	Year 2	Year 3	Year 4	Year 5
Total Investment	-	-	1,194,605	-	-
Sales (Output)	1,233,581	1,606,842	1,828,728	2,043,007	2,055,932
Capital: Output Ratio	1:1.03	1:1.35	1:1.53	1:1.71	1:1.72

## 5.7 CASH FLOW

Projected cash flow of the project is shown hereunder:

**TABLE – 24**  
**PROJECTED CASH FLOWS**

(Rs. in 000)

Description	End of Constr.	Year 1	Year 2	Year 3	Year 4	Year 5
<b>SOURCES</b>						
Net Profit	-	30,934	88,143	119,251	151,895	155,261
Add back:	-	66,271	66,271	66,271	66,271	66,271
Depreciation	-	1,750	1,750	1,750	1,750	1,750
Amortization	-	-	-	-	-	-
<b>Funds from Operations</b>	-	<b>98,955</b>	<b>156,164</b>	<b>187,272</b>	<b>219,916</b>	<b>223,282</b>
Paid-up Capital	298,651	-	-	-	-	-
Public subscription	298,651	-	-	-	-	-
Lease Financing	597,303	-	-	-	-	-
Inc. in Current Liabilities	-	15,000	5,000	5,000	5,000	5,000
<b>Total Inflow</b>	<b>1,194,605</b>	<b>113,955</b>	<b>161,164</b>	<b>192,272</b>	<b>224,916</b>	<b>228,282</b>
<b>USES</b>						
Fixed Assets	1,044,375	-	-	-	-	-
Capitalised Expenses	8,750	-	-	-	-	-
Repayment of Lease Instalments	-	59,730	59,730	59,730	59,730	59,730
Payment of Dividends	-	-	-	59,730	89,595	149,326
Increase in Current Assets	-	112,577	32,899	21,380	19,699	1,658
<b>Total Outflow</b>	<b>1,053,125</b>	<b>172,307</b>	<b>92,629</b>	<b>140,840</b>	<b>169,024</b>	<b>210,714</b>
Surplus / (Deficit)	141,480	(58,352)	68,535	51,432	55,892	17,568
Cash Opening Balance	-	141,480	83,128	151,663	203,095	258,987
Cash Closing Balance	141,480	151,663	151,663	203,095	258,987	276,555

## 5.8 BALANCE SHEET

Projected balance sheet for the first five years of operation are shown below:

**TABLE - 25**  
**PROJECTED BALANCE SHEETS**

(Rs. in 000)

Description	End of Constr.	Year 1	Year 2	Year 3	Year 4	Year 5
<b>ASSETS</b>						
Current Assets:-						
Cash/Bank Balance	141,480	83,128	151,663	203,095	258,987	276,555
Accounts Receivable	-	51,399	66,952	76,197	85,125	85,664
Raw material Inv.	-	33,453	43,548	49,560	55,367	55,717
Finished goods Inv.	-	25,700	33,476	38,099	42,563	42,832
Stores & Spares	-	2,025	2,500	3,000	3,500	4,000
<b>Total Current Assets</b>	<b>141,480</b>	<b>195,705</b>	<b>297,139</b>	<b>369,951</b>	<b>445,542</b>	<b>464,768</b>
Capital Expenses	8,750	7,000	5,250	3,500	1,750	-
Fixed Assets (at cost)	1,044,375	1,044,375	1,044,375	1,044,375	1,044,375	1,044,375
Less: Accum. Dep.	-	66,271	132,542	198,813	265,084	331,355
Fixed Assets (net)	1,044,375	978,104	911,833	845,562	779,291	713,020
<b>TOTAL ASSETS</b>	<b>1,194,605</b>	<b>1,180,810</b>	<b>1,214,223</b>	<b>1,219,013</b>	<b>1,226,583</b>	<b>1,177,788</b>
<b>LIABILITIES AND EQUITY</b>						
<b>Current Liabilities:</b>						
Dividends Payable	-	-	59,730	89,595	149,326	149,326
Accounts Payable	-	15,000	20,000	25,000	30,000	35,000
<b>Total Current Liab.</b>	<b>-</b>	<b>15,000</b>	<b>79,730</b>	<b>114,595</b>	<b>179,326</b>	<b>184,326</b>
Financial Assistance	597,303	537,573	477,843	418,113	358,383	298,653
<b>Equity</b>						
Paid-up Capital	597,303	597,303	597,303	597,303	597,303	597,303
Ret. Earnings	-	30,934	59,347	89,003	91,572	97,507
<b>Total Equity</b>	<b>597,303</b>	<b>628,237</b>	<b>656,650</b>	<b>686,306</b>	<b>688,875</b>	<b>694,810</b>
<b>TOTAL LIABILITIES AND EQUITY</b>	<b>1,194,605</b>	<b>1,180,810</b>	<b>1,214,223</b>	<b>1,219,013</b>	<b>1,226,583</b>	<b>1,177,788</b>

## 5.9 BREAK-EVEN ANALYSIS

The project's commercial break-even level (profitability break-even) is calculated below:

**TABLE – 26**  
**BREAK-EVEN ANALYSIS**

(Rs. in 000)

Items	Variable Cost	Fixed Cost	Total Cost
Raw Material	1,337,206	-	1,337,206
Stores and Spares	5,400	2,700	8,100
Salaries and Wages	43,822	14,607	58,429
Depreciation	-	66,271	66,271
Utilities	207,448	36,608	244,056
Repairs/ Maintenance	10,542	5,271	15,813
General & Admin. Expenses	12,184	8,122	20,306
Selling Expenses	5,000	2,500	7,500
Financial Expenses	-	2,253	32,253
WPPF & WWF	17,979	-	17,979
Amortizations	-	1,750	1,750
<b>TOTAL</b>	<b>1,639,581</b>	<b>170,082</b>	<b>1,809,663</b>

Sales Value of Production = Rs. 2,055,932

Break-even Sales	=	<u>170,082</u>	<u>170,082</u>	<u>170,082</u>
		1,639,581	1 - 0.80	0.20
	1-	<u>2,055,932</u>		

Break-even Sales = Rs. 850,410

Capacity Utilization Required

to Break-even	<u>850,410</u>	x 100	= 41.36%
	2,055,932		

Margin of Safety 100% - 41.36% = 58.64%

## 5.10 VALUE ADDED/ CONTRIBUTION TO GDP

Implementation of the project is expected to have a beneficial economic impact on regional/national economic development. The project's contribution towards the country's Gross Domestic Product (GDP) is estimated below.

