



# **Investment In Refining: Proactive Incentives to Enhance Capacity**

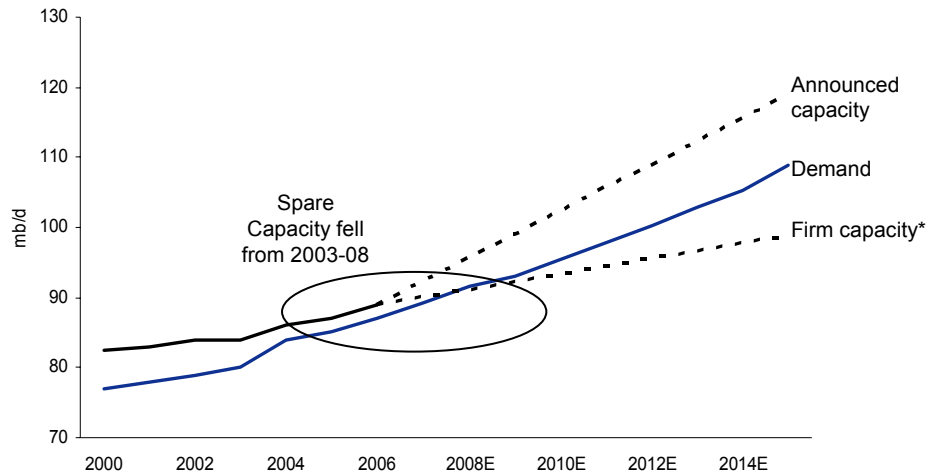
**Zafar Haleem**

*President Oil – Bosicor Oil Pakistan Ltd*

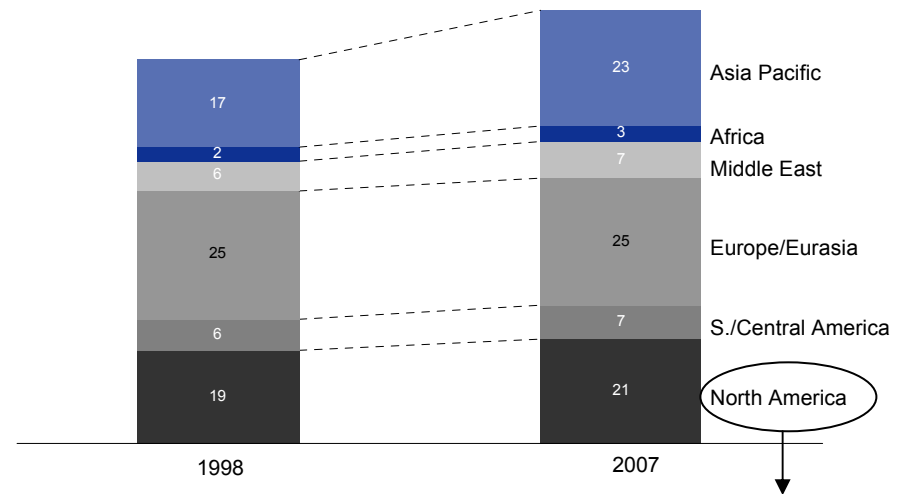
Pakistan 2009 Oil & Gas Forum  
*January 31st, 2009  
Islamabad, Pakistan*

# Global Refining Sector Overview

## Global Refining Demand/Capacity 2000-2015 (mb/d)



## Global Refining Capacity by Region



- Many analysts believe that high oil prices are not only due to scarcity of crude, but bottlenecks related to delivery, with the largest being available refining capacity. Spare refining capacity has tightened through 2003-08 due to strong economic growth attributable mainly to emerging economies, particularly India and China
- An estimated 30 mb/d of new refining capacity (33% of existing total capacity) had been announced to come on stream during 2007-15.\* However, only 33% (10 mb/d) of the new capacity is expected to be completed due to cost overruns, previously unavailability of EPC contractors and now due to global economics slow down
- An oversupply of 10 mb/d by 2015 was predicted by analysts if all planned capacity comes online. Given the current market environment it is likely that only 33% of planned comes online leading to a surplus demand of around 10 mb/d is expected
- The last few years' profitability for refiners was a welcome respite from several decades of difficult times. Beginning with the oil crises of the 1970s, industry participants have repeatedly struggled with structural overcapacity
- Since 2004 refiners have seen impressive margins as a result of several factors
  - Reduced investment levels, towards the end of the 1990s,
  - A sharp demand escalation in the US and China that gathered pace in 2003 and 2004
  - Specific events that reduced availability levels at multiple refineries (the most significant being associated with Hurricane Katrina)

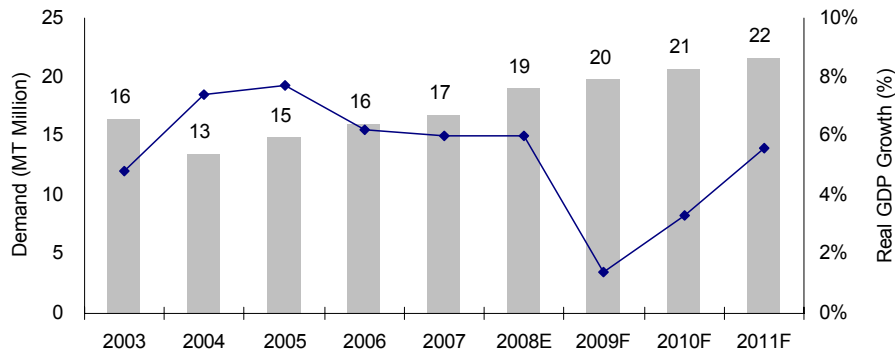
No new refinery has been built in the US since 1976 with companies exiting, shrinking, or moving east to defend stakes

Source: International Energy Agency, Saudi Aramco, BP Statistical Review of World Energy, \*Industry analyst consensus

