



# Oil Refineries An Overview

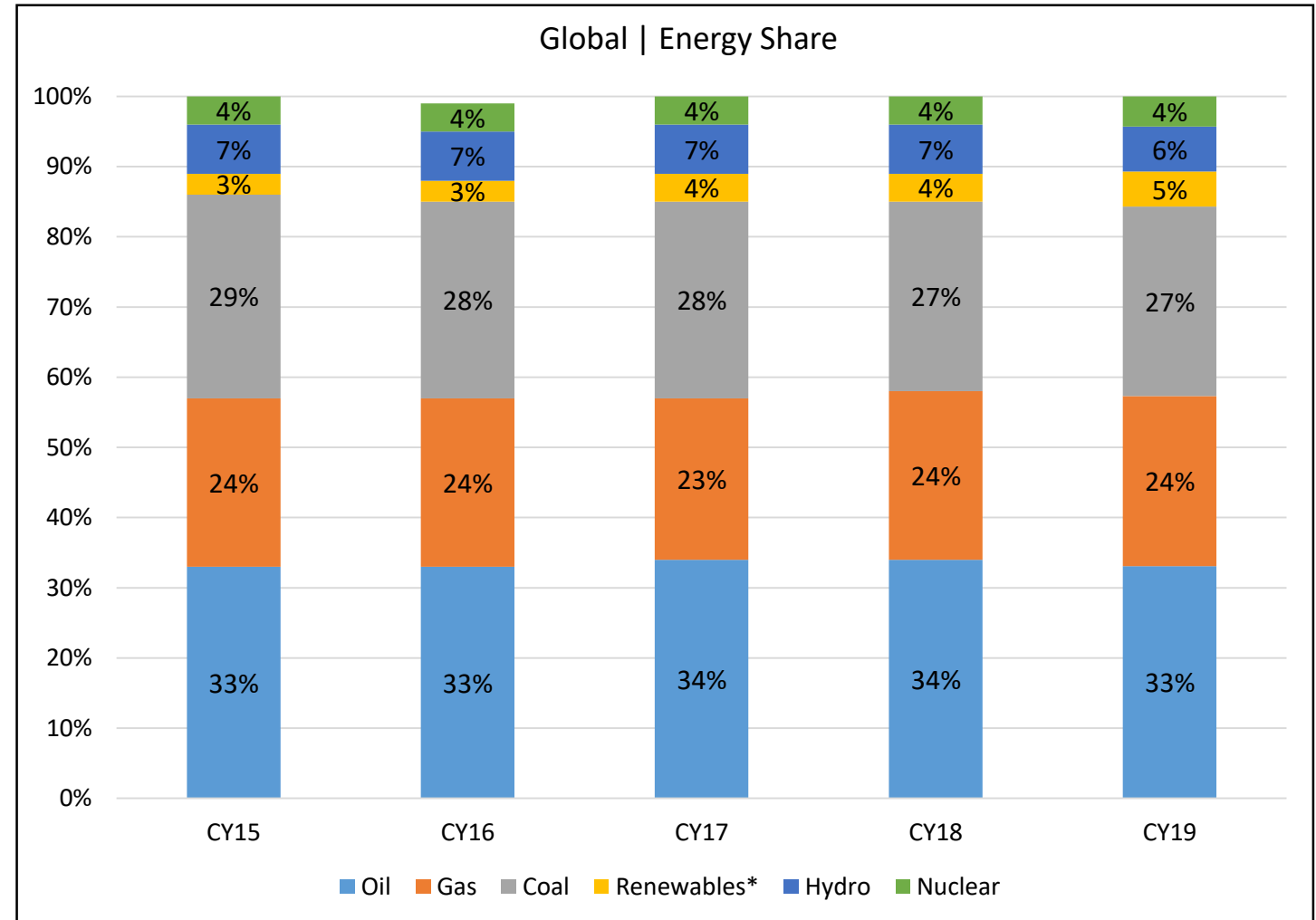
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# REFINERIES | GLOBAL INDUSTRY