**TABLE - 27**  
**VALUE ADDED /CONTRIBUTION TO GDP**

(Rs. in 000)

<b>Description</b>	<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>	<b>Year 4</b>	<b>Year 5</b>
Value of Production (Sales)	1,233,581	1,606,842	1,828,728	2,043,007	2,055,932
<b>Less Intermediate Input:</b>					
Raw Material	802,860	1,045,140	1,189,430	1,328,807	1,337,206
Utilities	159,582	197,538	242,968	242,968	244,056
Mfg. Overheads	27,865	27,865	31,819	31,819	31,819
Depreciation	66,271	66,271	66,271	66,271	66,271
<b>Total Intermediate Inputs</b>	<b>1,056,578</b>	<b>1,336,814</b>	<b>1,508,093</b>	<b>1,669,865</b>	<b>1,679,352</b>
Value Added	177,003	270,028	320,635	373,142	376,580
Value Added as % of Output	14.35 %	16.28 %	17.53 %	18.26 %	18.32 %
Value Added per Worker (Rs.)	383,954	585,744	695,521	809,419	816,875

## **CHAPTER 6**

### **CONCLUSION**

Global demand for iron and steel has risen sharply in the last five years mainly due to increasing demand from China and India, the world's two most populous countries which are experiencing high rates of economic growth.

Pakistan's consumption of iron and steel, which was very low in the past, has more than doubled in terms of per capita consumption (from 14.3 kgs per capita in 2003, to 30 kgs in 2004 and 35 kgs in 2005). This has been made possible by very high rates of growth in the production of automobiles, motor cycles, refrigerators, deep freezers and air-conditioners. The industrial and construction sectors have also recorded rapid growth fuelling demand for iron, steel and its products.

New capacity is being added by steel scrap melters which provided 2.10 million tons out of the country's total demand of 4.653 million tons in 2004-2005 (45.13 % share). Over 100 new furnaces have been ordered by melters in the recent past, out of which about 80 have been installed and are operational. Induction furnaces are now being preferred by melters due to their clear-cut advantage over arc furnaces and the older types of main frequency (low frequency) furnaces.

Pakistan's demand for iron and steel is estimated at 4.653 million tons in 2004-2005 against which domestic production capacity is placed at 2.750 million tons leaving a deficit of 1.903 million tons. To fill this deficit 30 induction furnaces of 65,000 tons per annum capacity are needed.

There is a large shortage of production capacity in the iron and steel sector which should be urgently developed. Three options are available to develop production capacity:

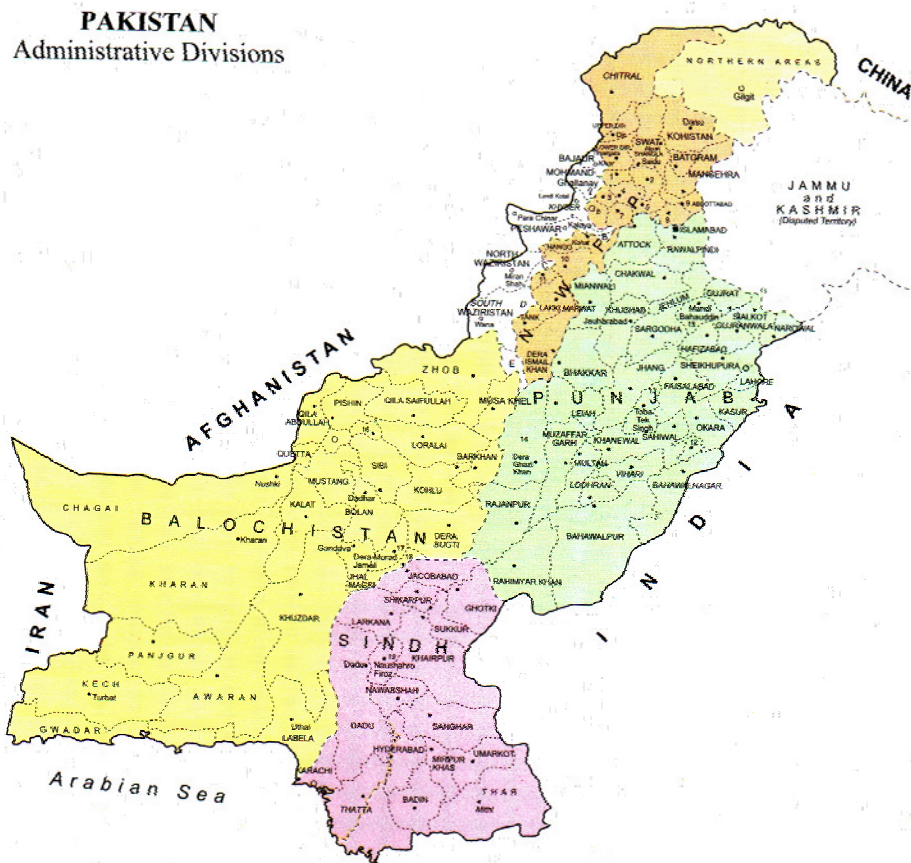
- Expansion in the capacity of Pakistan Steel Mills.
- Establishment of a new steel mill based on indigenous iron ore (this is likely to take too much time, however, this option deserves serious consideration).
- Setting up of new induction furnaces.

Local and foreign investors need to be motivated to set-up new iron, steel production capacity in Pakistan. A multi-pronged strategy, action plan needs to be effectively pursued in order to achieve the desired objective.