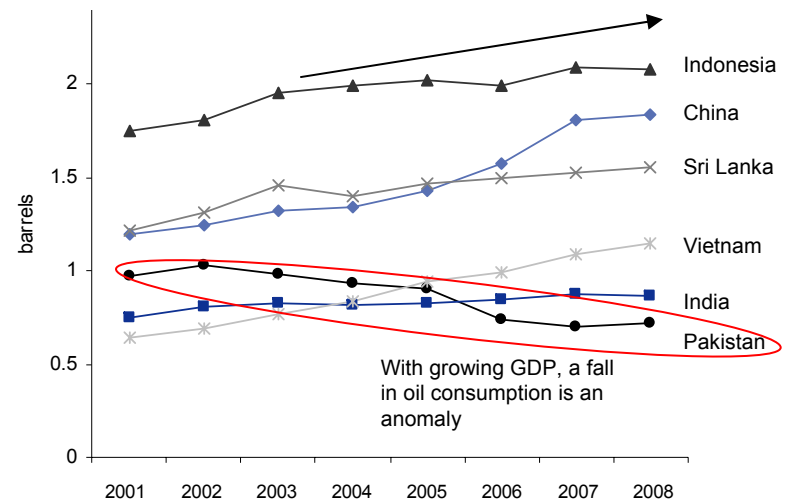
# Pakistan Refining Sector Overview

## POL consumption is expected to increase by 4.5% in Pakistan

POL Consumption (MT mill) vs Real GDP Growth (%)



Pakistan Oil Consumption / Capita (barrels)



- With 6.6% real GDP growth in 2008, Pakistan was one of the fastest growing economies of Asia through broad-based growth in all segments of the economy
- Petroleum, Oil and Lubricant (POL) demand has grown at a CAGR of over 5% for 1980-2005. Going forward POL consumption is expected to increase by 4.5%
- Nevertheless, oil consumption per capita (barrels) has been falling since 1999 and today ranks among the lowest in the region (0.72 barrels per capita)
- POL product volumes have fallen to below 16 million metric tons due to:
  - refining supply bottlenecks;
  - advent of CNG-powered vehicles reducing Motor Gasoline (MG) and High Speed Diesel (HSD) market share;
  - commissioning of the White Oil Pipeline (wopp) has resulted in fewer lorries required to transport POL products to the Northern regions (reduced HSD consumption)
- However demand for HSD and Furnace Oil (FO) will continue to rise in line with expected GDP growth as described subsequently

# POL Product Overview

**Furnace Oil (FO) is a deficit product, demand for which has exploded due to higher dispatch of IPPs with demand expected to continue to rise as many new oil fired IPPs are planned**

Furnace Oil

## Overview

- FO accounts for 32% of overall POL product sales by volume, and 83% of product produced is consumed by the thermal power generation sector
- FO is a deficit product with 37% of total demand catered to by imports
- FO prices have been de-regulated with effect from 1st July 2000

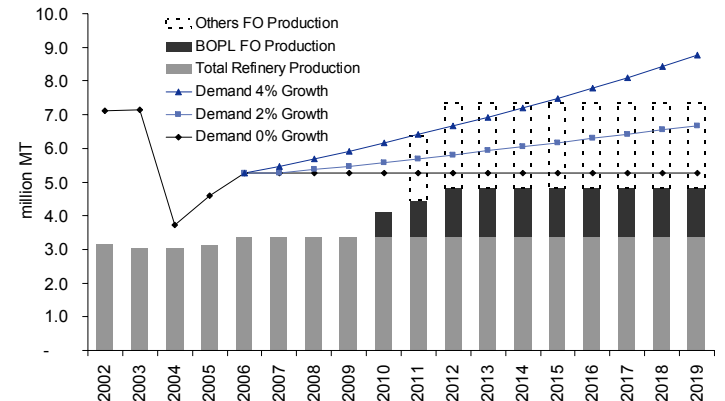
## Demand

- FO volumes have posted a 5 year CAGR of -9% with 5.2 million tons consumed in FY2006, down from 7.1 million in FY2002

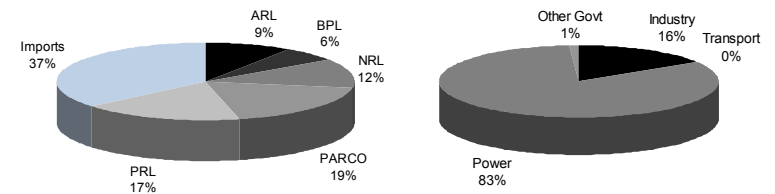
## Demand Drivers

- Power generation is the main driver of FO sales and has posted a 5 year CAGR of 5%
- Ahead of a looming power shortfall of 5,500MW, the GoP plans to speed up investment in the power sector to set up additional generation capacity on a fast track basis
- With new generation capacity required, rising power demand, lack of water availability and gas supply constraints, focus has shifted back to FO as the key fuel for the power generation sector

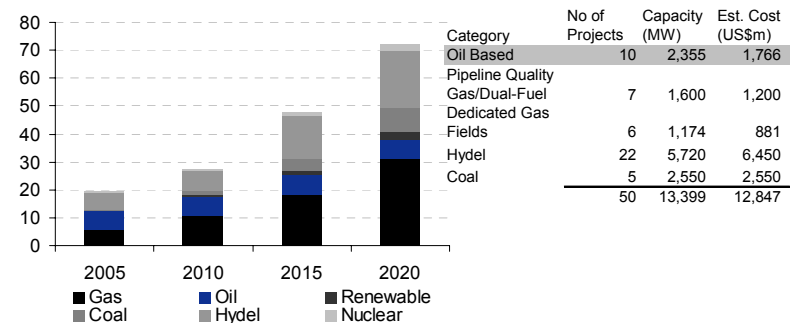
## Production & Demand (million MT)



