

# **REFINING AND OIL MARKETING IN PAKISTAN**

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**September 11, 2007**

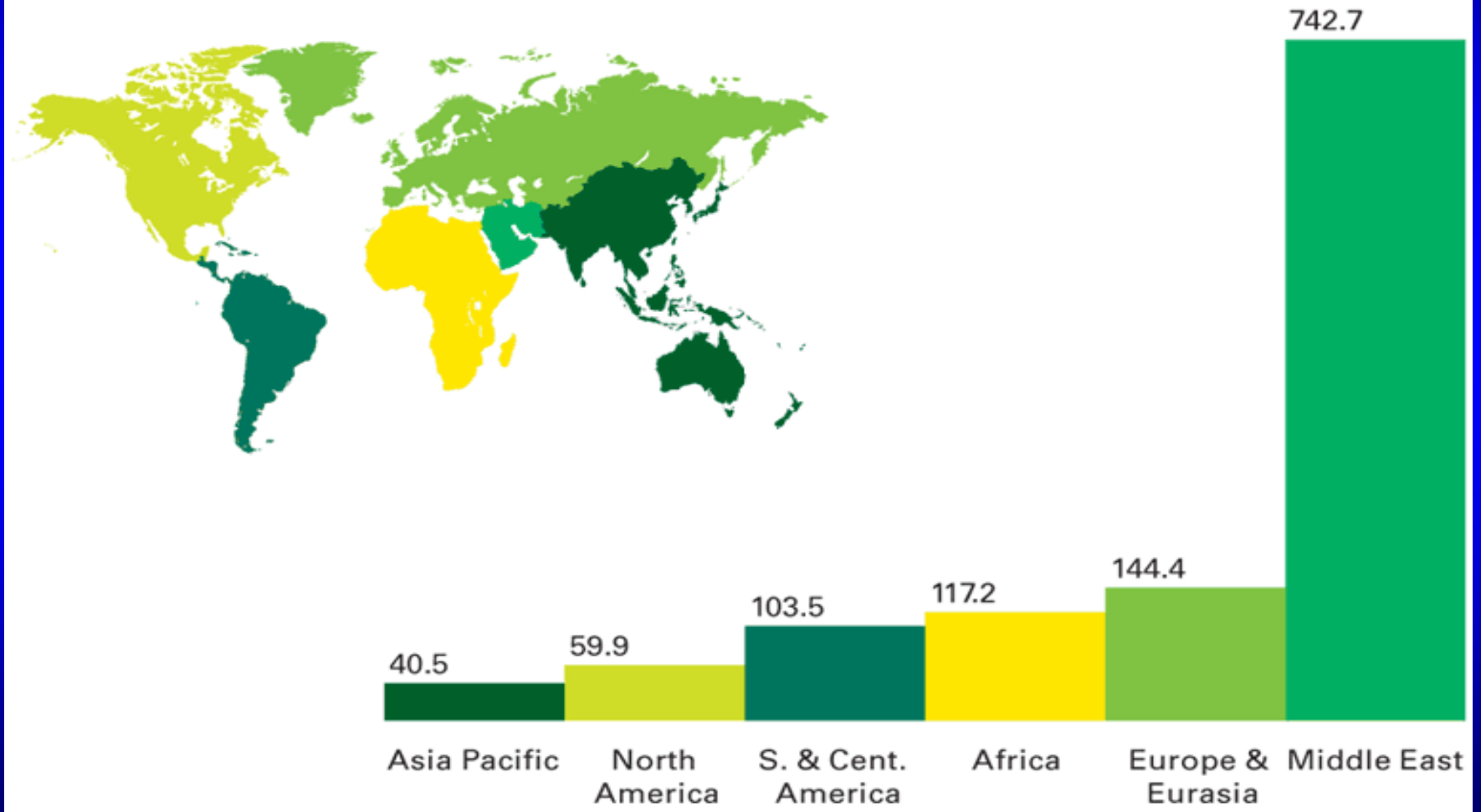
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# ➤ INTRODUCTION