# ANNEXURE 1

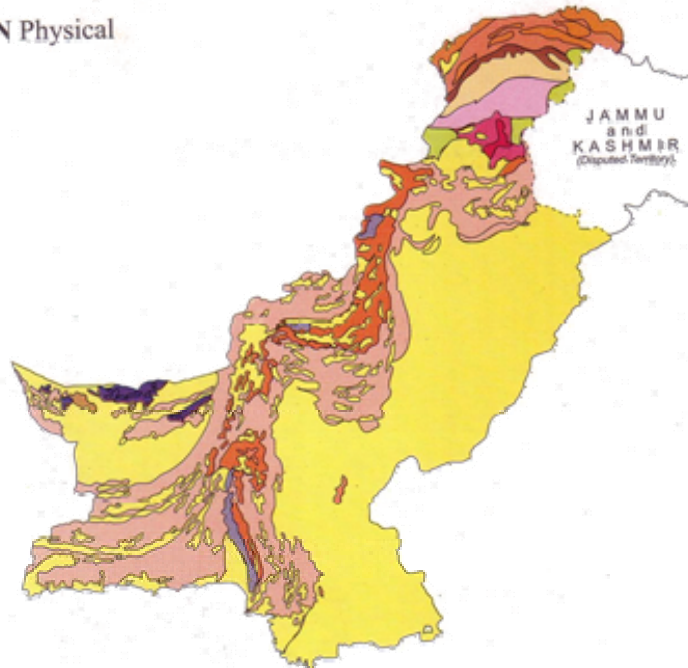
## PAKISTAN - A PROFILE

### INTRODUCTION



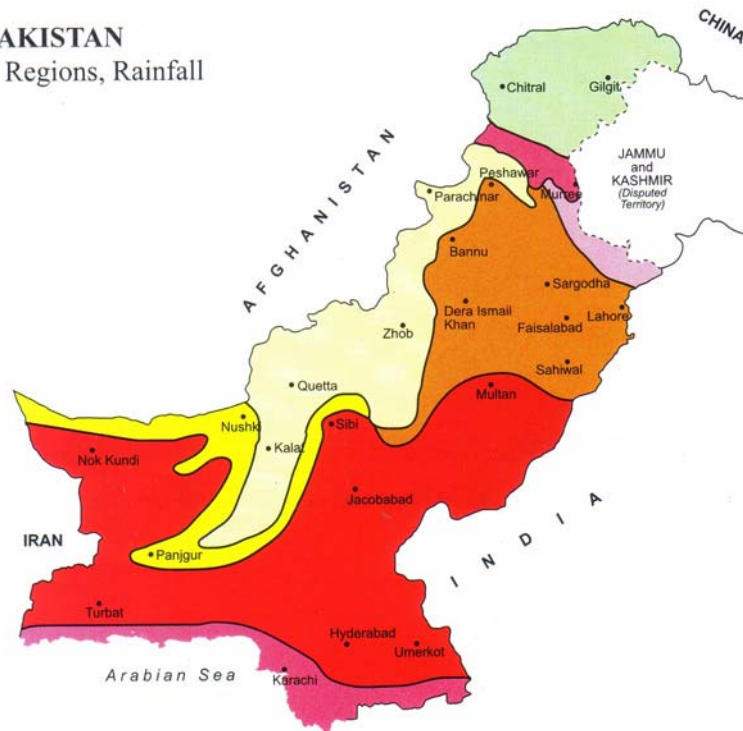
Pakistan is located in South Asia. It borders Iran to the southwest, Afghanistan to the northwest, China to the northeast and India to the east. The Arabian Sea marks Pakistan's southern boundary.

## PAKISTAN Physical



The total area of Pakistan is 796,095 square kilometers and the country is divided administratively into four provinces – Balochistan, North-West Frontier Province, Punjab and Sindh – and numerous federally administrated areas. The disputed territory of Azad Jammu & Kashmir lies to the north of Punjab.

## PAKISTAN Climatic Regions, Rainfall



Pakistan has a diverse array of landscapes spread among nine major ecological zones from north to south. It is home to some of the world's highest peaks including K-2 which at 8,611 meters above sea level is the world's second highest peak. Intermountain valleys make up much of the North-West Frontier Province, while the province of Balochistan in the west is covered mostly by rugged plateaus. In the east, irrigated plains along the Indus River cover much of Punjab and Sindh. In addition, both Punjab and Sindh have deserts, Thal, Cholistan and Thar deserts respectively.

Most of Pakistan has a generally dry climate and receives less than 250 mm of rain per year. The average annual temperature is around 27°C, but temperatures vary with elevation from -30°C to -10°C during cold months in the mountainous and northern areas of Pakistan to 50°C in the warmest months in parts of Punjab, Sindh and the Balochistan Plateau. Mid-November to February is dry and cool; March and April bring sunny spring, May to July is hot, with 25 to 50% relative humidity; Monsoons start in July and continue till September; October- November is the dry and colourful autumn season.

Pakistan had an estimated population in 2005 of 160 million, 40% of this population was less than 15 years of age. The major cities of Pakistan and their estimated populations are; Karachi (16.0 million), Lahore (8.0 million), Faisalabad (6.0 million), Rawalpindi (5.0 million), Multan (4.5 million), Hyderabad (3.0 million), Gujranwala (1.8 million) Peshawar (1.6) and Quetta (0.85). Islamabad, the Capital of the country, has a population of around 750,000.

According to the 1973 Constitution, Pakistan is governed under a federal parliamentary system with the President as head of state and a Prime Minister as head of government. The legislature, or parliament, consists of the Lower House (National Assembly) and the Upper House or Senate. Members of the National Assembly are directly elected for five-year terms.

Executive power lies with the President and the Prime Minister. The Prime Minister is an elected member of the National Assembly and is the leader of the majority party in the

National Assembly. An electoral college consisting of members of the national and provincial legislatures elects the president for a five-year term.

After the events of 9/11, Pakistan has become a key US ally in the war against terror. This alignment is totally in-line with the views of the majority of Pakistanis who practice and preach a moderate version of Islam. The Government of Pakistan fully realizes the need for promoting Islam as a modern progressive religion. The Government has chosen the difficult option of fighting the war against terror by clamping down on Taliban and Al-Qaeda remnants along the border with Afghanistan. The people of Pakistan fully support the Government in its efforts to promote the true face of Islam.

The US Government fully backs and supports Pakistan in this war against terror. US Aid which was stopped after the 1998 Nuclear Test has been restored and Pakistan will receive US\$ 3.0 billion over the next 5 years, divided equally between economic and military aid.

Pakistan follows a very active policy of regional alliances for trade and economic development. It is an active member of the South Asian Association for Regional Cooperation (SAARC) which groups Pakistan, India, Bangladesh, Sri Lanka, Nepal, Bhutan and the Maldives. It is also an active member of the Economic Cooperation Organization (ECO) comprising of Turkey, Iran, Pakistan, Afghanistan, and the six Central Asian Republics. Pakistan has an observer status at the Gulf Cooperation Council (GCC) as well as ASEAN and Shanghai Cooperation Organization. Being a member of WTO it conforms to most of the international trade regimes.

## **ECONOMY**

Pakistan's economy has made significant progress in the last six years. This has been possible because of the Government's policy of initiating growth through domestic and foreign direct investment. The GDP growth rate has increased from 1.8% per annum in 2001 to 8.4% per annum in 2005. Despite the devastating earthquake in October 2005, the economy is expected to grow at over 6.6% in 2006. Pakistan's GDP in 2005 was

estimated at US\$ 385.2 billion and its per capita GDP was US\$ 2,400. The Country's credit rating has been upgraded by Moody's from Caa1 in 2002 to Ba3 i.e. "stable" in 2006.

Pakistan has over 3.5 million laborers working in various countries of the Middle East. In addition, Pakistani technical and professional manpower is engaged in lucrative pursuits in USA, UK, Canada, Malaysia, etc. These non-resident Pakistanis annually send over US\$ 4.0 billion in foreign remittances.

The Government of Pakistan's policy of encouraging Foreign Direct Investment (FDI) has seen it grow from a mere US\$ 376.0 million in 1999 to more than US\$ 1.5 billion in 2005 which is expected to grow to over US\$ 3.0 billion in 2006.

In addition to Foreign Direct Investment, low domestic interest rates have meant that there has been an upsurge in domestic investment; the weighted average rate of lending has fallen from 16% in 1999 to approximately 8% in 2005.