## World Energy Mix Remains Largely Stable

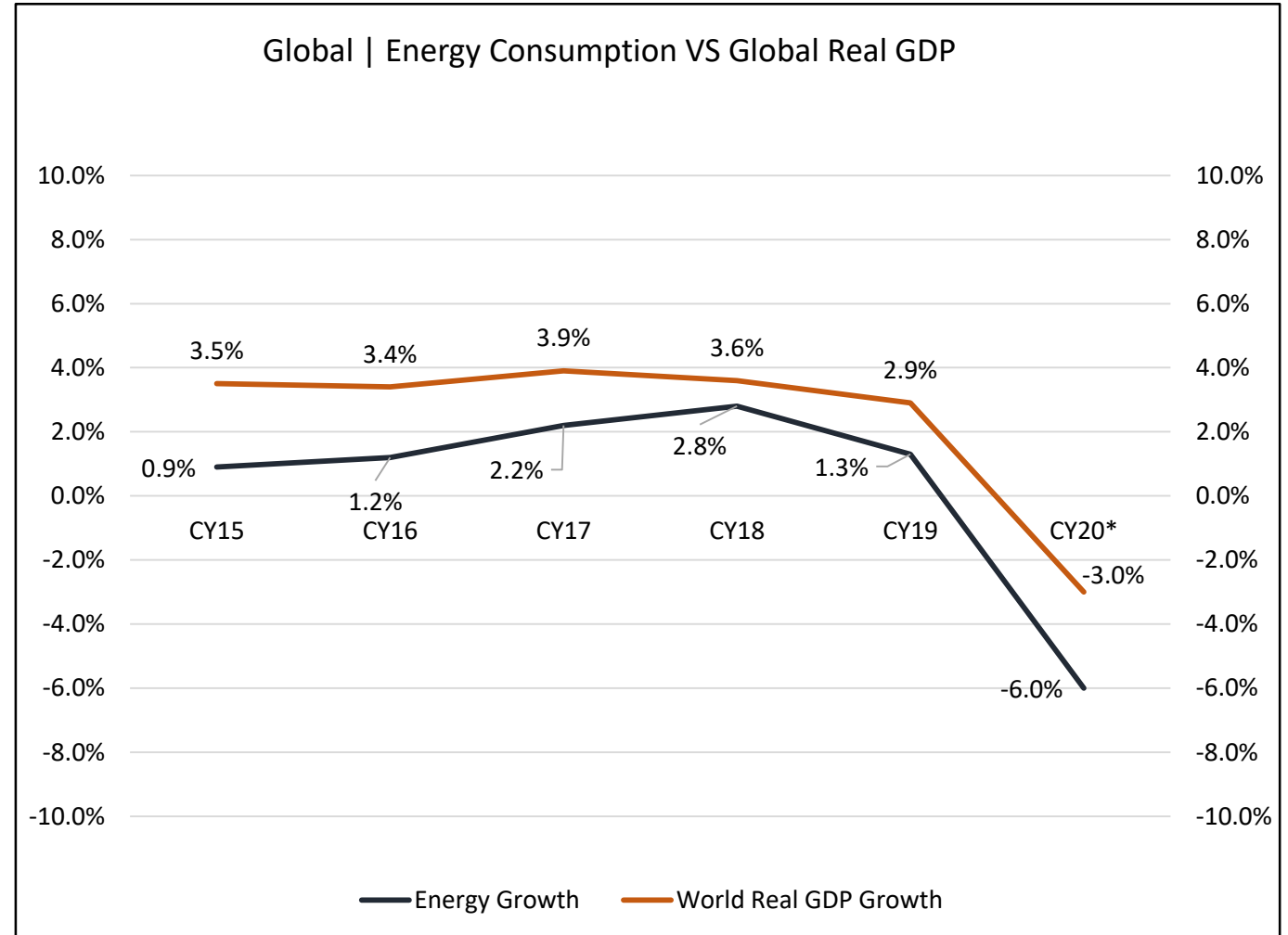
- Energy Market has remained largely stable over the last five years with fossil fuels (Oil, Gas, Coal) contributing ~84% to the World Energy Mix in CY19 (CY18:~85%). Oil has the highest share of ~33% in the global energy mix.
- Shift towards renewable sources of energy remains low. The same trend is expected to continue in the short to medium term horizon. Electric Vehicles (EV), storage batteries and sustained renewables are expected to change the mix in long term.



# REFINERIES | GLOBAL INDUSTRY

## Energy Consumption Declines Amid Covid-19 Crisis

- World energy consumption slowed down in CY19, witnessing a growth of ~1.3% as compared to ~2.8% in CY18.
- Slow down was prominent in the US, Europe, Russia & India due to weaker economic conditions led by US/China trade war, Brexit and milder weather impact on heating and cooling. These regions experienced highest growth in energy demand in CY18. In developed economies, average economic growth decreased by ~25% between CY18 & CY19. India's economic growth fell to ~4.8% in CY19 (CY18: ~6.8%).
- The Covid-19 pandemic has major implications on global economy. By mid of April'20, countries with complete lock down faced ~25% decline in their energy demand per week and countries with partial lock down faced ~18% decline in energy demand per week. During the first quarter of 2020, overall energy consumption fell by ~3.8%. Although some recovery came in third quarter, it is expected that the energy demand may decline by ~6% by the end of CY20.



\*forecasted

# REFINERIES

## Oil Value Chain

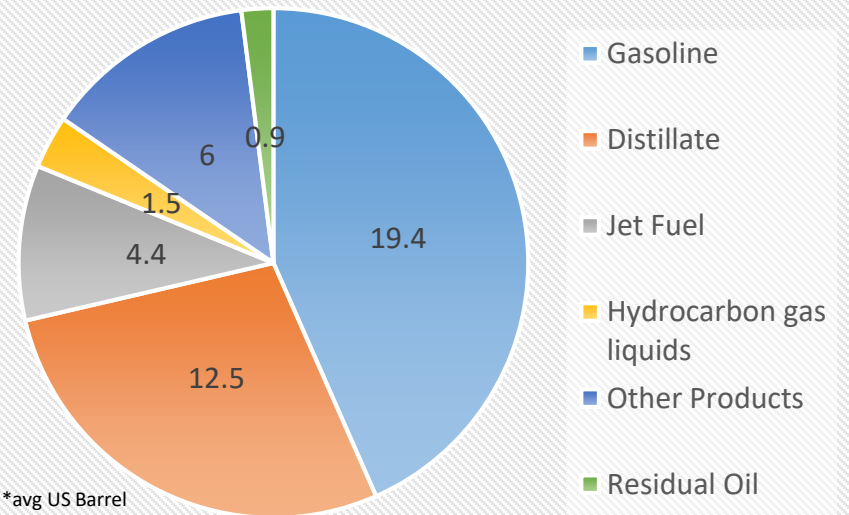
Crude oil is a mixture of hydrocarbons that exists in liquid phase in natural underground reservoirs and remains liquid at atmospheric pressure after passing through surface separating facilities.