## Market Share & Consumption 2006 (%)

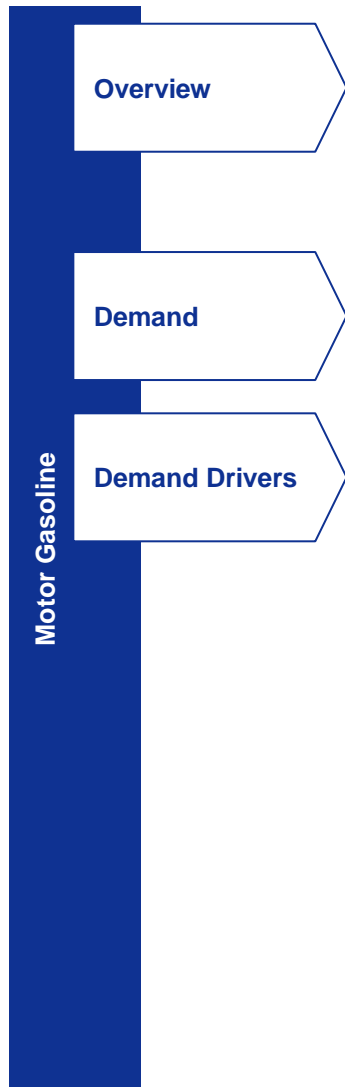


## Power Generation ('000 MW) & Power Projects



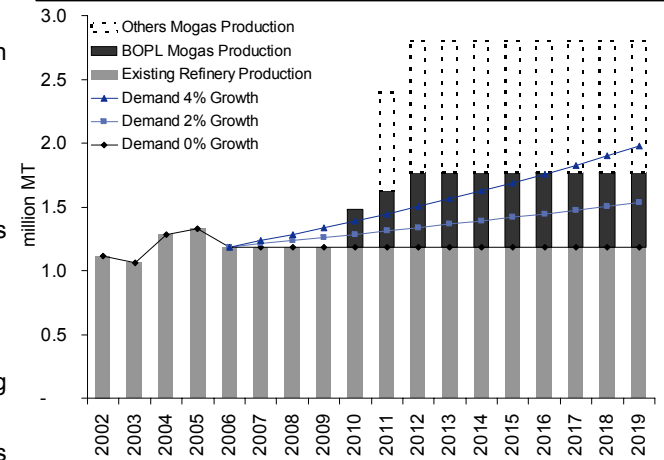
# POL Product Overview

**Motor Gasoline (Mogas), has had its growth stunted by cheaper CNG over recent years, but increasing motor cycle and automobile sales should support demand**

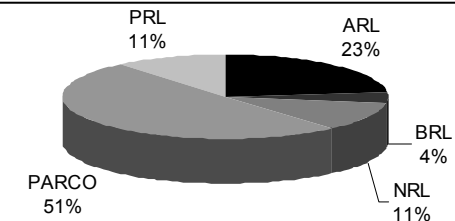


- Motor Gasoline accounts for 7% of total POL product sales volume and 98% of MG sales are in road transportation
- Pakistan has met domestic requirements of MG through local production since commissioning of PARCO refinery in 2001. MG exports are minimal
- MG prices are regulated by the OGRA
- MG sales volumes dropped by 11% in FY2006 to around 1.2 million tons per annum
- In addition, smuggling from Iran has been a persistent industry problem
- During the first five months of FY07, car sales rose by 11.26% reaching 78,618 as compared to Jul-Nov FY06 sales volumes of 70,659.
- There has been robust growth in potential Gasoline consuming vehicles (5-year CAGR of 6%) driven by readily available car financing and reduced interest rates. Furthermore, all major vehicle assemblers are in the process of expansion which will further drive sales
- However, MG demand has not grown in line with growth in number of vehicles. The primary reason is the availability of cheaper fuels such as CNG (sold at an approximate 40%-50% price differential), and biofuel (PKR1.5 per litre less by than the current petrol price) in the face of constantly rising oil prices
- From FY2008 onwards, expectations are that the price disparity between MG and CNG will narrow leading to normalization of MG growth (4-year volume CAGR of 1% going forward)

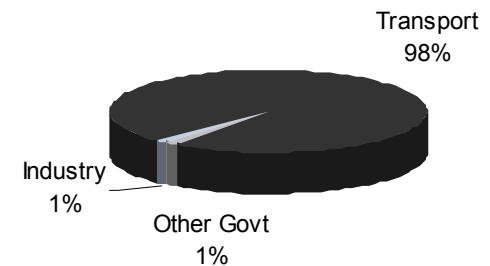
**Production & Demand (million MT)**



**Market Share, 2006 (%)**



**Consumption by Sector, 2006 (%)**



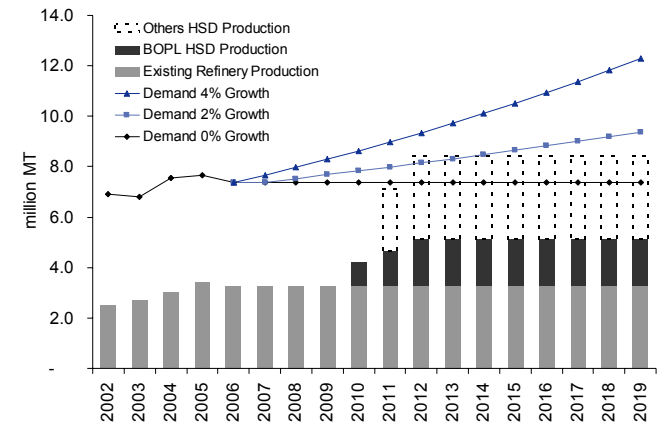
# POL Product Overview

**High Speed Diesel (HSD), a deficit product, is the main driver of POL product sales and enjoys highest customs duties, providing high GRMs to local refineries**