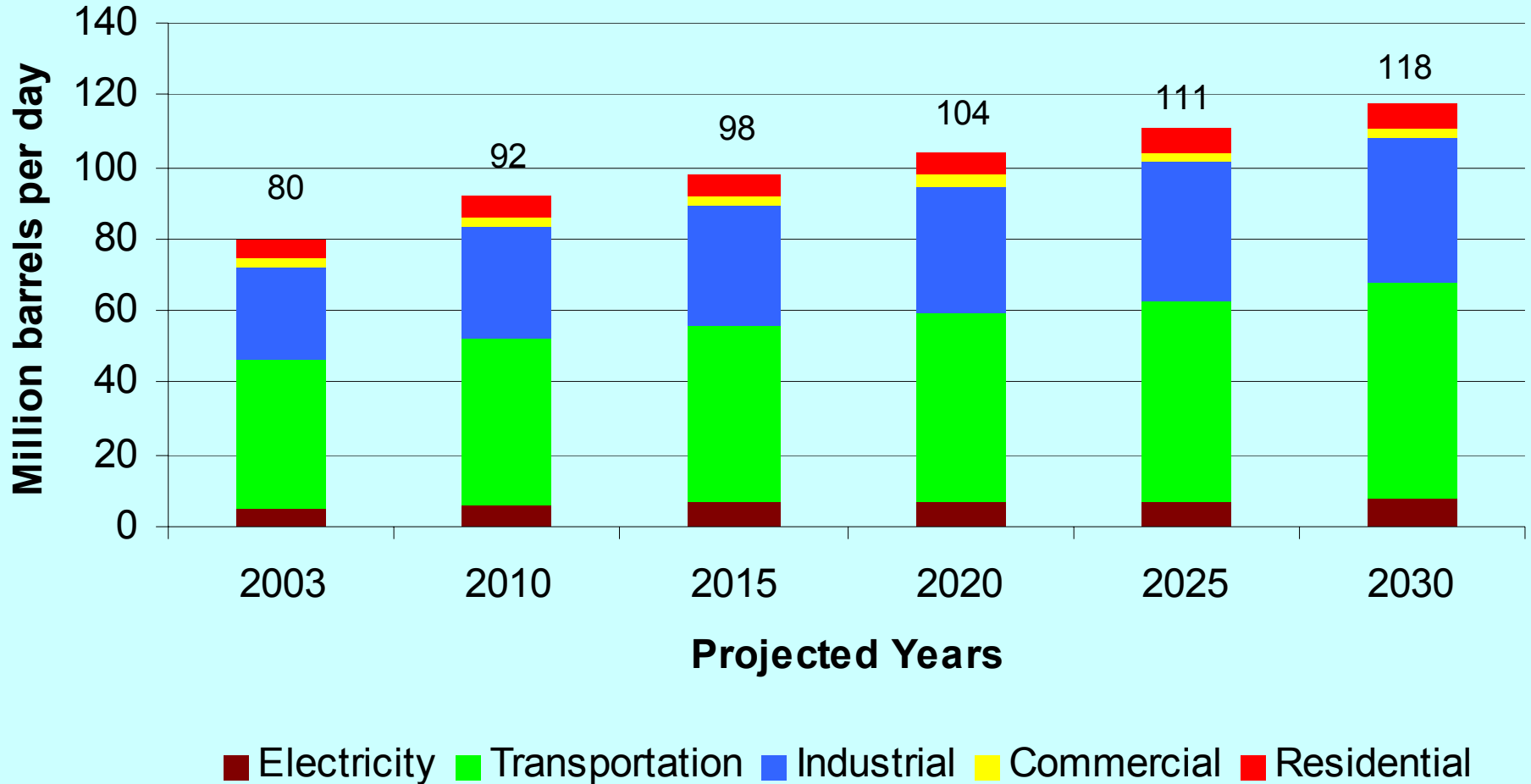
- WORLD REFINING OVERVIEW

# OIL- A Major Key Player

Proved reserves at end 2006  
Thousand million barrels



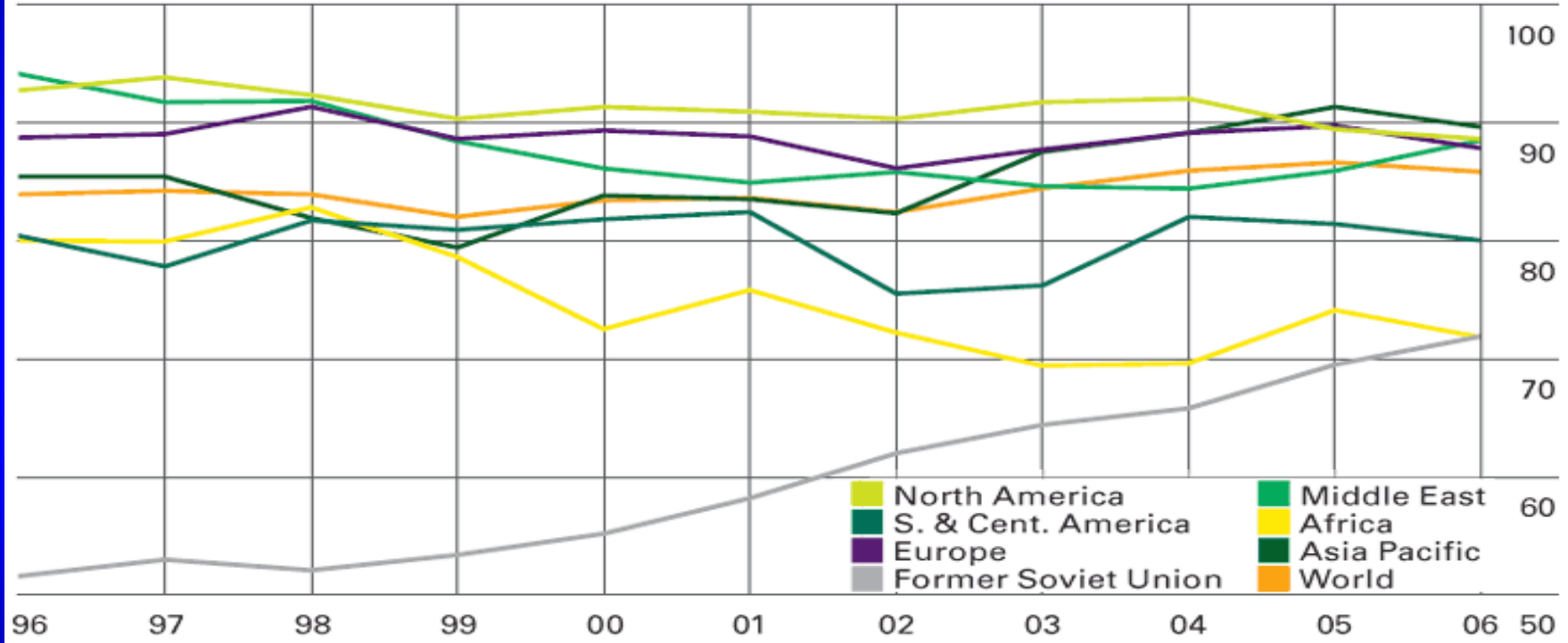
# Demand Steadily Increasing



Source: Energy Information Administration EIA

# Strong demand will continue driving capacity utilization

Refinery utilization Percentage



Demand growth slowed again in 2006 and was exceeded by global refining capacity additions for the first time since 2001. As a result, global average refinery utilization fell to 85.8% versus a revised 86.6% for 2005. Even so, crude runs grew rapidly in Asia Pacific, the Middle East and the Former Soviet Union in support of strong domestic demand. In every other region, throughputs fell versus 2005 levels.