Crude oil is transported to refineries to convert oil into many petroleum products.

Refining breaks crude oil down into its various components, which are then selectively reconfigured into new products. All refineries have three basic steps: Separation, Conversion, Treatment

Petroleum products include gasoline, distillates such as diesel fuel and heating oil, jet fuel, petrochemical feed stocks, waxes, lubricating oils, and asphalt

Petroleum Products from a Barrel of Crude Oil- Gallons

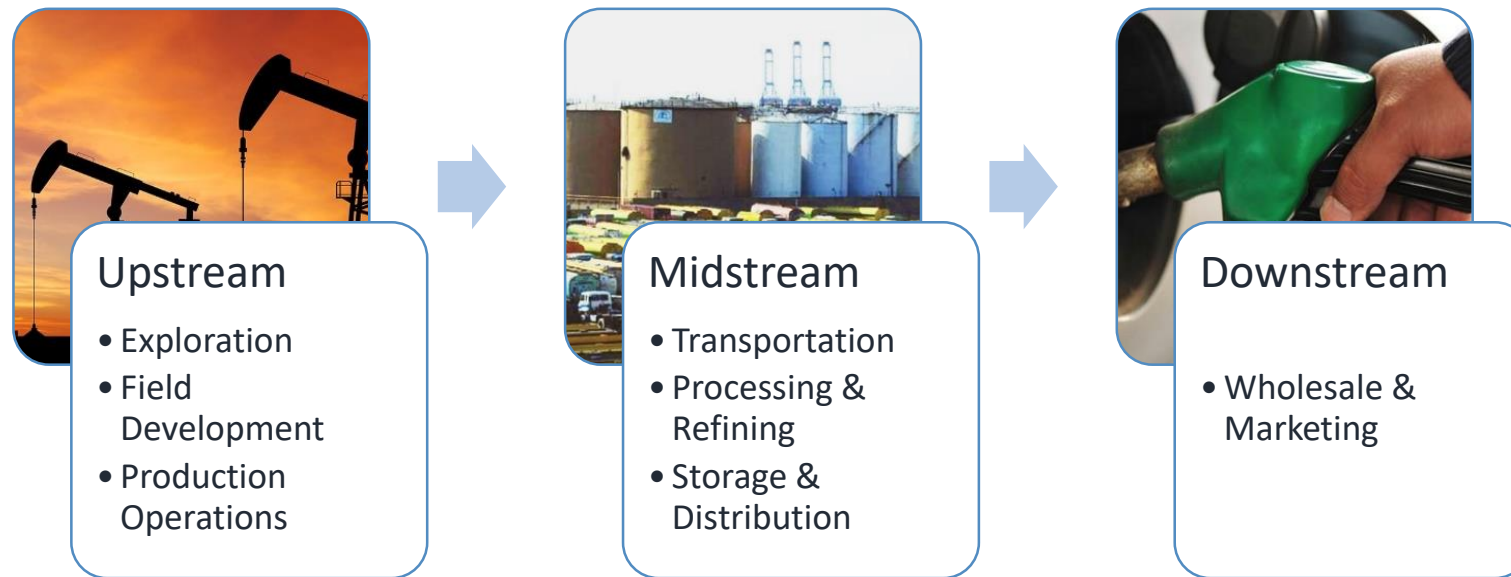


\*avg US Barrel  
~45 Gallons

Note: Conversion Table  
1MT~7.33Barrels  
1Gallon~0.02Barrels



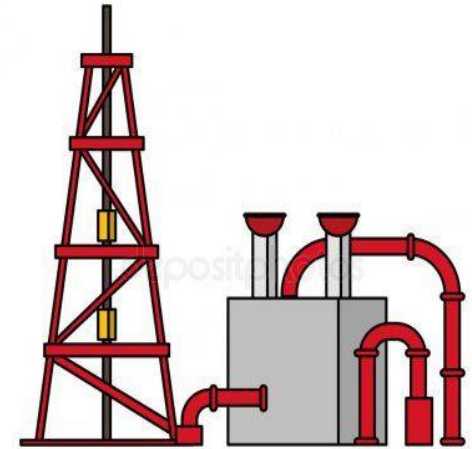
## Oil Market Segments



- Oil sector is divided into **Upstream**, **Midstream** and **Downstream** segments. Global Investment in Upstream Sector is estimated to be USD~347bln in CY20 (USD~438bln in CY19).
- Upstream Sector encompasses Exploration and Production of oil.
- Midstream includes transporting oil from production sites to refineries via pipelines, trains, tankers, and trucks and production of refined products.
- Downstream comprises marketing & distribution of refined petroleum products.
- World investment in the Midstream and Downstream Sector is expected to be USD~180bln in CY20 (USD~270bln in CY19).