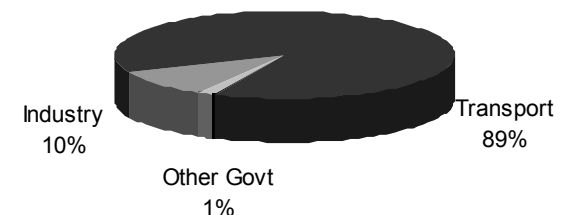


- HSD is the main demand driver of POL product sales in Pakistan with 46% of overall sales volume and 72% of white oil volume
- Transportation is the largest consumer of HSD, with 89% of consumption, followed by industry with 10%
- HSD is a deficit product with over 56% of consumption imported
- HSD is a partially deregulated product with refineries intimating their prices to Oil Marketing Companies (OMCs), although maximum prices are set by OGRA
- Demand for HSD has increased at a CAGR of 1.5% for 2003-06, however volumes fell in 2006 due to commencement of the White Oil Pipeline, adoption of CNG fueled vehicles and decline in total agricultural area under cultivation
- The growth in demand is contributed to by :
  - motor vehicles which have increased at a steady CAGR of 9% for 1998-06 on the back of easy consume financing
  - growth in the agriculture sector of nearly 4% CAGR for 2002-2006
- HSD consumption is seasonal in line with agricultural activity, as a result of tractor/heavy machinery usage peaking during rice/cotton sowing season and falling in rice harvesting season
- Export potential prior to major capacity expansion is limited on account of the domestic HSD deficit
- It is expected that with the economy set to grow at 6-8%, the correlation between HSD and GDP growth will again be re-established

## Production & Demand (million MT)



## Consumption by Sector, 2006 (%)



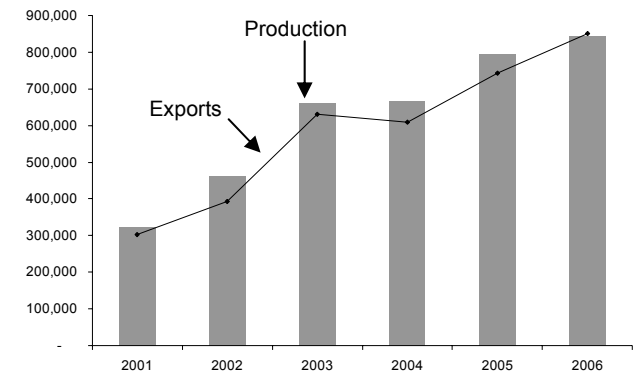
# POL Product Overview

**Close to 100% of naphtha production is exported, and naphtha alone constitutes 68% of POL exports**

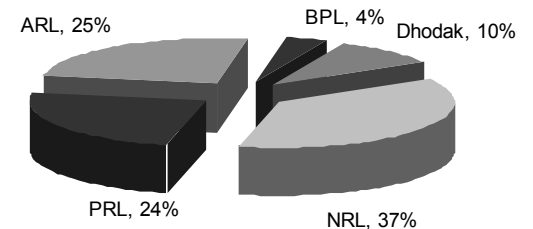


- Naphtha is used primarily as feedstock for producing high octane gasoline, petrochemicals, and in the chemical industry for solvent applications
- Naphtha is a surplus product, and close to 100% of domestic production is exported, accounting for the majority (68%) of POL exports
- Naphtha is unregulated and pricing is dictated by market forces
- Pakistani refineries do not have sophisticated naphtha crackers or economically-sized Aromatics production units, resulting in minimal domestic demand for the product
- Naphtha sales have increased as refiners choose to export naphtha to keep capacity utilization rates high, as opposed to further processing it into MG which can not be exported easily
- Liquid Petroleum Gas (LPG) is becoming an increasingly attractive substitute for Naphtha and substitution is a growing trend. LPG, which climbed to \$563/mt on March 16, currently costs \$60/mt (10%) less than Naphtha allowing producers to cut costs by switching raw materials.
- However, Asian crackers are typically able to substitute a maximum of 10-15% of their Naphtha intake with LPG (based on configurations), thus continued growth in LPG substitution is not expected to take place

**Production & Exports (metric tons)**



**Refinery Market Share (%)**



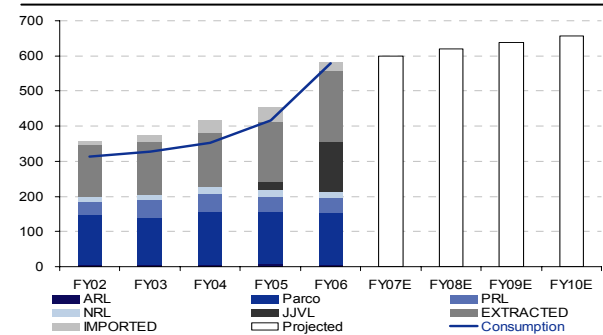
# POL Product Overview

**Demand for Liquefied Petroleum Gas (LPG), a deficit product, has grown at a CAGR of 19% for FY2001-06 as the GoP promotes its use over conventional fuels**