# Planned Capacities by 2010-Major Investment planned (MBpd)

Presently 2,900

	CDU	CCR	Severe Secondary	of which: HDC	Dist. HDT	of which: HDS	Resid HDS
Presently 2,500							
South Asia	5,165	559	1,641	484	1,525	250	28
India	3,939	435	1,481	418	1,337	232	28
Pakistan	752	84	100	66	91	-	-
Bangladesh	326	18	38	-	64	18	-
Sri Lanka	148	22	22	-	33	-	-

Presently 282

Source: Asia Pacific Energy Consulting

Refining & Marketing in Pakistan-Carbon Credits Potential in Oil & Gas Sector

# China & Middle East Expansions (by 2010) MBPD

Company	CDU	VDU	Coking	HDC	R/FCC	THC/ VSB	Cat. Reform	Alky/ Poly	Isom	BTX	Dist. HDT	Resid Desulf.	Lubes	Asphalt
Wepec	-	-	-	30	-	-	-	-	-	-	40	-	-	-
PetroChina	744	178	23	135	6	18	57	2	-	-	256	-	1.0	-
Sinopec	1,430	282	70	111	103	-	43	1	-	-	419	119	8.0	-
GS Caltex	-	-	-	-	-	-	35	-	-	-	-	-	-	-
Jiangsu Lingguang Group	30	-	-	-	-	-	-	-	-	-	-	-	-	-
Sinopec /ExxonMobil/ Aramco	158	65	-	32	28	-	20	2	-	-	60	25	-	-
CNOOC	236	98	74	73	24	-	30	3	-	-	115	40	-	-
Sinopec/ Hainan Provincial Co.	156	98	-	54	-	30	23	-	4	-	45	-	-	-
Yangchang Oil Administration	58	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>GRAND TOTAL</b>	<b>2,812</b>	<b>721</b>	<b>167</b>	<b>435</b>	<b>161</b>	<b>48</b>	<b>208</b>	<b>8</b>	<b>4</b>	<b>-</b>	<b>935</b>	<b>184</b>	<b>9.0</b>	<b>-</b>

Middle East	CDU	VDU	Coking	HDC	R/FCC	THC/VSB	Cat. Reform	Alky/Poly	Isom	BTX	MTBE	Naphtha HDT	Distillate HDT	GO Desulf.	Resid Desulf.	Lubes	Asphalt
<b>Mideast Total</b>	<b>1,429</b>	<b>195</b>	<b>-</b>	<b>116</b>	<b>271</b>	<b>65</b>	<b>278</b>	<b>12</b>	<b>108</b>	<b>14</b>	<b>1.5</b>	<b>391</b>	<b>468</b>	<b>71</b>	<b>106</b>	<b>4.0</b>	<b>2.0</b>

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- 1. REGIONAL ENERGY OVERVIEW**
  - 2. PAKISTAN ENERGY SCENARIO**
  - 3. REFINING SECTOR**
  - 4. CHALLENGES**
  - 5. OPPORTUNITIES**