The Government's economic policy has seen foreign currency deposits rise from US\$ 1.7 Billion in 1999 to now US\$ 13.0 billion in 2006; this has led to both low rates of inflation and to a stable exchange rate.

With the Government of Pakistan targeting annual growth in the economy at 7.5% per annum in the next 5 years, Pakistan is the country of choice for foreign and domestic investors.

## **INFRASTRUCTURE**

The National Highway Authority (NHA) has the responsibility for 17 of Pakistan's major inter provincial links called the National Highway including the Motorways, which are access controlled and tolled highways. Total length of roads, under NHA, currently stands at 8845 Kms.

These roads account for only 3.5% of Pakistan's entire road network but cater for 80% of the commercial road traffic in the country. Improvement and extension of the existing network is, therefore, essential to develop remote areas and provide better connection between the economic centers of Pakistan. In addition a first class road network is essential if Pakistan is going to connect its all-weather Arabian Seaports with the landlocked Central Asian Republics and Western China. The Government has initiated work on the North-South Trade Corridor with planned investment of over US\$ 60 billion.

In order to further speed up the development of the road network, the Government is actively seeking the participation of the private sector to implement road projects on a Build-Operate-Transfer (BOT) basis. A number of projects are currently being implemented under the BOT concept and others are in the identification stage. These BOT projects cover the construction of new roads as well as the upgrading of existing roads.

Pakistan has about 1062 km of coastline on the Arabian Sea running from the Indian border to the Persian Gulf. The Karachi Port is the premier port of Pakistan and is managed by the Karachi Port Trust (KPT). Karachi port handles about 75% of the entire national cargo. It is a deep natural port with a 11 km long approach channel to provide safe navigation up to 75,000 DWT tankers, modern container vessels, bulk carriers and general cargo ships. The Karachi Port has 30 dry cargo berths including two Container Terminals and 3 liquid cargo-handling berths. KPT intends to cater for 12-meter draught ships, which are the most widely used container vessels. In order to facilitate accommodate and fast turnaround time of mother vessels, the KPT is offering to the private sector the opportunity to develop a terminal on BOT basis. In addition KPT has plans to develop a Cargo Village on 100 acres. This Cargo Village shall serve as a satellite to the port, integrating container, bulk and general cargo handling as well as providing processing plants for perishable exports. With direct connection to the National Highway Network, as well as National Railways Network the cargo village shall also alleviate the problem of upcountry trade with cost effective storage/handling services in the vicinity of the port. A master plan is under preparation and all the units within the

village shall be allocated to the private sector on BOT and Build-Operate-Own (BOO) basis within the next year.

Pakistan's second Sea Port, Port Qasim is located 50 kilometers to the South East of Karachi. It is the Country's first industrial and multi-purpose deep-sea-port. Currently it is handling 23% of Pakistan's sea trade. Port Qasim has attractions and advantages for investment both in port facilities and port-based industrial development. Port Qasim Authority from the very beginning has actively sought the help of the private sector in the development of its port structure. Some of the projects which have been completed with private sector involvement include; dedicated oil terminal developed in private sector on BOO basis at a cost of US\$ 87 million to cater for oil imports with a handling capacity of 9 million tons per annum, a container terminal developed by P&G Group, Australia, at a cost of US\$ 35 million on BOO basis, for chemicals imports a facility in collaboration with Vopak of Netherlands on BOT basis at a cost of US\$ 67 million. Some of the projects which the Port plans to develop with the private sector on the basis of BOT include; establishment of a second oil jetty, establishment of a dedicated coal and clinker/cement terminal and the establishment of a marine workshop and dry dock facilities.

To encourage industrial development the Port Qasim Authority has reserved 300 acres of land on a prime location in the Eastern Industrial Zone (EIZ) for allotment of plots to Overseas Pakistanis to induce and encourage foreign investment and provide them an opportunity to establish small size industries in Pakistan. Each plot is measuring 100 square yards at a very low cost on attractive terms and conditions. This is in addition to existing 1,200 acres of industrial zone which houses a number of auto assemblers such as Toyota, Suzuki, Chevrolet and the Textile City spread over 1,250 acres.

The Pakistan Merchant Marine Policy 2001, has deregulated the shipping sector and aims to attract investment; both local and foreign, public and private, by offering a range of incentives. The new policy in addition to offering duty-free import of ships, offers many new incentives to local and foreign investors including Income Tax exemption till 2020.

Pakistan's annual seaborne trade is about 45 million tons, just 5 per cent of which is carried by the national carrier Pakistan National Shipping Corporation (PNSC), the country's annual freight bill surpasses staggering \$ 1.5 billion which is causing a colossal drain on foreign exchange resources, the marine policy aims to reverse this situation to some extent.

The Shipping Policy aims to revive and augment national ship-building/capacity to meet 20 per cent ship construction requirements of the country merchant marine and entire requirements of support and ancillary crafts. The policy also aims to rejuvenate and expand the ship repair potential to undertake the entire range of repairs and maintenance of 50 per cent of Pakistani Flag ocean-going vessels and all ancillary sectors. The new Shipping Policy offers many financial incentives for potential investors. It offers tax exemptions and concessional tax measures backed by assurances. It also aims at simplifying the rules by deregulating the sector.

To begin with, ships and floating crafts — tugs, dredgers, survey vessels, and specialized crafts — purchased or bareboat chartered by a Pakistani entity flying the Pakistani flag will be exempt from all import duties and surcharges till 2020. The policy accords ship-building and ship-repair the status of an industry under the investment policy which is entitled to all incentives contained therein.

To attract foreign investment, all port and harbor authorities in Pakistan will allow all ships and floating crafts 10 per cent reduced berthing rates when the same are berthed for purposes of repair and maintenance. Under the Policy, ships and all floating crafts are considered bonafide collateral against which financing can be obtained from Banks and Financial Institutions subject to policy of the financial institution.

There are 42 airports in the country managed by the Civil Aviation Authority (CAA). Out of these, five airports; Lahore, Karachi, Islamabad, Peshawar and Quetta are international airports. The CAA is planning to develop a new international airport at Islamabad for

which land has been acquired and it is planned to fund the US\$ 250-300 million on BOT basis.

The Pakistan International Airlines (PIA) is the national flag carrier flying to 46 international and 36 local destinations. Other Pakistani airlines in the private sector include, Aero Asia, Air Blue, Shaheen Air International and Pearl Air. In addition to direct flights from most parts of the world, Pakistan can also be accessed through the regional hubs of most international airlines, which operate through airports in the Gulf countries.

The Pakistan Railways provides an important nation-wide mode of transportation in the public sector. It contributes to the country's economic development by catering to the needs of large-scale movement of freight as well as passenger traffic. Pakistan railway provides transport facility to over 70 million people and handles freight above 6 million tons annually.