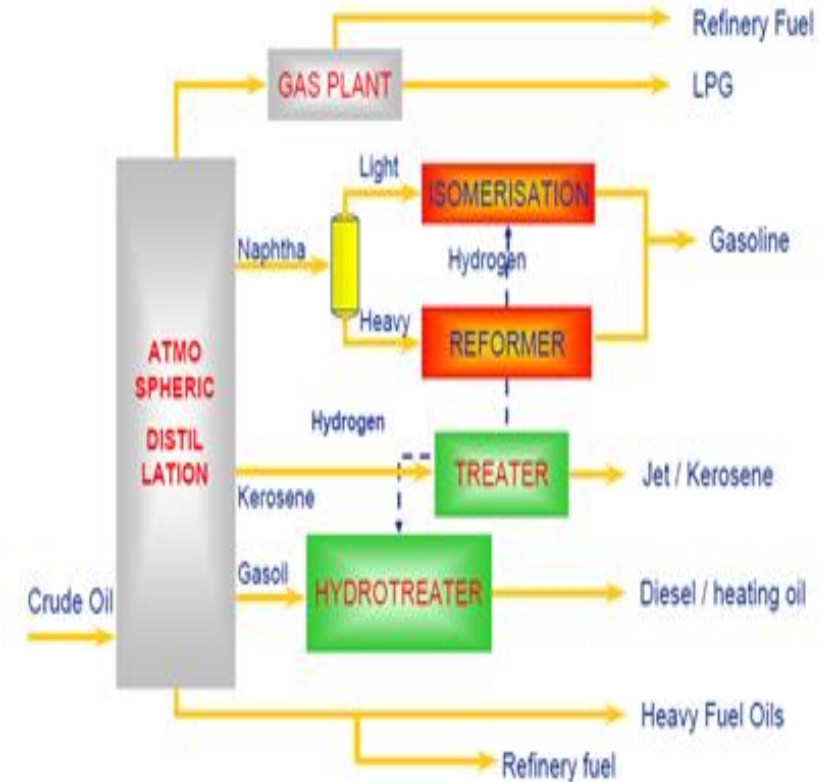
# REFINERIES | A BRIEF OVERVIEW

- An oil refinery or petroleum refinery is an industrial processing plant where crude oil is transformed and refined into more useful products such as diesel, gasoline, naphtha etc.
- Oil, being a crucial source of energy, it has a high cross sector dependence
- Oil Refineries are part of the mid stream and downstream energy sector.
- Among tradable commodities, oil holds the highest geopolitical influence.
- Crude oil was the world's number one export product in CY19, outpacing exports of cars in second place
- Oil refining industry witnessed a CAGR of 0.55% from CY15-19 in terms of production.
- Global oil production increased by 2.41% in 2018 but fell 0.33% in CY19 in line with weaker economic growth
- The global refining capacity for CY19 was 5046 mln MT on annual basis (101 mln b/d) which was ~63 mln MT greater than the previous year.
- The global refining capacity utilization was ~82% for CY19 which was marginally less than the previous year.
- In 2020, global oil demand witnessed a sharp decline of ~35% due to COVID-19 induced lockdowns. The demand for oil dried up to the extent that oil futures turned negative. This happened for the first time in history; WTI futures expiring in May 2020 went negative on 20<sup>th</sup> April 2020.



# REFINERIES | PRODUCTION PROCESS

- Refineries have multiple outputs/products which are used in a vast range of industries
- This leads to a high amount of cross sector dependence of other industries with oil refineries
- Crude oil is made up of a mixture of hydrocarbons, and the distillation process aims to separate this crude oil into broad categories of its component hydrocarbons, or "fractions."
- The most widely used conversion method is called cracking because it uses heat, pressure, catalysts, and sometimes hydrogen to crack heavy hydrocarbon molecules into lighter ones. A cracking unit consists of one or more tall, thick-walled, rocket-shaped reactors and a network of furnaces, heat exchangers, and other vessels.
- Complex refineries may have one or more types of crackers, including fluid catalytic cracking units and hydrocracking units.
- Crude oil is first heated and then put into a distillation column. Inside the distillation column, the liquids and vapors separate into petroleum components called fractions according to their boiling points.
- Lighter products include butane and other Liquefied Petroleum Gas (LPG), gasoline blending products, and naphtha, are recovered at the lowest temperatures.
- Mid-range products include jet fuel, kerosene, and distillates (such as home heating oil and diesel fuel).
- The heaviest products such as residual fuel oil are recovered at temperatures sometimes over 1,000 degrees Fahrenheit
- Hydro-skimming refineries are another type which have a main Atmospheric Distillation unit, a naphtha reforming unit and necessary treating processes for other products going to storage
- Hydro-skimming refineries are designed to operate with a high level of heat integration between process streams to cater lower temperature distillates as well. All products are line blended into finished product tankage.