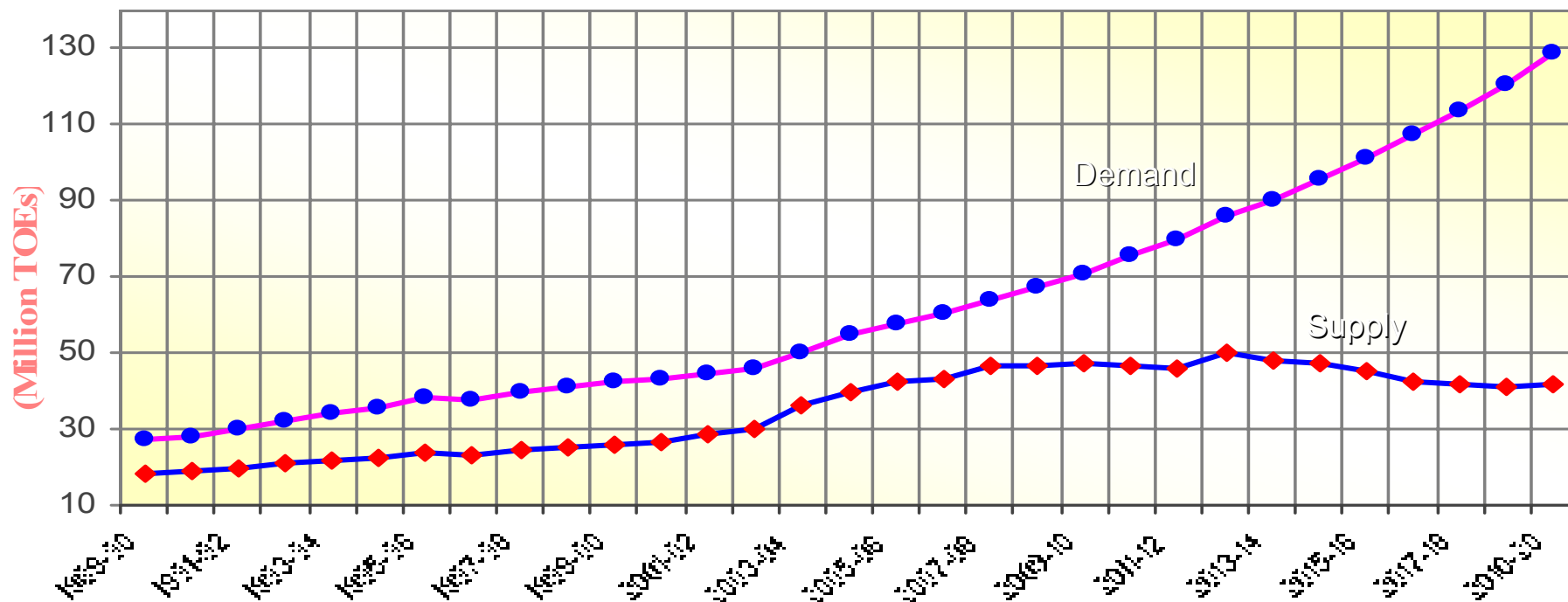
# Per Capita Consumption Increasing

<u>Year</u>	Per Capita Energy Consumption - Pakistan (TOE/capita)
2004-05 Actual	0.37
2009-10	0.42
2014-15	0.52
2019-20	0.64

<u>Per Capita Energy Consumption (TOE/capita)</u>	<u>Countries</u>
Below 0.5	Nepal, Uzbekistan, Kenya, Bangladesh, India
0.5 – 1.0	Indonesia, China, Sri Lanka, Philippines, Algeria
1.0 – 2.0	Thailand, Malaysia, Brazil, Turkey, Egypt
2.0 – 6.0	U.S.A, U.K, France, Saudi Arabia, Singapore

# Increasing Gap

## Pakistan: Energy/Supply Pattern



Year	Total Energy Demand	Local Energy Supply	Energy Deficit Million TOE
2004-05 Actual	54.9	39.6	(15.3)
2009-10	71.0	47.2	(23.9)
2014-15	95.6	47.0	(48.6)
2019-20	128.7	41.9	(86.8)

# Energy Imports expected

Year	Natural Gas	Oil Products	Coal/Hydel /Nuclear etc	Total Demand (million TOE)
2004-05 Actual	28.0 (51%)	15.9 (29%)	11.0 (20%)	54.9
2009-10	30.7 (43%)	26.5 (37%)	13.8 (20%)	71.0
2014-15	43.3 (45%)	33.4 (35%)	18.9 (20%)	95.6
2019-20	55.0 (43%)	43.9 (34%)	29.8 (23%)	128.7

## DEFICIT IMPORTS (Million TOE)

Year	Natural Gas Imports	Petroleum Products Imports	Coal Imports	Total Imports
2004-05 Actual	-	13.1	2.2	15.3
2009-10	-	21.2	2.6	23.9
2014-15	16.4	28.2	4.4	48.6
2019-20	41.0	38.7	7.1	86.8

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# REFINERIES-Limited Capacity

Existing Refineries	Barrels per Stream Day (BPSD)	Million Tons per Annum*
Pak-Arab Refinery Limited (PARCO)	100,000	4.47
National Refinery Limited (NRL)	62,000	2.77
Pakistan Refinery Limited (PRL)	50,000	2.24
Attock Refinery Limited (ARL)	40,000	1.79
BOSICOR Pakistan Limited (BPL)	30,000	1.34
<b>TOTAL</b>	<b>282,000</b>	<b>12.61</b>