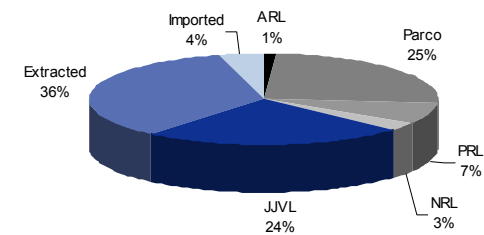


- LPG is used as a fuel in heating appliances and vehicles and primarily used in the domestic sector
- LPG is a deficit product, however less than 5% of consumption is imported
- The GoP has deregulated LPG prices effective September 2000
- LPG consumption has substantially increased from 277,000 tons in FY2001 to 578,000 tons in FY2006 translating into a CAGR of 19%
- Demand for LPG is driven by growth in number of households (1.8 million out of 19.2 million households in Pakistan are using LPG). Consumption is seasonal and reduces sharply in summer particularly in the upper parts of the country where 20% of supply is guaranteed by quota
- The GoP is promoting LPG in the automotive sector and as a fuel to replace conventional fuels like coal & firewood. The GoP is continuing its existing policy of ensuring availability of domestic and imported LPG at competitive prices in remote areas, where supply of natural gas through pipelines is not economically feasible
- Progas has constructed a LPG terminal with a capacity of 6,500 metric tons at Port Qasim, Pakistan's second LPG terminal facility, enabling more imports of LPG
- Volatility in LPG prices motivated traders to import gas in bulk and LPG prices fell in the international market. The resulting glut dropped the retail price from Rs56 to Rs48. The removal of import duty by the government in December 06 also helped boost imports.

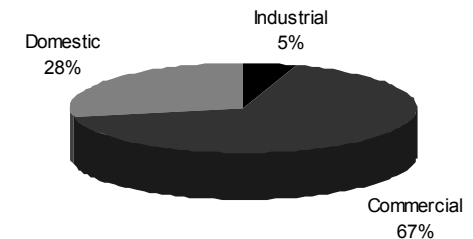
**Supplies/Consumption ('000T)**



**Market Share, 2006 (%)**



**Consumption by Sector, 2006 (%)**



# Refining Business Drivers

## Drivers of a refining company's financial performance

### Driver

### Description

### Example

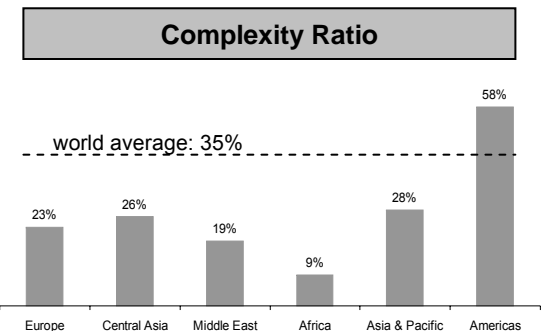
#### GRMs

- The gross refining margin (GRM) is the difference between the price of refined products manufactured (e.g. mogas, HSD) and the cost of the feedstock used in its production (crude oil)
- Refiners' earnings are highly leveraged to changes in refining margins, with small changes having multiplier effects on the refiners net earnings

Company	Est. fall in 08 EPS from US\$1 fall in GRM
<u>Independent Refiner</u>	
Tesoro	37%
Valero	30%
Frontier Oil	20%
<u>Integrated O&amp;G</u>	
Royal Dutch Shell	5%
Exxon Mobil	5%

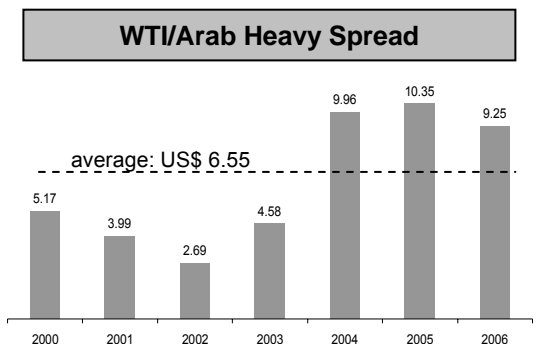
#### Complexity

- Product yields vary significantly depending on the hardware configuration of a particular refinery or its "complexity". Plants that are more sophisticated, have the capability to process lower quality crudes (that are less expensive) and produce more complex products unlike simpler refineries
- Typically, complex refiners realize higher GRMs than simpler refiners because of the discounted price of lower quality crudes and higher GRMs associated with more complex products



#### Light/Heavy Crude Spreads

- The most efficient plants produce 75%-80% mogas, and middle distillate products (e.g. HSD, and jet fuel). Simpler plants produce a higher quantity (more than 25%) of lower valued by-products such as fuel oil
- When light/heavy spreads are wide, complex plants that are able to process less expensive heavy crude may have a significant price advantage over those refineries operating on sweet crude exclusively
- However, when light/heavy spreads are narrow, the price advantage can be diminished, or mitigated completely, by higher operating costs of complex refineries (see example on next slide)