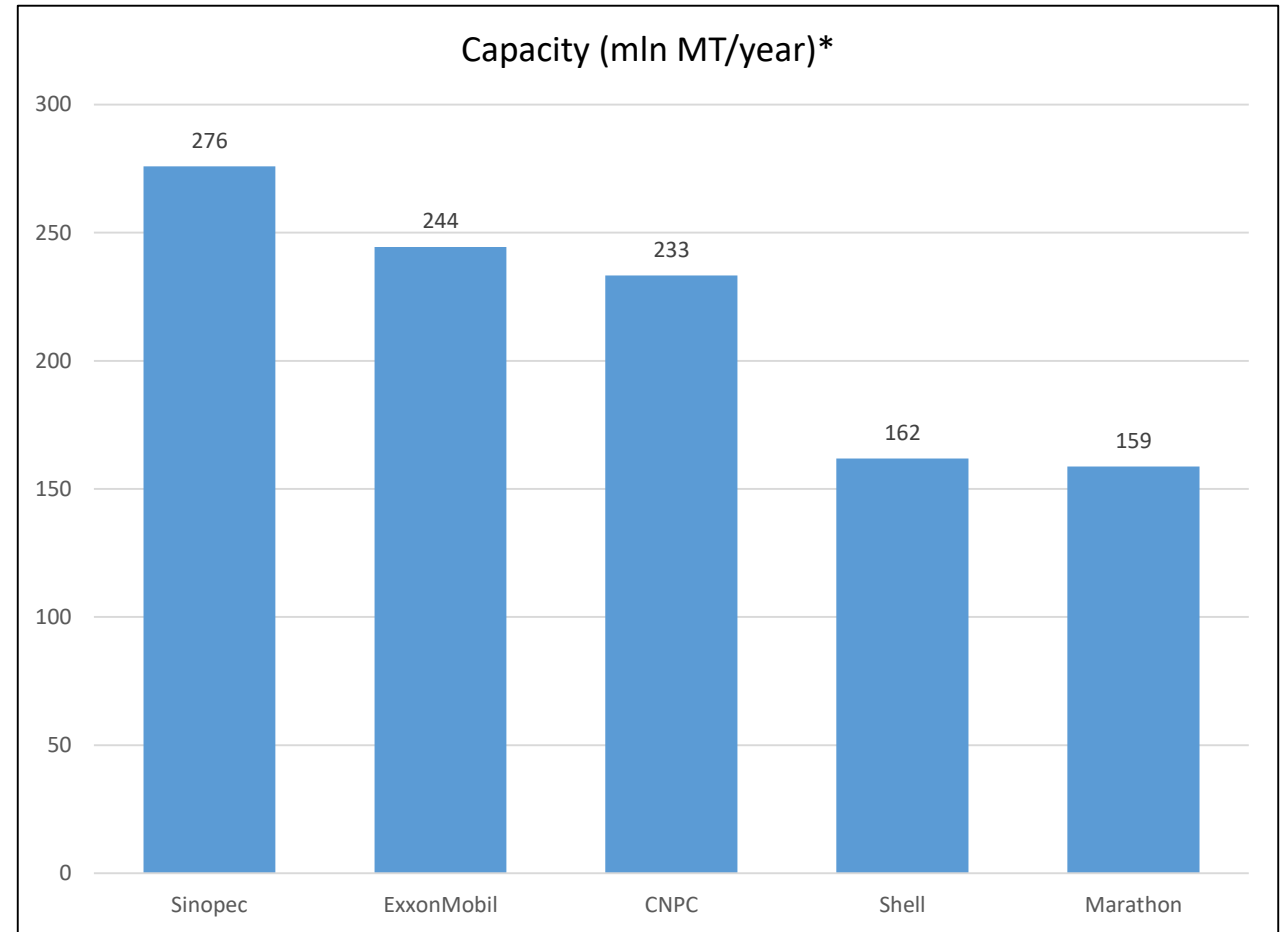
# REFINERIES | TOP PLAYERS

- World's Top 10 Refineries generated annual revenue of USD~1,873,371 mln in CY19 (USD~2,014,751mln in CY18).
- Top 10 Refineries contributed ~1.4% to world's GDP in CY19 (~1.5% in CY18).
- Top 10 Refineries serve in all three streams of oil industry.

Global   Revenue-mln USD			
Period	Origin	CY18	CY19
CNPC	China	413,122	401,013
Royal Dutch Shell	Netherland	335,597	294,677
Exxon Mobil	U.S	279,332	255,583
Sinopec	China	218,196	207,086
BP	England	195,020	180,236
Saudi Aramco	Saudi Arabia	147,420	140,645
Chevron	U.S	158,902	139,865
Lukoil	Russia	126,360	121,019
Phillips 66	U.S.	71,515	71,360
Total	France	69,287	66,887
Grand Total		2,014,751	1,878,371