\* Tons per annum based on 340 Stream days and 7.6 Bbl/Ton factor

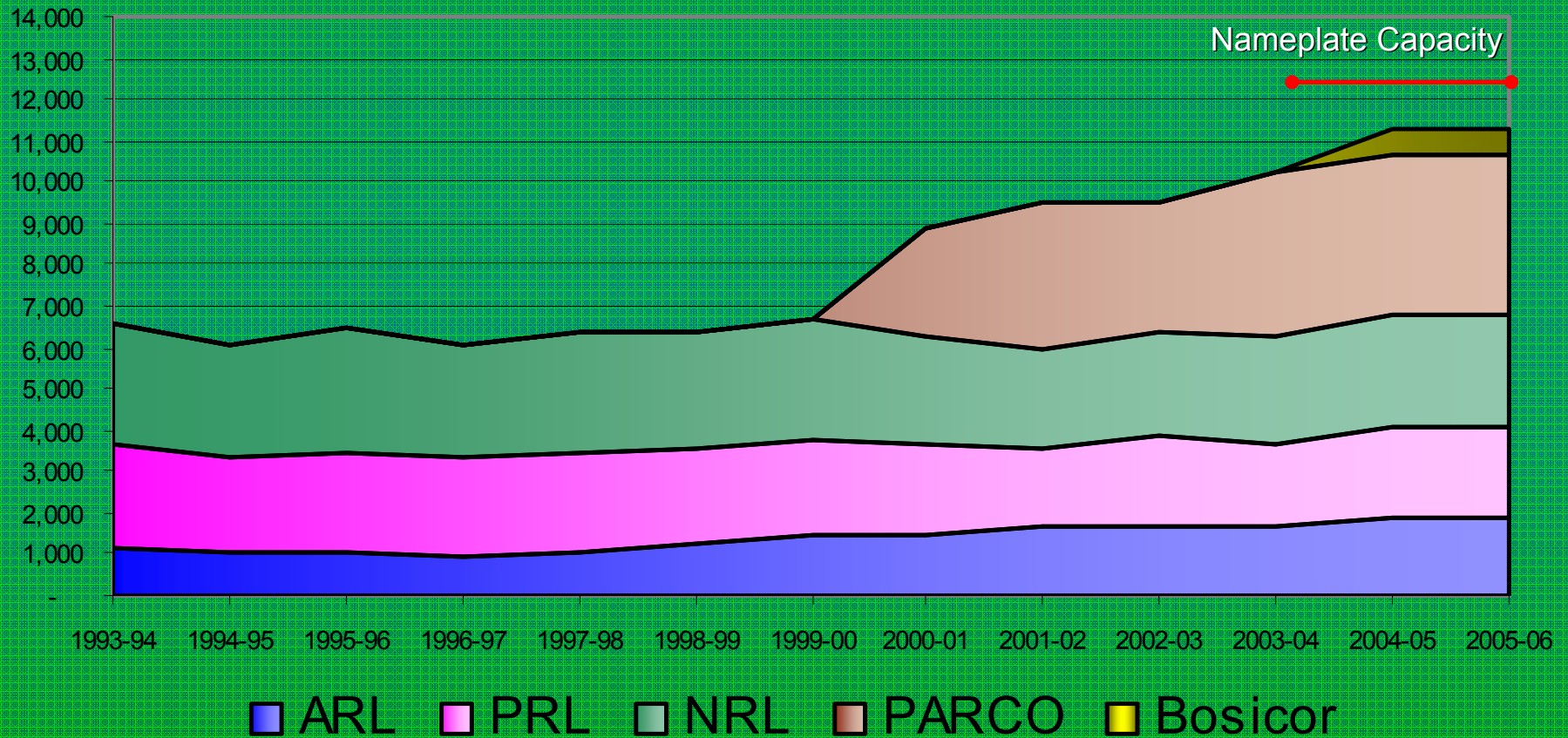
# Mostly Hydroskimming

Refinery	Configuration
PARCO	CCR/DieselMax/Visbreaker
NRL	Hydroskimming/Lubes
PRL	Hydroskimming
ARL	Hydroskimming
BOSICOR	Hydroskimming



# Operating Throughputs reaching nameplate

TON  
'000'



# Planned Projects

Planned Refineries	Barrels per Stream Day (BPSD)	Million Tons per Annum*
INDUS REFINERY	100,000	4.47
BOSICOR (New)	120,000	5.37
COASTAL REFINERY	250,000	11.18
<b>TOTAL</b>	<b>470,000</b>	<b>21.02</b>

\* Tons per annum based on 340 Stream days and 7.6 Bbl/Ton factor

# Location of Refineries



# Projects in Initial Planning Stage

Planned Refineries	Barrels per Stream Day (BPSD)	Million Tons per Annum*
GWADAR REFINERY AT GWADER PORT	250,000	11.18
PAK-KUWAIT REFINERY AT PORT QASIM KARACHI	100,000	4.47
<b>TOTAL</b>	<b>350,000</b>	<b>15.65</b>

\* Tons per annum based on 340 Stream days and 7.6 Bbl/Ton factor

# Upgradation Plans at a glance

- All existing Refineries working on producing Cleaner Fuels

Refinery	Plan
PARCO	Diesel Hydrodesulfurization (HDS)
NRL	HDS
PRL	Vacuum unit/ HDS/ Thermal Cracker
ARL	Isomerization/ HDS
Bosicor	Isomerization

# OIL MARKETING COMPANIES (OMCs)

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## ➤ MAJOR OMCs

- **Pakistan State Oil Company Limited**
- **Shell Pakistan Limited**
- **Attock Petroleum Limited**
- **Caltex Oil (Pakistan) Limited**
- **Total Pakistan Private Limited**
- **Admore Gas (Pvt) Limited**

## ➤ OTHERS

- **ASKAR Oil Services (Pvt) Limited**
- **Hascombe Storage (Private) Limited**
- **Overseas Oil Trading Company (Pvt) Limited**

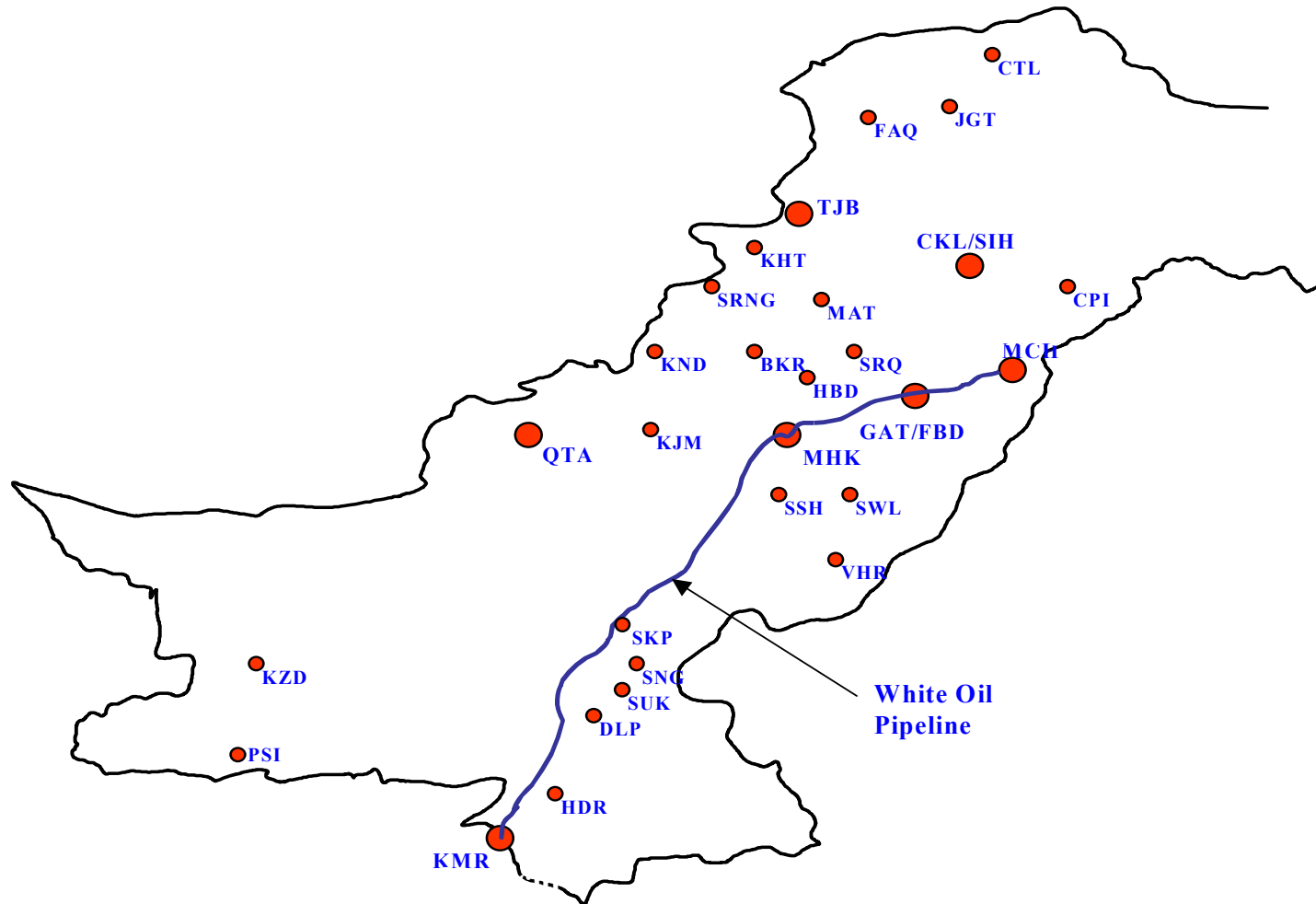
Refining & Marketing in Pakistan-Carbon Credits Potential in Oil & Gas