# Refining Business Drivers

## Drivers of a refining company's financial performance (cont'd)

Driver	Description	Example																										
<b>Operating Costs</b>	<ul style="list-style-type: none"> <li>A high percentage of a refiner's operating costs are fixed (50-60% of total costs).</li> <li>Energy costs are the most variable expense and affected by movements in prices of crude oil, electricity, and natural gas</li> <li>Logistics costs are substantial, especially in lieu of less than optimal infrastructure facilities.</li> <li>High capacity utilization is key to minimize per-barrel operating costs</li> </ul>	<p><b>Components of Operating Costs</b></p> <table border="1"> <tr> <td>Energy</td> <td>40-50%</td> </tr> <tr> <td>Employee Labor</td> <td>35-40%</td> </tr> <tr> <td>Maintenance/Repair</td> <td>10-15%</td> </tr> <tr> <td>Other</td> <td>5-10%</td> </tr> </table>	Energy	40-50%	Employee Labor	35-40%	Maintenance/Repair	10-15%	Other	5-10%																		
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<b>Plant Reliability</b>	<ul style="list-style-type: none"> <li>Refineries need to undertake routine planned plant-wide maintenance (usually around 30 days every eighteen months)</li> <li>However, excessive plant maintenance or unplanned outages in a refinery's operations result in lost production capacity and foregone income. This can meaningfully impact a company's financial results, particularly smaller companies with low throughput levels.</li> </ul>	<p><b>Maintenance Downtime 2006 (mb/d)</b></p> <table border="1"> <caption>Maintenance Downtime 2006 (mb/d)</caption> <thead> <tr> <th>Month</th> <th>Downtime (mb/d)</th> </tr> </thead> <tbody> <tr><td>Jan</td><td>1,600</td></tr> <tr><td>Feb</td><td>2,300</td></tr> <tr><td>Mar</td><td>3,500</td></tr> <tr><td>Apr</td><td>3,700</td></tr> <tr><td>May</td><td>3,800</td></tr> <tr><td>Jun</td><td>3,500</td></tr> <tr><td>Jul</td><td>2,500</td></tr> <tr><td>Aug</td><td>1,300</td></tr> <tr><td>Sep</td><td>2,600</td></tr> <tr><td>Oct</td><td>2,500</td></tr> <tr><td>Nov</td><td>1,100</td></tr> <tr><td>Dec</td><td>1,000</td></tr> </tbody> </table>	Month	Downtime (mb/d)	Jan	1,600	Feb	2,300	Mar	3,500	Apr	3,700	May	3,800	Jun	3,500	Jul	2,500	Aug	1,300	Sep	2,600	Oct	2,500	Nov	1,100	Dec	1,000
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<b>Financing &amp; Overhead Costs</b>	<ul style="list-style-type: none"> <li>Excessive financing and overhead costs are a major concern for smaller refining companies, which cannot allocate these costs across extensive product ranges/processes</li> <li>For example, financing and overhead costs as a percentage of operating profit can be as high as 34% for a smaller refiner, as compared to 17% for a large refiner</li> </ul>	<p><b>U.S. F/O Costs (% of op. profit)</b></p> <table border="1"> <caption>U.S. F/O Costs (% of op. profit)</caption> <thead> <tr> <th>Year</th> <th>F/O Costs (% of op. profit)</th> </tr> </thead> <tbody> <tr><td>2003</td><td>52%</td></tr> <tr><td>2006</td><td>16%</td></tr> </tbody> </table>	Year	F/O Costs (% of op. profit)	2003	52%	2006	16%																				
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# Refining Business Drivers

Refining industry earnings are very sensitive to changes in GRMs and are driven by a number of factors



Effect on Refining Margin

Driver	Description	Effect on Refining Margin	
Drivers of Gross Refining Margins	<b>Inventory Levels</b>	<ul style="list-style-type: none"> <li>• There is a negative correlation between GRMs and refined product inventory levels i.e. when inventories are low, GRMs typically are high and visa versa</li> <li>• However, recent studies have indicated that this relationship is beginning to break down</li> </ul>	●
	<b>Regulation</b>	<ul style="list-style-type: none"> <li>• In 2004-06, international standards which permit a maximum allowable amount of benzene and sulphur in petroleum products have been implemented, requiring non-complying refineries to invest substantial capex in order to meet new standards</li> <li>• This has resulted in US/European companies moving into emerging markets rather than constructing Greenfield refineries</li> </ul>	●
	<b>Substitutes</b>	<ul style="list-style-type: none"> <li>• Natural gas, ethanol, and other bio-fuels are examples of substitutes of petroleum products</li> <li>• When the prices of these substitutes are low and/or oil prices are high, substitution becomes more attractive for consumers</li> </ul>	●
	<b>Crude Oil Prices</b>	<ul style="list-style-type: none"> <li>• Gradually declining crude oil prices support GRMs whilst rising crude prices place downward pressure on GRMs</li> <li>• If oil prices rise due to geopolitical risks or disrupted supply (as opposed to increased underlying demand), refined product prices may not fully reflect the increased cost of crude</li> <li>• A rise in crude oil prices causes refiners to enjoy inventory gains and reductions in crude prices cause inventory losses</li> </ul>	◐
	<b>Light/Heavy Spreads</b>	<ul style="list-style-type: none"> <li>• When light/heavy crude oil differentials widen, the spread between gasoline and residual fuel prices widen as well – giving complex refiners an advantage over simple refiners</li> <li>• When light/heavy spreads are wide, losses on residual fuel production are steeper, prompting simple refineries to reduce throughput. When light/heavy spreads narrow, losses on fuel oil sales decline, eventually by enough to restore profitability on the entire refined barrel for simple refiners</li> </ul>	◐

# Refining Business Drivers

Refining industry earnings are very sensitive to changes in GRMs and are driven by a number of factors

○ Favorable  
● Unfavorable

**Effect on Refining Margin**

Driver	Description	Effect on Refining Margin																
<b>Economic Growth &amp; Demand</b>	<ul style="list-style-type: none"> <li>Strong economic growth drives dependence on power, industry and transportation which drives demand for petroleum products. There is a direct correlation between petroleum demand growth and GDP growth</li> <li>Demand for petroleum is influenced by a variety of factors including the strength of the economy and gasoline prices. Demographic trends and fuel efficiency initiatives also affect demand</li> <li>Distillate demand, which represents consumption of heating oil and diesel fuel, is driven by weather and the strength of the economy — particularly the manufacturing sector, which influences transportation activity</li> </ul>	○																
	<ul style="list-style-type: none"> <li>Tight refining capacity tends to support GRMs while low rates of utilization puts downward pressure on GRMs. Capacity utilization is expected to remain high in the medium term until excess capacity overtakes demand in 2010-12</li> <li>World capacity utilization has been high, currently averaging circa 85-88%</li> </ul>	○																
<b>Capacity Utilization</b>	<table border="1"> <thead> <tr> <th>Bullish Refining Indicators</th> <th>Bearish Refining Indicators</th> </tr> </thead> <tbody> <tr> <td>Fast growing real GDP and strong refined product demand</td> <td>Falling GDP and weak refined product demand</td> </tr> <tr> <td>Gradually declining crude prices</td> <td>Rising crude prices</td> </tr> <tr> <td>Wide light/heavy crude spreads for complex refiners</td> <td>Narrow light/heavy crude spreads for complex refiners</td> </tr> <tr> <td>High capacity utilization</td> <td>Low capacity utilization</td> </tr> <tr> <td>Low inventory levels</td> <td>High inventory levels</td> </tr> <tr> <td>Relaxed regulatory environment</td> <td>Stringent regulatory environment</td> </tr> <tr> <td>Increase in price of substitutes</td> <td>Decrease in price of substitutes</td> </tr> </tbody> </table>	Bullish Refining Indicators	Bearish Refining Indicators	Fast growing real GDP and strong refined product demand	Falling GDP and weak refined product demand	Gradually declining crude prices	Rising crude prices	Wide light/heavy crude spreads for complex refiners	Narrow light/heavy crude spreads for complex refiners	High capacity utilization	Low capacity utilization	Low inventory levels	High inventory levels	Relaxed regulatory environment	Stringent regulatory environment	Increase in price of substitutes	Decrease in price of substitutes	
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Drivers of Gross Refining Margins