The Pakistan Railways Network was based on a total of 11,515 track kilometers (including track on double line, yard & sidings) at the end of 2001-2002. This network consists of 10,960 kilometers of broad-gauge and 555 kilometers of meter gauge.

Pakistan Railways has launched modernization activity with rehabilitation and improvement plan both for its infrastructure and rolling stock including prime mover. The ongoing schemes worth over US\$ 500 million are progressing satisfactorily and have brought a radical improvement in service. The railways is gearing up to the challenge of providing improved connectivity to Iran, India, and link the upcoming Gwadar Port to Afghanistan and onward to Turkmenistan.

Pakistan Telecommunication Limited (PTCL) dominated Pakistan's telecommunications market for the fixed-line services. Today the Pakistan Telecommunication Authority (PTA) has the role of a regulatory body and is responsible for implementing the telecom deregulation policy. For a long time, Pakistan lagged behind in the region as far as

telecom access is concerned. With cellular mobile revolution taking place, Pakistan's tele-density currently stands at 10.37%, with gross subscribers base of fixed (5.05 million) as well as mobile subscribers (10.54 million) touching 15.59 million for a population of 160.0 million.

The Telecomm Sector has attracted the largest FDI in Pakistan with approximately US\$ 1.5 billion having been invested in 2005.

At the moment there are six companies providing mobile phone services in Pakistan, with the largest of them, Mobilink (owned by Orascom Telecom) with nearly 50% of the market share, other foreign players include MCE, Telenor and Warid.

In addition Wateen Telecom, a subsidiary of UAE-based Al Warid Telecom, has launched a US\$ 75.0 million project to lay an optic fiber optic backbone across the Country. The first segment of the project of 800 kms would stretch from Karachi to Rahimyar Khan and would be further linked with the rest of the country up to Peshawar through 63 cities. When completed the backbone would be 5,000 kilometers, long spanning the length and the breadth of Pakistan and would facilitate both the corporate and residential segments, providing voice and high-speed data services on a converged wireless network.

Pakistan in 2005 had 70 operational providers of internet services across 1,900 cities and towns of the Country catering to about 2 million subscribers. In addition the Government has reduced bandwidth rates for high speed board band internet connections and the number of subscribers in this category is expected to grow to 200,000 by end of 2006.

## **AGRICULTURE**

Agriculture accounts for nearly 23 percent of Pakistan's national income and employs 42 percent of its workforce. Nearly 68 percent of the population lives in rural areas and is directly or indirectly dependent on agriculture for their livelihood. Livestock is the single largest contributor 47 percent share in the national income. The major crops; cotton,

wheat, sugarcane and rice contribute 37 percent to agriculture while the minor crops like oilseed, spices, onion and pulses contribute another 12 percent.

Pakistan is the fifth largest producer of milk in the world. The per capita availability of milk at present is 185 liters, which is the highest among the South Asian countries. Milk production in Pakistan has seen a constant increase during the last two decades. The production has increased from 8.92 million metric tons in 1981 to 28 million metric tons in 2005. There is a large and untapped potential in the dairy industry. With a population of 160 million, a significant demand for dairy products exists in Pakistan. There is a need for establishing modern milk processing and packaging facilities based on advanced technology to convert abundantly available raw milk into high value added dairy products. In addition, with improved conditions for milk pasteurization, availability of chilled distribution facilities and consumer preference for the low cost pasteurized milk, the sector provides unique opportunity for investment in establishing pasteurized milk production plants.

There is also great scope for establishing related industries in the form of an efficient milk collection system and refrigeration & transportation facilities. The sector offers opportunity to foreign investors for establishing a joint venture for the production of dairy products, particularly dried milk and infant formula milk for which great demand exists in the neighboring countries like Afghanistan, Iran, UAE and Saudi Arabia.

Out of the 28 million tons of milk produced per annum in Pakistan, only 2.5 to 3 per cent reaches the dairy plants for processing into variety of dairy products. Pakistan's dairy industry produces Ultra Heat Treated (UHT) Milk, Pasteurized Milk, Dry Milk Powder, and Condensed milk. Other major milk products produced by the dairy industry include butter, yogurt, ice cream, cheese, cream and some butter oil. Approximately half of the 0.3 million tons of milk available to the industry is processed into UHT milk, 40 percent into powdered milk, and the remaining 10 percent into pasteurized milk, yogurt, cheese and butter etc. Major players in the sector include Nestle, Haleeb and Engro Foods.

Pakistan produced 1.1 million tons of beef, 740,000 kgs of mutton and 410,000 kgs of chicken meat in 2005; in addition it also produced approximately 5 billion eggs in 2005. Processed meat is exported to Saudi Arabia, UAE, Oman, Bahrain, Qatar and Kuwait in the Middle East and Malaysia in the Far East. Pakistan exports around 40,000 live animals and 2.83 million kg of meat to the Gulf.

Cotton is an important non-food crop and a significant source of foreign exchange earning. It accounted for 10.5 percent of the value added in agriculture and about 2.4 percent of the GDP in 2005. Pakistan in 2005 produced about 14.5 million bales of cotton.

Rice is a high value added cash crop and is also a major export item, it accounts for 5.7 percent of the total value added in agriculture and 1.3 percent of the GDP. Production of rice in 2005 was about 5 million tones. In 2005 rice became the second largest export from Pakistan when the country exported rice worth US\$ 934 million. In addition to high value Basmati rice, Pakistan also exports IRRI 6 parboiled rice and IRRI rice to Africa.

Sugarcane is an intensive cash crop and serves as the major raw material for production of white sugar and gur. Its share in the value added in agriculture is 3.6 percent and 0.8 percent in the GDP. The total sugarcane crop in 2005 was estimated at 45 million tones.

Wheat is the leading food grain of Pakistan, and being the staple diet of the people, it occupies a central position in agricultural policy. It contributes 13.8 percent to the value added in agriculture and 3.2 percent of the GDP. The size of the wheat crop in 2005 was estimated at 21.0 million tons.

In addition to the above, Pakistan also produces bajra, jowar, tobacco, barley, oilseed, pulses, potato, onion, chillies etc.

The Government of Pakistan has launched a plan to promote Corporate Agriculture Farming and has offered a number of incentives to develop the sector including the provision of land and other facilities.

## **MANUFACTURING**

In the post quota regime, total exports of textile increased from \$ 6.5 billion in 2004 to \$ 7.4 billion in 2005. Pakistan textiles are poised to achieve \$ 10 billion exports by June 2006. This growth is largely driven by the continuity of government policies, positive macroeconomic indicators, tariff rationalization, removal of sales tax on textile chain, deregulation, lower interest rates, increased market access, public-private partnership programs and the creation of a hassle free environment by the government.