# STORAGES: Refineries & OMCs

(Pakistan Oil Report 2004-5)

<b>Crude/Product</b>	<b>MTons (July 01, 2006)</b>
<b>Crude</b>	<b>844,400</b>
<b>Naphtha</b>	<b>105,584</b>
<b>LPG</b>	<b>2,770</b>
<b>100/LL</b>	<b>1,200</b>
<b>JP-1</b>	<b>76,216</b>
<b>JP-8</b>	<b>21,101</b>
<b>Premium Motor Gasoline</b>	<b>92,138</b>
<b>HOBC</b>	<b>3,404</b>
<b>Kerosene</b>	<b>83,706</b>
<b>High Speed Diesel</b>	<b>1,017,465</b>
<b>Light Diesel Oil</b>	<b>28,927</b>
<b>Low Sulfur Fuel Oil</b>	<b>35,046</b>
<b>High Sulfur Fuel Oil</b>	<b>496,711</b>
<b>Total</b>	<b>2,808,668</b>

# Location of OMC's Storages



Source: Oil Companies Advisory Committee OCAC

# MAJOR EXISTING OIL PIPELINES

Company (Pipeline)	Service	Dia (Inches)	Km
PARCO (Karachi-Mahmood Kot)	Crude	16	864
PAPCO (Port Qasim-Mahmood Kot)	HSD	20	817