## Current GoP Policies

### Petroleum Policy

- The Petroleum Policy has been enacted by the MPNR. The Policy is designed to provide a favorable investment climate to attract private investment in both the upstream and downstream oil and gas infrastructure of Pakistan. GoP initiatives include expediting disposal of applications, 100% ownership of exploration blocks, increased terms of exploration licenses and construction/operation of pipelines
- The policy provides for the following:
  - No permission required for setting up new refineries or for expanding existing ones
  - Import parity price formula will apply for all new oil refinery projects
  - Import of crude oil will be permitted from any source, after uplifting of local crude oil if so allocated
  - Export of surplus products will be freely allowed
  - GoP will not give any product off-take right guarantee. Refineries will be allowed to sell products to any marketing company or they can establish their own OMCs
  - No minimum rate of return guarantee will be provided by the GoP for new refinery projects

### Customs Duties

- Implied customs duties form part of OGRAs “ex-refinery” product pricing regime and as such improves the competitive position of refiners. The duty was provided in order to improve the balance sheets of downstream companies to enable them to undertake upgrading and expansion activities
- Customs duties collected by the GoP on HSD, kerosene, LDO, and aviation fuel have been substantial in the last few years, in lieu of soaring product prices.
- GoP has reduced deemed customs duty on HSD from 10% to 7.5%. As customs duties are included in the pricing formula, this reduction has negatively affected GRMs for the refineries as well as revenue collections of GoP.
  - Pakistan’s existing simple refineries can not operate at the same economics as regional complex refineries

# Industry Competitive Landscape

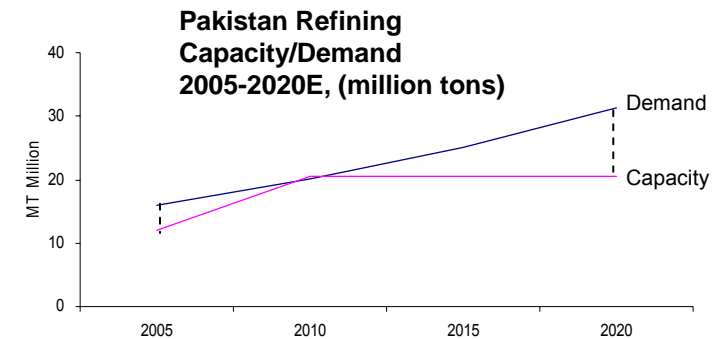
## Pakistan's top five refineries have a combined market share of 98%

Company	Market Share	C.O.D.	Capacity (bpd)	Capacity Utilization
Pak-Arab Refinery Co Ltd (PARCO)	35%	2000	100,000	87%
National Refinery Ltd (NRL)	22%	1963	62,050	105%
Pakistan Refinery Ltd (PRL)	17%	1962	47,110	105%
Attock Refinery Ltd (ARL)	14%	1922	40,000	102%
Bosicor Pakistan Ltd (BPL)	11%	2004	30,000	81%

Planned Expansion 2007-2011	Capacity (Kbpd)	Success Probability
Pak Kuwait Refinery	200	n/a
Coastal Refinery	45	○
Indus Refinery	100	◐
Trans Asia Ltd (Al Ghurair)	100	◑
Bosicor Oil Pakistan	115	●
Khalifa (PARCO & IPIC)	200-300	●
<b>TOTAL PLANNED CAPACITY</b>	<b>760-860</b>	

○ Low probability  
● High probability

- Pakistan has five main refineries with an overall refining capacity of 12.9 million tons. Demand for refined products presently exceeds supply by approximately 4 million tons
- PARCO, the only major non-listed refiner, has the largest production capability (35% of total capacity) followed by NRL (22%) and PRL (17%). Capacity utilization is above 100% for three out of the five main refineries
- At least 6 refinery projects are in planning stages which if completed (see success probability chart), could produce excess surplus capacity by 2011
- Given the current global economic environment most of the projects have been delayed





# Current Situation

- Except for Parco & NRL other refineries are hydroskimming
- Hydroskimming GRM's are generally poor
- Various formula have been applied to sustain refineries profitability, like processing fee, fixed return on equity etc



# Opportunities/ Routes to Follow

- Configure refineries to meet upcoming product challenges (Environmentally friendly products)
  - Low Sulphur Diesel ( Distillate desulphurizer)
  - Low Benzene Gasoline (Isomerization, Alkylation)
- Upgrade Production slate (Hydrocracker, Coker etc)
  - Increase Diesel
  - Reduce Furnace Oil
  - Reduce Naphtha