# REFINERIES| MARKET LEADERS (Capacity Wise)

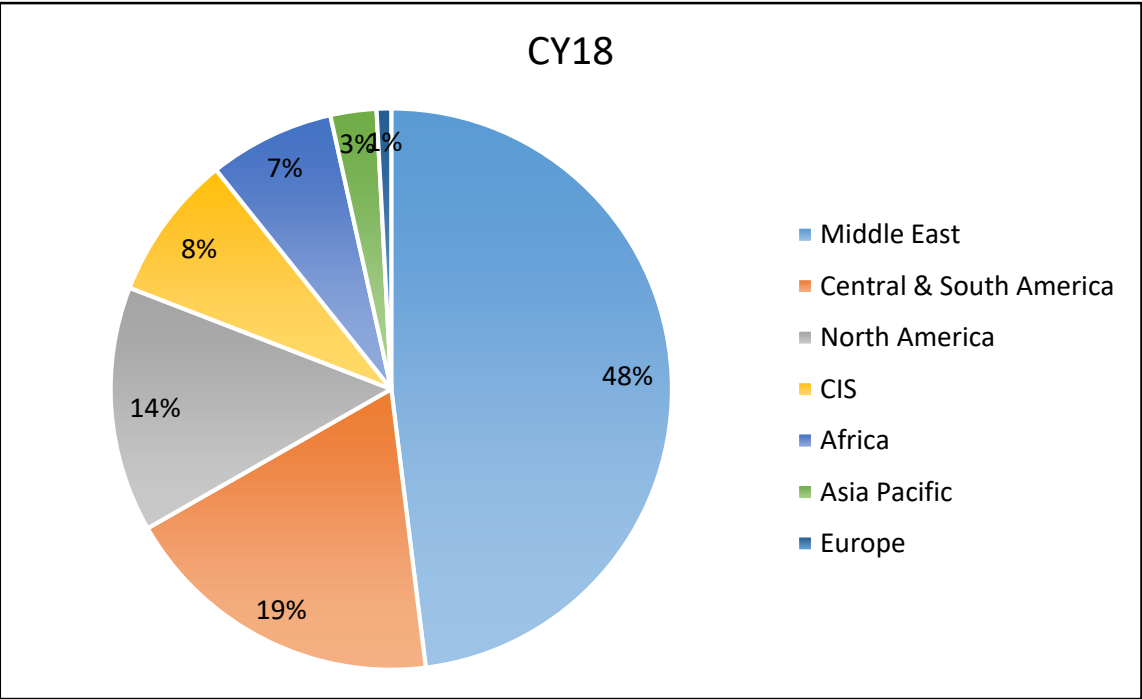
- Most oil refineries are run by giant multinational corporations which are either state-owned or public/private limited
- Sinopec, a Chinese oil and gas enterprise based in Beijing, owns 28 oil refineries and has the greatest aggregate production capacity followed by Exxon Mobil which owns 24 refineries.
- The top three producers i.e. US, Saudi Arabia and Russia occupy more than one third of the world market share
- The top consumers follow a similar trend. Top three players i.e. US, China and India consume more than one third of the entire global consumption
- The industry has high barriers to entry and requires extensive capital investment



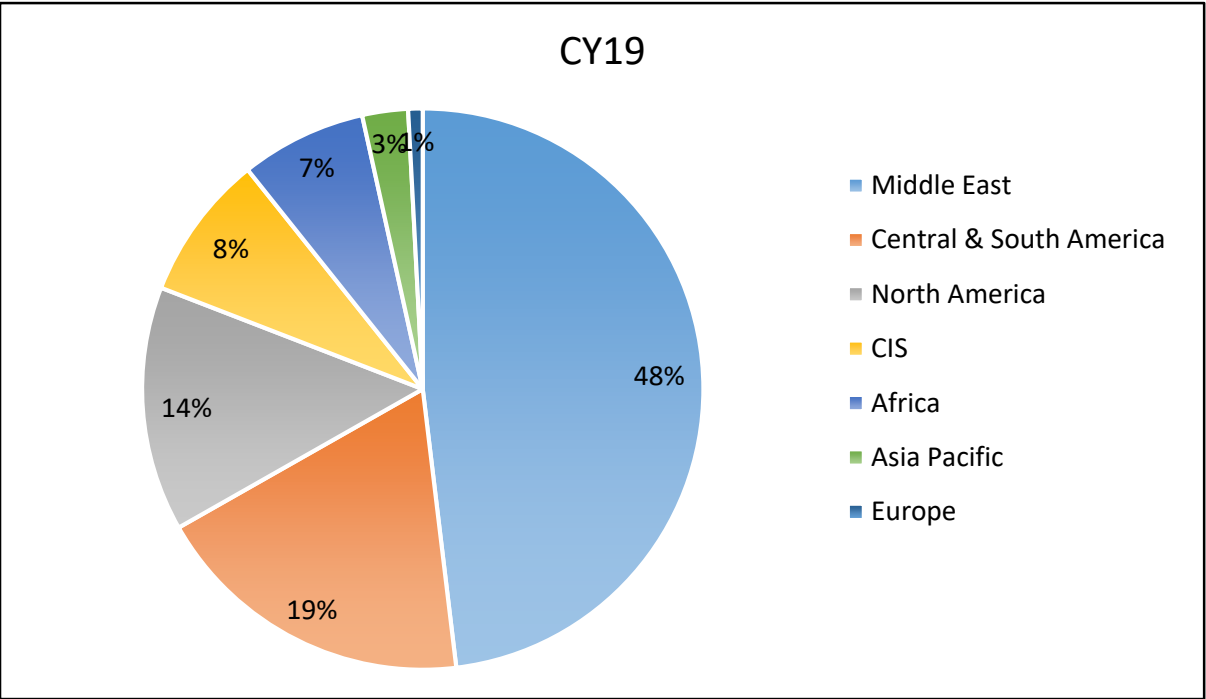
\*Barrels per day has been converted to mln MT/year (multiplied by 365 and divided 7,330,000)

Crude Oil Reserves Position

- World Crude Reserves stood around ~ 225,140 mln MT in CY20.
- Reserves have been growing at a meagre CAGR of ~0.8% from CY15-CY19.
- OPEC countries account for ~70% of the world’s oil crude oil