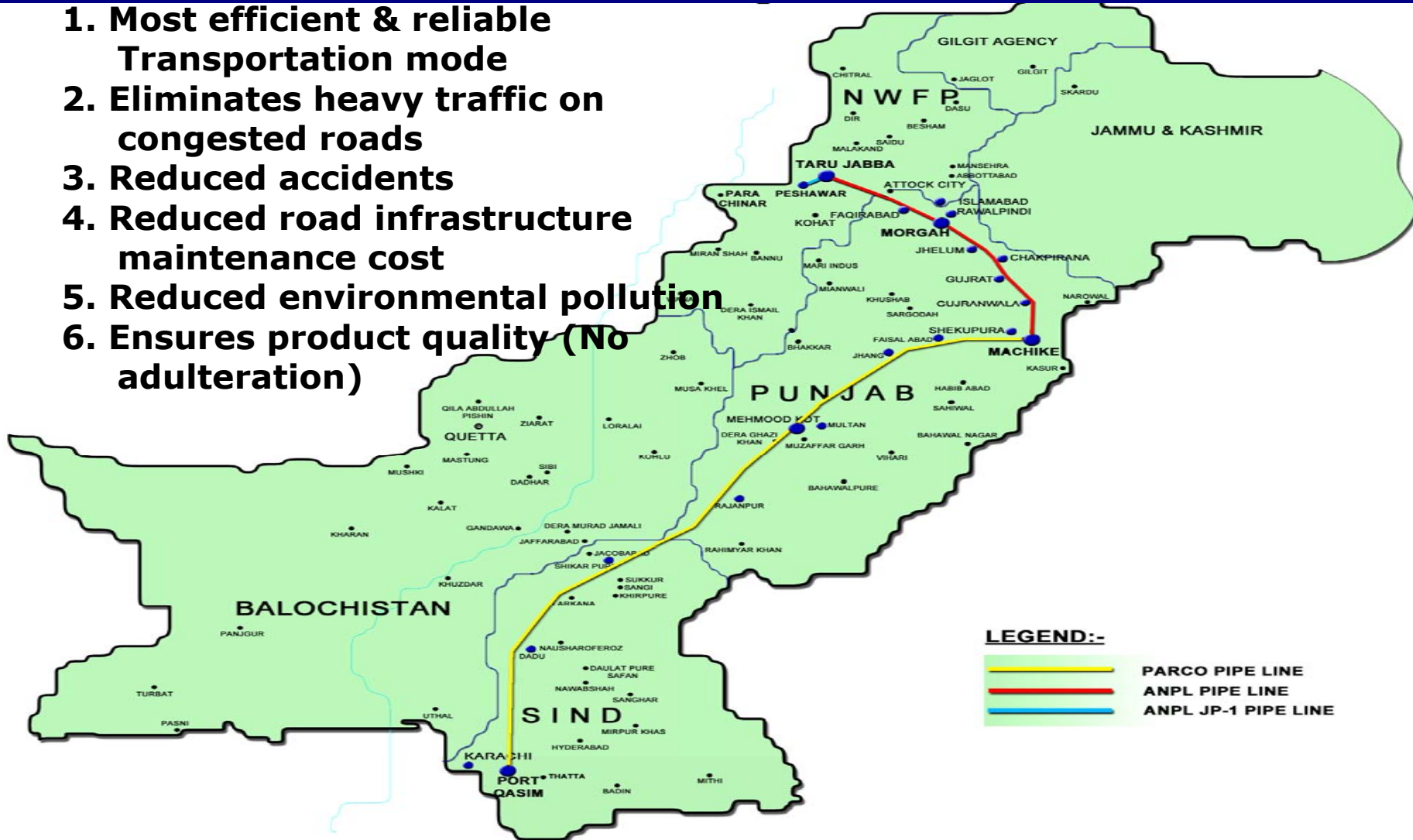
**\*Proposed**

# MAJOR PROPOSED OIL PIPELINES

Company (Pipeline)	Service	Dia (Inches)	Km
ARL (Machike-Morgah-Taru Jabba)	PMG/Kero/ HSD/Jet fuels	16/12	470
PARCO (Faisalabad-Kharian)	Products	-	190
PARCO (Faisalabad- Sahiwal)	Products	-	90
PARCO (Mahmoodkot- Peshawar)	Products	-	430
BOSICOR(Refinery- SPM)	Crude/Products	-	15

# Main Oil Pipeline Routes

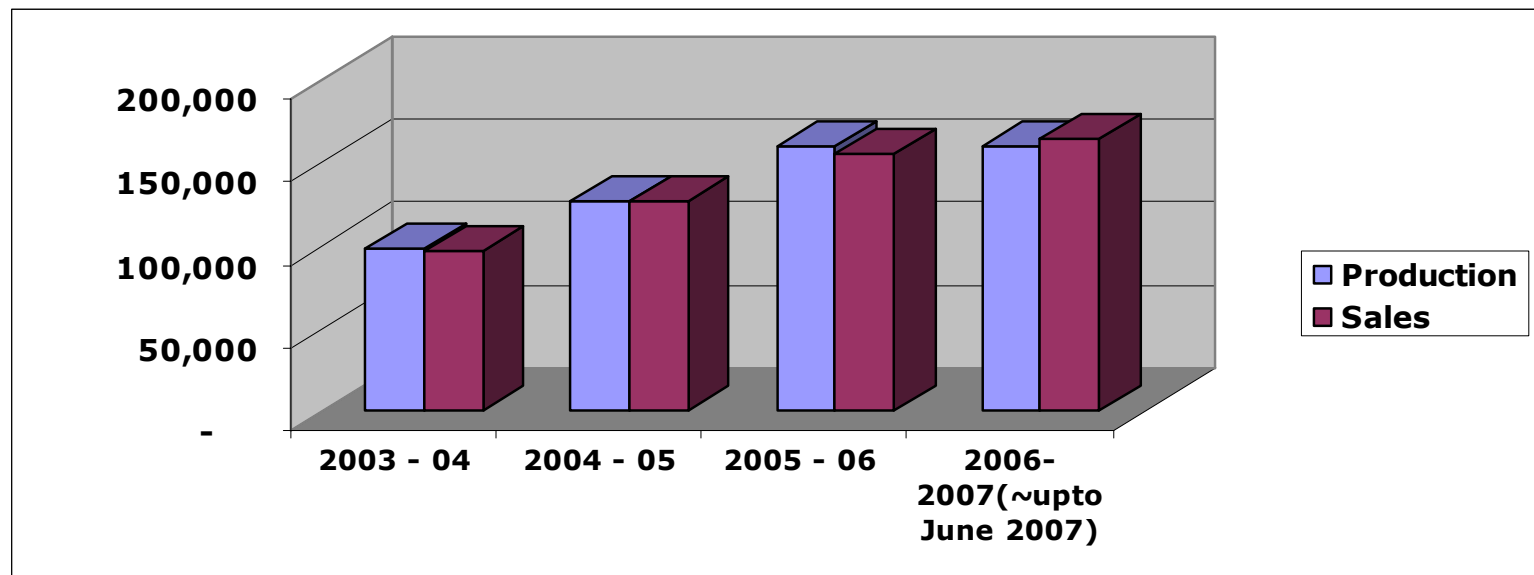
1. Most efficient & reliable Transportation mode
2. Eliminates heavy traffic on congested roads
3. Reduced accidents
4. Reduced road infrastructure maintenance cost
5. Reduced environmental pollution
6. Ensures product quality (No adulteration)



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# Big Jump in Car Sales But all CNG- Pressure on PMG Sales

## Car Production and Sales



	2003 - 04	2004 - 05	2005 - 06	2006-2007(~upto June 2007)
<b>Production</b>	98,461	126,403	160,642	160,496
<b>Sales</b>	96,620	127,309	155,514	165,268

Source: PAMA

# Naphtha Exports at a loss

REFINERY	EXPORT Tons/Annum
PARCO	-
NRL	315,000
PRL	200,000
ARL	212,000
BOSICOR	37,000
Dhodak	83,000
<b>Total Country Exports Potential</b>	<b>847,000</b>