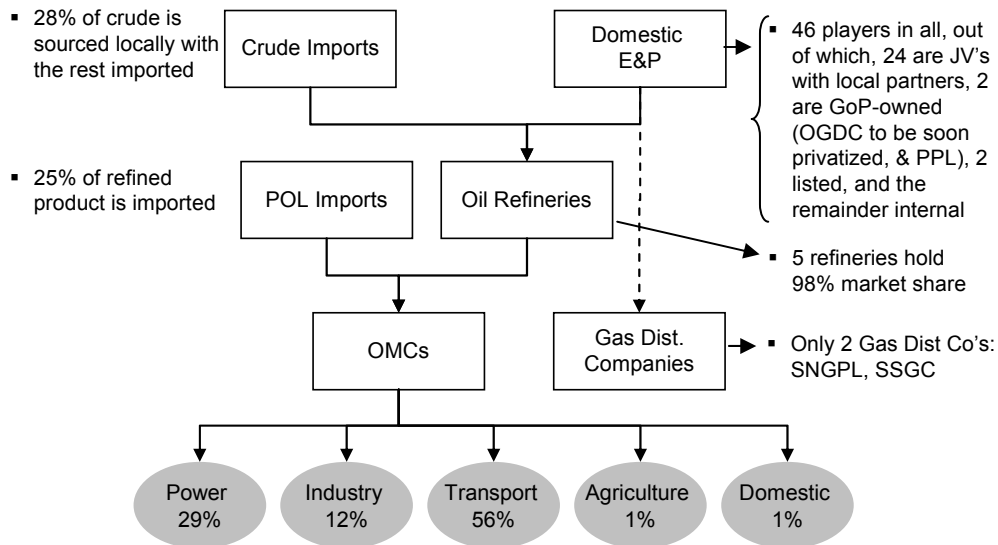
# Way forward

- Agree with stakeholders time line for phased investment on which route to follow & provide appropriate incentives, in addition to product quality premium, like:
  - No import duty on equipment
  - Tax incentives & no levies, especially when being setup in under developed areas.
  - Due to volatility of Crude and product prices and no mechanism to hedge, a \$/bbl return is required for the long term sustainability of existing investments in refining as well as to attract new refining investment.
  - Preference in allocation of Gas (as fuel)
  - Assistance in infrastructure development

# Industry Structure & Regulatory Environment

## Pakistan's oil & gas industry is highly segmented

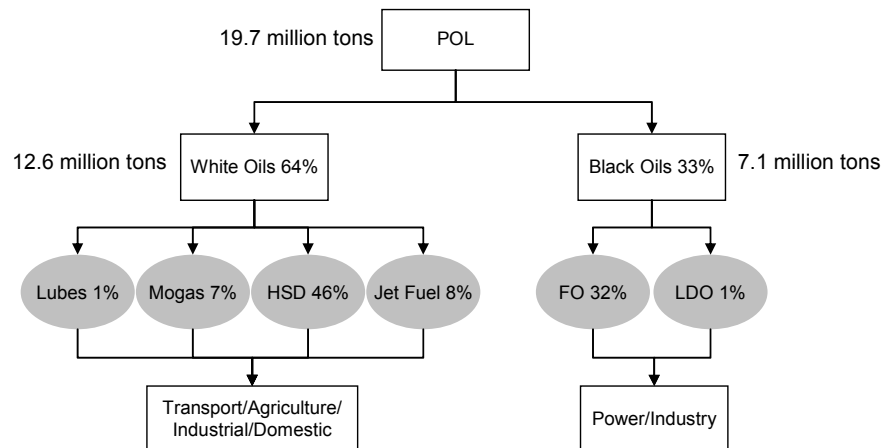
### Structure of Pakistan's oil & gas sector



### General Description

- Pakistan's oil and gas industry is highly segmented, with each sector performing a specific task in the chain, and no "fully integrated" outfits involved in all phases of production
- Exploration & Production ("E&P"), commonly referred to as "upstream", is the process of searching for oil resources, extracting it from the ground and selling it to refiners.
- Refining, together with Marketing, is commonly referred to as "downstream", and is the process of converting crude oil into petroleum, oil, and lubricant ("POL") products such as gasoline, diesel fuel, and jet fuel
- Marketing entails selling products to the end-user. Marketing companies can purchase domestically refined products or imported products. Two pricing regimes have been employed: 1) Import parity pricing of refined product to ensure that imported refined products are no more cost competitive than domestically refined products and 2) IFEM (Inland Freight Equalization Margin) to ensure refined product prices are equal across the country

### Product Market Shares



Source: AKD, Pakistan Energy Yearbook 2006, Abraaj analysis

### Regulatory Authorities

- OGRA**
  - The Oil & Gas Regulatory Authority ("OGRA") has the exclusive authority to grant licenses, prescribe technical standards, and announce fortnightly oil prices
- OCAC**
  - The Oil Companies Advisory Committee ("OCAC") represents the downstream oil industry and is not strictly a regulatory body, but a forum for interaction between oil companies and the government
- MPNR**
  - The Ministry of Petroleum & Natural Resources ("MPNR") is responsible for legislation, policy, and planning in relation to the oil and gas sector
  - The Petroleum Policy provides packages for both the upstream and downstream activities of Pakistan. The objective is to attract private investment in improving oil and gas infrastructure as well as its distribution

# Residue Outlets – The Long List

## Carbon Rejection

## Hydrogen Addition

ATM Residue								
VAC Residue	✓		✓	✓	✓		✓	✓
Cracked Residue								

*Bitumen*  
*Cat Cracking*  
*Deasphalting*  
*Therm CR / Visb*  
*Coking*

*Long Res HDM*  
*Long Res HDS*  
*Fixed Bed HC*  
*Ebul / Slurry HC*  
*Hycon Bunker*

*Gasification*  
*Power Gen*

→ There is no single answer...