Global Crude Oil Reserves- mln MT						
Period	CY15	CY16	CY17	CY18	CY19	CY20
Total World	229,452	230,486	235,733	236,780	236,499	225,140



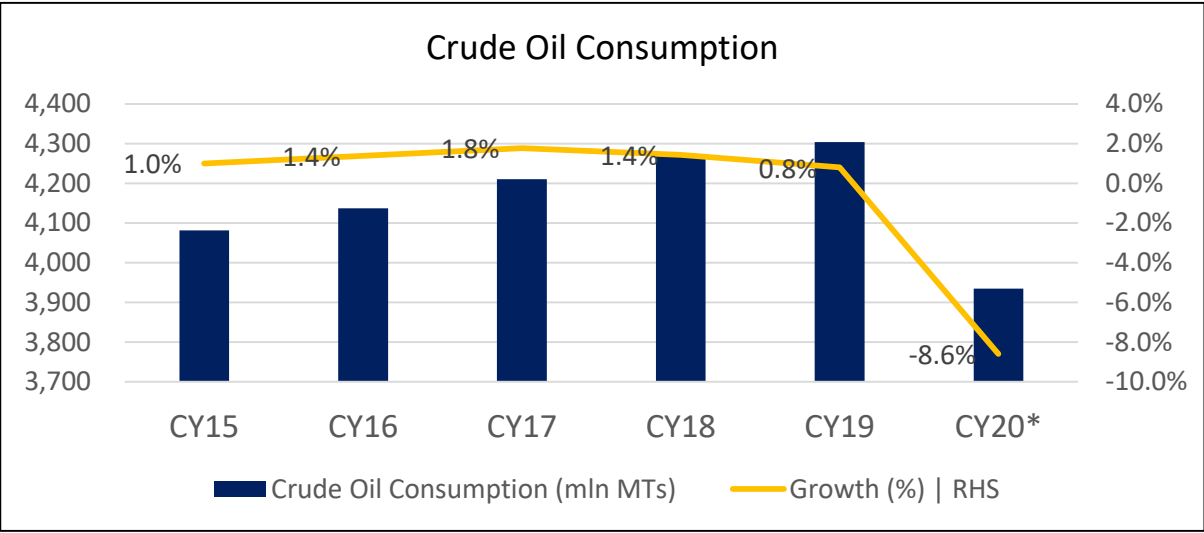
1 Barrel =0.1364 MT

# REFINERIES | GLOBAL INDUSTRY

## Crude Oil Production & Consumption Levels

- Yearly Crude extraction as a percentage of reserves is ~1.7%.
- Total World crude oil extraction has increased at an average CAGR of ~0.45% from CY15-CY20.
- Global crude oil extraction is expected to decline by ~6% in CY20 due to lower production needs
- OPEC countries account for ~33% of the world crude production.
- Crude oil consumption is expected to decline by ~8.4% in CY20 due to Covid-19 pandemic.
- CAGR of crude oil consumption from CY15-CY19 has recorded at ~1.3%.