The Government of Pakistan continues to take steps to further develop the textile sector focusing on bridging the skills gap promoting research and development activities, facilitating an increase in the number of women employees, outsourcing of specialized work and simplification of procedures. To facilitate value addition in the textile sector, world class departments in various disciplines related to textile industry are being set up in three universities. These departments will have linkages with corresponding foreign departments of high repute.

In the past 5 years, approximately US\$ 5.5 billion have been invested in the textile sector with the major investments being in spinning (\$ 2.6 billion), weaving (\$ 1.5 billion), and textile processing (\$ 600 million). A Rs.10 billion, Pakistan Textile City facility located on 1,250 acres of land near Karachi is in the process of being set-up. This will have its own desalination plant, effluent treatment plant, a self-power generation plant and all the other modern facilities required for industrial production. It is expected that the Textile City will lead to an increase in exports of US\$ 400 million and provide jobs to 60,000 workers

Pakistan's leather exports in 2005 were US\$ 883 million which is the second largest export sector after textiles. It is expected that exports will cross the US\$ 1 billion mark in

2006. Major exports include finished leather; both for garments and footwear, finished leather garments, leather work gloves, and other leather products. The major centers for the manufacture of leather and leather products are; Karachi, Lahore, Sialkot and Kasur, it is estimated that there are more than 700 tanneries operating in Pakistan employing more than 100,000 persons, in addition another 150,000 workers are employed in the value addition sectors. In order to promote the industry, the Government has zero-rated the sales tax on the leather sector and is working to ensure that the industry conforms to international waste management standards.

Pakistan's light engineering sector consists of twenty-eight sub-sectors including consumer durables and other industrial products. The surgical instrument manufacturing sector which forms part of light engineering sector is clustered around Sialkot and exports 95% of its production. There are about 2,500 large, medium and small sized units with the industry employing about 50,000 skilled and semi-skilled workers. The surgical goods sector produces both disposable and reusable instruments. The product range consists of more than 10,000 different items.

The cutlery industry which in 2005 exported goods worth approximately US\$ 31 million is mainly concentrated in the locality of Wazirababd, Nazimabad and Allahbad in Gujranwalla district. There are approximately 300 units and 25,000 people are directly or indirectly employed by the industry. The industry has great export potential and requires better marketing strategies.

The auto parts sector consists of more than 1,200 vendors who are supplying to about 84 Original Equipment Manufactures (OEM) massive capacity increase in Pakistan. The total investment in the vendor industry exceeds Rs.10 billion and employs more than 40,000 skilled and semi-skilled workers and also brings in more than US\$ 160 million in the form of export earnings.

With the local auto assemblers planning to increase production to 500,000 units by 2008 from the 2006 production figure of 170,000 units, the vendor industry is gearing up for.

Although the industry has made considerable progress on its own, the need is for joint collaboration with foreign companies which will not only bring production techniques but also help in marketing the production of the local vendor industry.

There are a total of 42 assemblers of motorcycles in Pakistan who between them manufacture 600,000 motorcycles a year, it is expected that the production will increase to 1 million units a year in the next two years. The main manufacturers of motorcycles in Pakistan are; Honda, Yamaha and Suzuki who between them command more than 80% of the domestic market

There are 11 Fertilizer units operating in Pakistan with an installed capacity of 6 million tones out of which nitrogenous fertilizer has a capacity of 4.9 million tons and phosphatic fertilizer has a capacity of 1 million tons. Wheat being the most important crop 45% of the total fertilizer consumption is in this Sector. Cotton consumes 21%, rice 10%, sugarcane 8% while the remaining 16% is consumed by other crops.

Out of a total of 24 cement plants, currently 22 units are operative, 17 companies being listed on the Karachi Stock Exchange. The country, at present, has an installed capacity of producing 17.55 million tons of cement per annum, mainly Portland cement. It is envisaged to increase installed capacity (also by expansion) to 28.21 million tons per annum by 2008. New projects as well as capacity increases in existing units should boost production capacity to about 7 million by 2007.

The demand for cement is expected to be robust, as the Government of Pakistan has initiated a massive reconstruction drive in the earthquake hit regions of Northern Pakistan and Azad Kashmir. In addition large quantities of cement will be required for the mega construction projects initiated by the Government of Pakistan including the construction of large dams and road projects. Also the industry has good prospects for exporting cement to Afghanistan where reconstruction work is on-going on in that Country.

Pakistan is the twelfth largest producer of sugar in the World; it ranks fourth in sugarcane production and holds seventh position in yield, which is about 50 tons per hectare.

The sugar industry has 76 units installed mostly in Punjab and Sindh. The total capacity of the industry is estimated at 5 million tones per annum. In order to provide incentives to the growers, the Government determines a support price keeping in mind the production costs and profits of other crops. The Government and the Industry are trying to increase cane yield to ensure an increase in the total production of sugar.

The demand for Steel has undergone a dramatic increase in 2005; the total consumption of steel in 2005 is estimated at 5 million tons as against a domestic production of only 3.2 million tones. The biggest producer of domestic steel is the Pakistan Steel Mills with a capacity of 1.1 million tones per annum. In addition to the Pakistan Steel Mills there are approximately 350 steel re-rolling mills in the country, which mainly cater to the needs of the construction industry.

The demand for steel is expected to further surpass production because of increased demand due to economic activity and construction of large dams and infrastructure projects in the Country. The Government is encouraging the private sector to come forward and invest in mini steel mills and in the mining sector. The Government in an effort to increase production, is in the process of privatizing major light and heavy engineering concerns.

## **OIL, GAS & ENERGY SECTOR**

The Pakistani economy is expected to grow at a rate of 7 to 8 percent over the next five years. In order to sustain the growth momentum a rise in levels of income and increased availability of goods and services, the country is following a policy to increase the supply of and the conservation of energy.

In 2005 the consumption of petroleum products in household and agriculture exhibited sharp decline to the tune of 16.8 and 16.2 percent, respectively. The decline in the use of

petroleum products was mainly on account of the availability of alternative and relatively cheaper fuels in the form of natural gas and LPG

Historically, the country is dependent on oil imports. The crude oil import for 2005 was about 8.3 million tons, equivalent of US\$ 2,606 million. The import of petroleum products import was 5.7 million tons, an equivalent of US\$ 1,998 million. The total annual import bill for the year 2005 was US\$ 4,604 million. Due to increase in international prices of crude oil, the import bill in 2006 is expected to be US\$ 5,500 million. Pakistan has five refineries, namely, National Refinery, Pakistan Refinery, Bosicor, Pak Arab Refinery and Attock Refinery; annual oil refining capacity is 12.82 million tons. In the downstream oil marketing business, the main players are; Pakistan State Oil (100% owned by the Government of Pakistan), Caltex, Shell and Total.