Source: OCAC

# Sulfur Main concern-Investments Required

## HSD

### Current PSI Specifications

Specification	Value	Limit
Sulfur	1 wt%	Max

### Coming Specifications (EURO II)

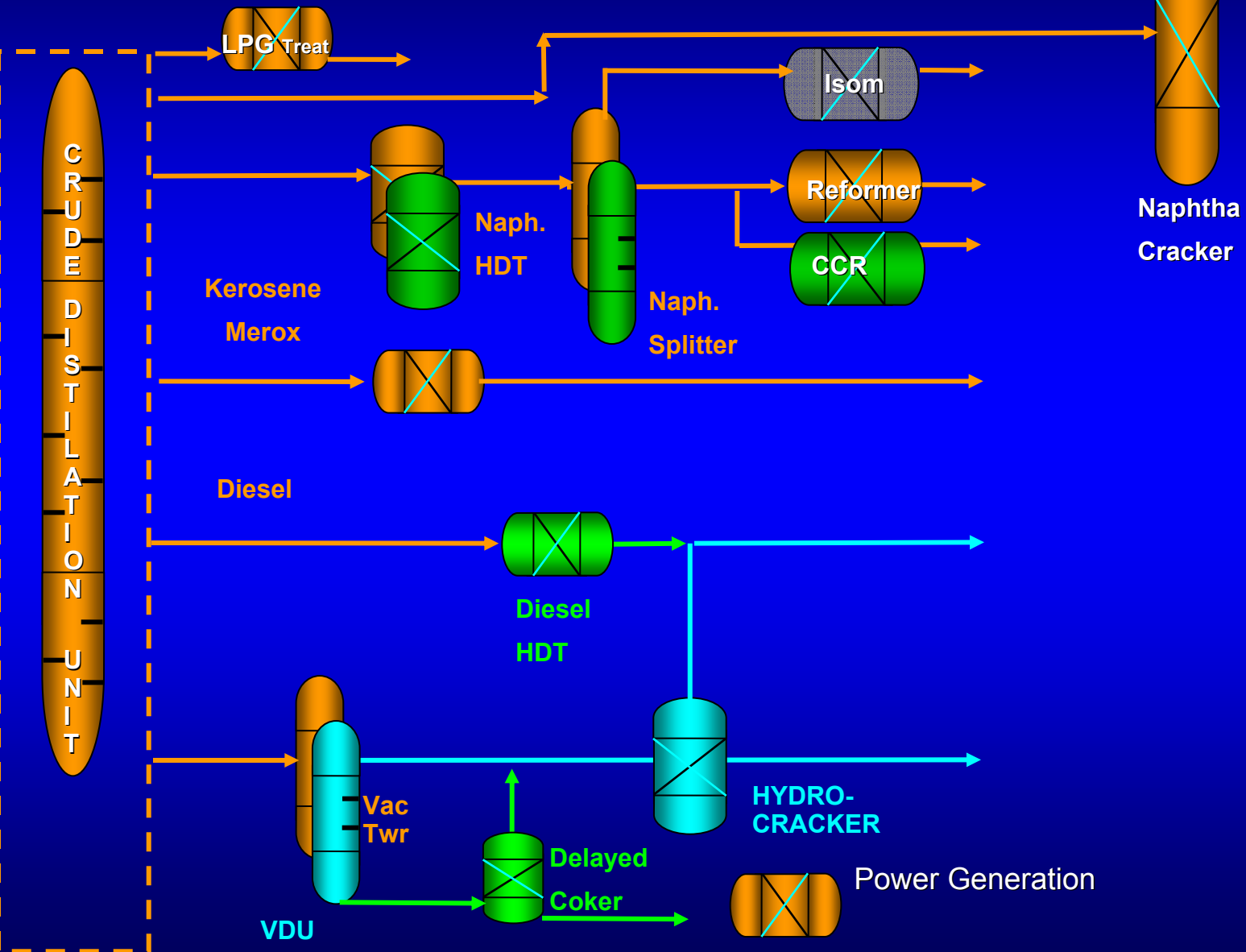
Specification	Value	Limit
Sulfur	0.05 wt% (Euro II)	Max

# OPPORTUNITIES FOR CDM

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- 1. Investments in Refining and Petrochemical**
- 2. Power Sector**
- 3. Gwadar Port**

# Upgradation to Improve Margins and Specifications-lead to CO2 production



# Major Infrastructure Build Up-CO2

Motorways, Trucking System

Railways, Ports

Digital / Fiber Connectivity





Energy, Education

CHINA

 HUBS

 CORRIDORS



-  MMTJPP Pipeline
-  Connecting Highways
-  Motorways
-  National Highways

## Major new Industrial Estates / Clusters will be set up along the new Trade Corridors

Source: Planning Commission

# NEW HUBS FOR CO2 EMISSIONS THAT CAN BE TAPPED

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- **US \$ 12.5 Billion Oil-Petrochemical City Planned**
  - **Oil Refinery**
  - **Petrochemicals**
  - **Storages/Terminals**
- **Feasibility of the proposal in progress**
- **12,500 Acres of land being acquired**

# ***CDM Potential in Petroleum Refineries***

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- **Major areas for energy efficiency improvement are utilities (30%), fired heaters (20%), process optimization (15%), heat exchangers (15%), motor and motor applications (10%), and other areas (10%)**
- **Hydrogen gas production from Platformer off gas instead of Naphtha**
- **Waste Heat Recovery and using the recovered heat for heating oil**
- **Crude Preheat Train optimization through modification of heat exchangers network**

# ***CDM Potential in Petroleum Refineries***

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- **Gas flaring reduction which is the main source of GHG emissions from oil and gas industry**
- **Reducing heat loss into atmosphere along with the flue gases by utilizing it for preheating combustion air of heaters/boilers**
- **Steam generation through waste heat recovery from processes, cogeneration, and boilers**
- **Installation of CO<sub>2</sub> recovery plant and utilize for urea production**

**THANK-YOU**