Pakistan has an interesting Geo-dynamic history of large and prospective basin (onshore and offshore) with sedimentary area of 827,268 sq. km. So far about 844 million barrels crude oil reserves have been discovered of which 535 million barrels have already been produced. A Prognostic potential of total endowment of hydrocarbons has been estimated as 27 billion barrels of oil. To date various national and international exploration and production companies, resulting in over 177 oil and gas discoveries, have drilled more than 620 exploratory wells. Indigenous production of crude oil during the year 2005 was 66,079 barrels per day. The main companies in the upstream chain include; BHP Petroleum, Lasmo Oil, Shell, OMV Pakistan etc.

Pakistan is among the most gas dependent economies of the world. Natural gas was first discovered in 1952 at Sui in Balochistan province that proved a most significant and the largest gas reservoir. After successful exploration and extraction, it was brought to service in 1955. This major discovery at Sui followed a number of medium and small size gas fields in other parts of the country.

So far about 52 TCF of gas reserves have been discovered of which 19 TCF have already been produced. Natural gas production during 2005 was about 3.7 billion cubic feet per

day. Pakistan has well developed and integrated infrastructure of transporting, distributing and utilizing natural gas with 9,063 km transmission and 67,942 km of distribution and service lines network, developed progressively over the last 50 years.

Natural gas sectoral consumption during 2005 was: power (43.7%), fertilizer (16.4%), cement industry (1.2%), general industry (19.5%), domestic (14.8%), commercial (2.3%) and Transport (CNG; 2.1%).

Gas importation projects envisage about 1500 to 2000 km long pipelines connecting regional gas supply sources such as Turkmenistan, Iran and Qatar to the domestic pipeline network bringing in more than 1.5 billion cubic feet gas per day. With further extension, the imported gas can also reach the Indian market.

Pakistan started using Compressed Natural Gas (CNG) as transport fuel through establishment of research and demonstration CNG refueling stations by the Hydrocarbon Development Institute of Pakistan (HDIP) at Karachi in 1982 and at Islamabad 1989. CNG is now fast emerging as an acceptable vehicular fuel in place of oil. Pakistan is third largest user of CNG in the world after Argentina and Brazil. As many as 835 CNG stations have been set up in the country by December 2006 and 200 stations were under construction. With 850,000 CNG vehicles on the road, the CNG sector has attracted Rs.20 billion investment while another Rs.2 billion is in the pipeline, providing 16,000 jobs.

Large diesel vehicles (buses and trucks) being the major consumer of HSD are now the next target for substitution by CNG for economic and environmental reasons. Meanwhile a private company has imported some CNG diesel dual-fuel buses for Karachi and plans are also underway for local manufacturing of these buses.

The total power generation capacity of Pakistan is 19,540-mw. In order to sustain a higher GDP growth rate of 7–8 percent, the Government is planning to increase its power generation capacity by 143,000-mw in the next 25 years, to 162,590-mw.

The 25-year Energy Security Plan (ESP 2005-2030) approved recently by the Government envisages increase in nuclear power generation by 8,400-mw to 8,800-mw by the year 2030 from current nuclear power of 400-mw. The ESP envisages the share of nuclear power to increase to 4.2 per cent of country's total energy mix from the current rate of 0.8 per cent. The current energy mix has (highest) 50 percent share of gas, 30 percent oil, 12.7 per cent hydel, 5.5 per cent coal, 0.8 per cent nuclear and zero percent renewable energy.

The additional 143,053-mw would include 8,400-mw of nuclear power, 26,200-mw hydel-power, 19,753-mw coal based energy, 9,520 mw renewable energy, 1,360-mw oil based and 77,820-mw gas based power production.

By the year 2010, the country would have an additional power of 7,880-mw and hence total capacity would reach 27,420-mw. This additional power would not include any new plant in the nuclear sector, but hydel generation would increase by 1,260-mw, coal based increase of 900-mw and renewable energy increase of 700-mw. A minor increase of 160-mw would take place in the oil-based generation while gas based power production would increase by 4,860 mw.

## IMPORTANT CONTACTS

Deputy Chairman,  
**Planning and Development Division,**  
Ministry of Planning & Development,  
Govt. of Pakistan,  
Block P, Pakistan Secretariat,  
Islamabad.  
Office Tel: 92 (51) 9211147, 9202783  
[www.mopd.gov.pk](http://www.mopd.gov.pk)

Secretary,  
**Planning and Development Division,**  
Ministry of Planning & Development,  
Govt. of Pakistan,  
Block P, Pakistan Secretariat,  
Islamabad.  
Office Tel: 92 (51) 9211147, 9202783  
[www.mopd.gov.pk](http://www.mopd.gov.pk)

Secretary,  
**Ministry of Finance,**  
Govt. of Pakistan,  
Block Q, Pak. Secretariat,  
Islamabad.  
Office Tel: 92 (51) 9201962  
Fax No: 92(51) 9213705  
[www.finance.gov.pk](http://www.finance.gov.pk)

Secretary,  
**Ministry of Industries, Production & Special Initiatives,**  
Govt. of Pakistan,  
Block A, Pak. Secretariat,  
Islamabad.  
Office Tel: 92(51) 9210192, 9211709  
E-mail: [secretary@moip.gov.pk](mailto:secretary@moip.gov.pk)  
<http://www.moip.gov.pk>

Secretary,  
**Ministry of Communication,**  
Govt. of Pakistan,  
Block D, Pak. Secretariat,  
Islamabad.  
Office Tel: 92 (51) 9201252

Secretary,  
**Ministry of Commerce,**  
Govt. of Pakistan,  
Block A, Pak. Secretariat,  
Islamabad.  
Office Tel: 92(51) 9208692,  
[www.commerce.gov.pk](http://www.commerce.gov.pk)

Secretary,  
**Ministry of Health,**  
Govt. of Pakistan,  
Block C , Pak. Secretariat,  
Islamabad.  
Office Tel: 92(51) 9211622  
Fax No: 92(51) 9205481

Secretary,  
**Ministry of Food, Agriculture and Livestock,**  
Govt. of Pakistan,  
Block B, Pak. Secretariat,  
Islamabad.  
Office Tel: 92(51) 9203307, 9210351  
Fax No: 92(51) 9210616

Secretary,  
**Ministry of Ports & Shipping,**  
Govt. of Pakistan,  
Block D , Pak. Secretariat,  
Islamabad.  
Office Tel: 92(51) 9215354  
Fax No: 92(51) 9215349

Secretary,  
**Ministry of Tourism,**  
Govt. of Pakistan,  
Block D , Pak. Secretariat,  
Islamabad.  
Office Tel: 92(51) 9213642  
Fax No: 92(51) 9215912  
Email: [secretary@tourism.gov.pk](mailto:secretary@tourism.gov.pk)

Governor,  
**State Bank of Pakistan,**  
I.I. Chundrigar Road,  
Karachi. Pakistan.  
Phone: 111-727-111 Fax: (+92-21)  
9212433-9212436  
www.sbp.org.pk

Chairman,  
**Board of Investment,**  
Govt. of Pakistan,  
Attaturk Avenue,  
Sector G-5/1,  
Islamabad.  
Tel: 92(51) 9207531, 9206161  
www.pakboi.gov.pk

Chairman,  
**Pakistan Telecommunication  
Authority,**  
Head Quarter Sector F-5/1,  
Islamabad.  
Tel: 92-51-2878143,9225326,  
Fax: 92-51-2878155  
E-mail: chairman@pta.gov.pk  
www.pta.gov.pk

Chairman,  
**Oil & Gas Regulatory Authority,**  
Tariq Chambers, Civic Center,  
Melody Market, Sector G-6,  
Islamabad.  
Tel: 92-51-9221705  
Fax: 92-51-9221714  
Email: chairman@ogra.org.pk  
www.ogra.org.pk

Chairman,  
**Pakistan Electronic Media Regulatory  
Authority,**  
Green Trust Tower,  
6th Floor, Jinnah Avenue, Blue Area,  
Islamabad  
Phone#:0092-051-9222320/26/32/40/42  
E-Mail: ctv@pemra.gov.pk  
www.pemra.gov.pk

Chairman,  
**Securities and Exchange Commission  
of Pakistan,**  
National Insurance Corporation  
Building,  
Jinnah Avenue,  
Islamabad-44000,  
Telephone: 92-51-9207091 (3 lines)  
Fax: 92-51-9204915  
Email: enquiries@secp.gov.pk  
www.secp.gov.pk

Chairman,  
**Export Promotion Bureau,**  
Govt. of Pakistan,  
5th Floor, Block A  
Finance & Trade Centre,  
Shahrah-e-Faisal.  
Karachi.  
Tel: 92-21-9206462-70  
Fax: 92-21-9206461  
www.epb.gov.pk

Chairman,  
**Engineering Development Board,**  
Govt. of Pakistan,  
5-A, Constitution Avenue, SEDC  
Building (STP), Sector F-5/1,  
Islamabad,  
Tel: 92-51-9205595-98  
Fax:92-51-9205595-98  
Email: edb@edb.gov.pk  
www.engineeringpakistan.com

Chairman,  
**Alternative Energy Development  
Board,**  
Govt. of Pakistan,  
344-B,Prime Minister's Secretariat,  
Constitution Avenue,  
Islamabad.  
Phone No: 92-51-9223427, 9008504  
Fax No: 92-51-9205790  
E-mail: support@aedb.org  
www.aedb.org  
Chairman,

**Small & Medium Enterprise  
Development Authority,**  
6th Floor, LDA Plaza, Egerton Road,  
Lahore.  
Tel: 92-42-111-111-456  
Fax: 92-42-6304926  
E-mail [helpdesk@smeda.org.pk](mailto:helpdesk@smeda.org.pk)  
[www.smeda.org.pk](http://www.smeda.org.pk)

Managing Director,  
**Private Power and Infrastructure  
Board,**  
50 Nazimuddin Road, F7/4,  
Islamabad, Pakistan.  
Tel: 92-51 9205421,9205422  
Fax: 92-51 9215723,9217735  
Email: [ppib@ppib.gov.pk](mailto:ppib@ppib.gov.pk)  
[www.ppib.gov.pk](http://www.ppib.gov.pk)

CEO,  
**Competitiveness Support Fund,**  
House No. 53,  
Street 1, F-6/3,  
Islamabad.  
Cell: 92-300 856 5277  
Email: [arthur.bayhan@telefonica.net](mailto:arthur.bayhan@telefonica.net)  
[www.competitiveness.org.pk](http://www.competitiveness.org.pk)

Chairman,  
**Pakistan Software Export Board,**  
2nd Floor Evacuee Trust Complex  
F-5, Aga Khan Road  
Islamabad - 44000  
Tel: 92-51-9204074  
Fax: 92-51-9204075  
[www.pseb.org.pk](http://www.pseb.org.pk)

Managing Director,  
**Karachi Stock Exchange (Guarantee)  
Limited,**  
Stock Exchange Building, Karachi.  
Tel: 92-21-111-001122  
Fax : 92-21-241 0825  
Email: [info@kse.com.pk](mailto:info@kse.com.pk)  
[www.kse.com.pk](http://www.kse.com.pk)  
Chairman,

**Karachi Cotton Association,**  
The Cotton Exchange,  
I.I Chundrigar Road,  
Karachi, Pakistan.  
Tel : 92-21-242-5007, 241-2570,  
Fax : 92-21-2413035  
Email: [contact@kcapk.org](mailto:contact@kcapk.org)  
[www.kcapk.org](http://www.kcapk.org)

President,  
**Federation of Pakistan Chambers of  
Commerce and Industry,**  
Federation House,  
Sharea Firdousi, Main Clifton,  
Karachi.  
Tel: 92-21-5873691,93-94  
Fax : 92-21-5874332  
Email : [fpcci@cyber.net.pk](mailto:fpcci@cyber.net.pk)  
[info@fpcci.com.pk](mailto:info@fpcci.com.pk)  
[www.fpcci.com.pk](http://www.fpcci.com.pk)

President,  
**Karachi Chamber of Commerce  
Industry,**  
Aiwan-e-Tijarat Road,  
Off Shahrah-e-Liaquat,  
Karachi.  
Tel: 92-21- 241 6091-94  
Fax : 92-21- 241 0587  
Email: [info@karachichamber.com](mailto:info@karachichamber.com)  
[www.karachichamber.com](http://www.karachichamber.com)

President,  
**Lahore Chamber of Commerce  
Industry,**  
11, Shahrah Aiwan i Tijarat,  
Lahore. Pakistan.  
Tel: 92-42 -111-222-499  
Fax : 92-42 -636-8854  
[www.lcci.com.pk](http://www.lcci.com.pk)

President,  
**Rawalpindi Chamber of Commerce  
and Industries,**  
Chamber House, 39 - Mayo Road  
(Civil Lines),  
Rawalpindi.  
Tel: 92-51-5111051-54  
Fax: 92-51-5111055  
E-mail : rcci@isd.wol.net.pk  
www.rcci.com.pk

Secretary,  
**Overseas Chamber of Commerce and  
Industries,**  
Chamber of Commerce Building,  
Talpur Road, P.O. BOX 4833,  
Karachi.  
Tel: 92-21-2410814-15  
Fax: 92-21-2427315  
E-mail: info@oicci.org

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**Study Commissioned by:**  
**EMPLOYMENT & RESEARCH SECTION,**  
**PLANNING & DEVELOPMENT DIVISION, GOVERNMENT OF PAKISTAN,**  
**PAKISTAN SECRETARIAT, P- BLOCK, ISLAMABAD**  
**Tel: (92-51) 921 2831, Fax: (92-51) 920 6444**