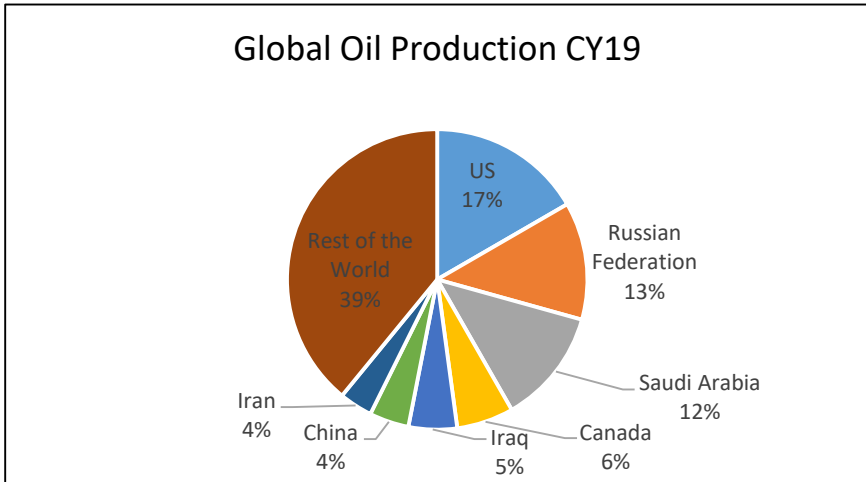
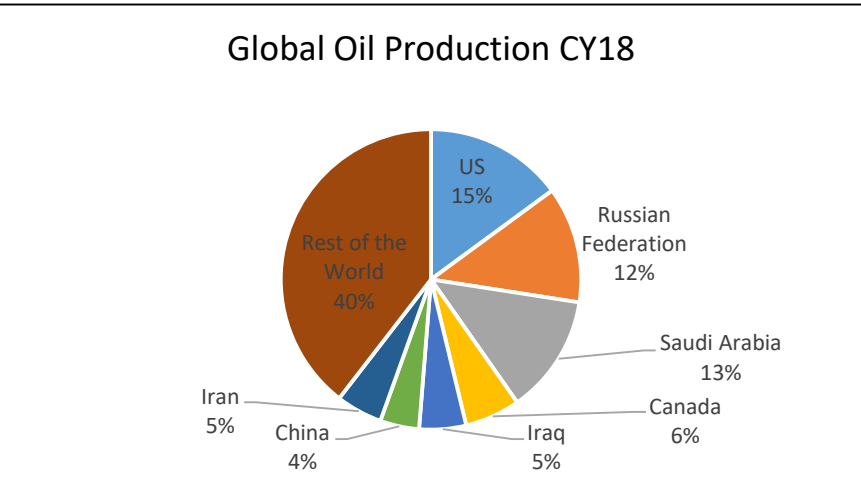
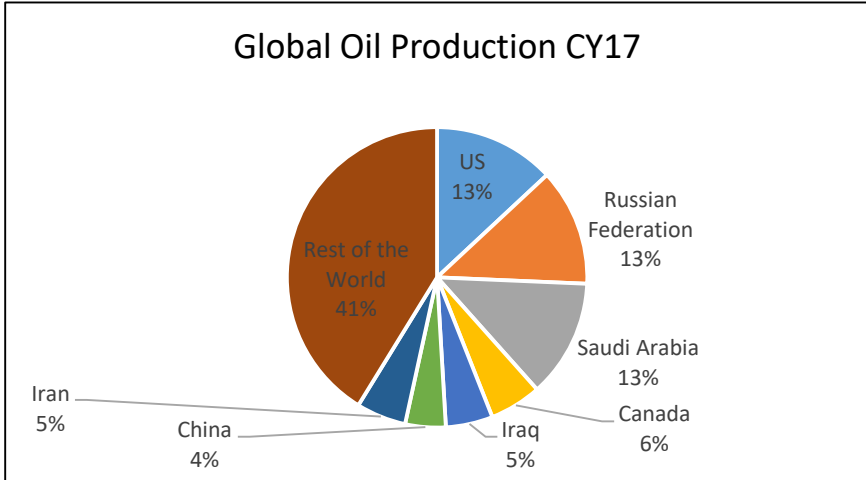
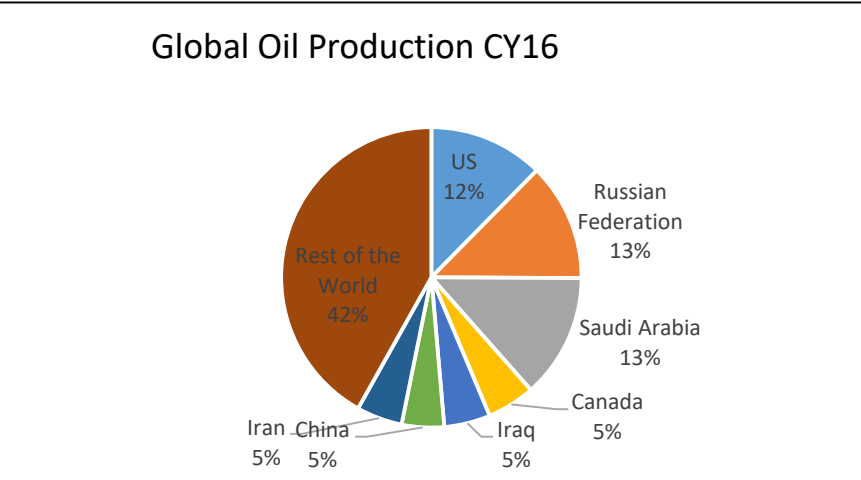
Global   Crude Oil Extraction-mln MT						
Period	CY15	CY16	CY17	CY18	CY19	CY20*
Total World Production	4,056	4,049	4,067	4,158	4,129	3,881
Middle East	1,317	1,395	1,378	1,394	1,317	
North America	773	738	770	865	924	
CIS	676	686	693	706	709	
Africa	380	356	379	388	392	
Asia Pacific	388	370	357	348	349	
Central & South America	365	347	335	304	288	
Europe	158	158	155	153	149	



\*Pro-rated

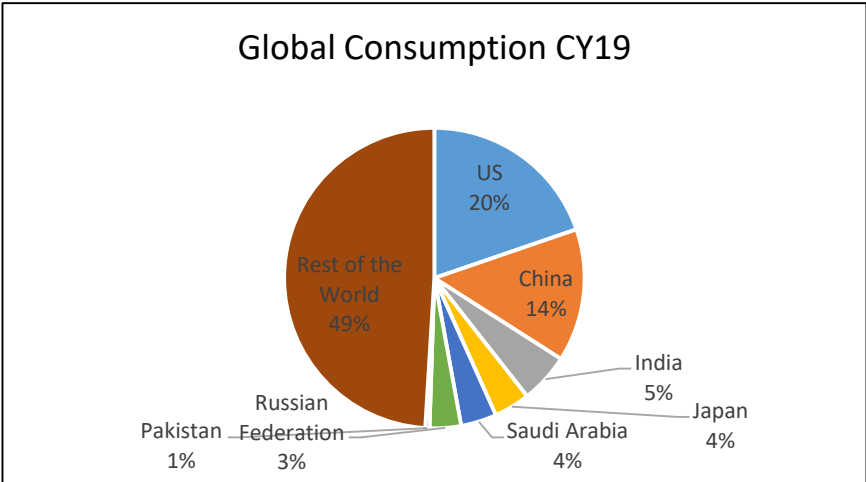
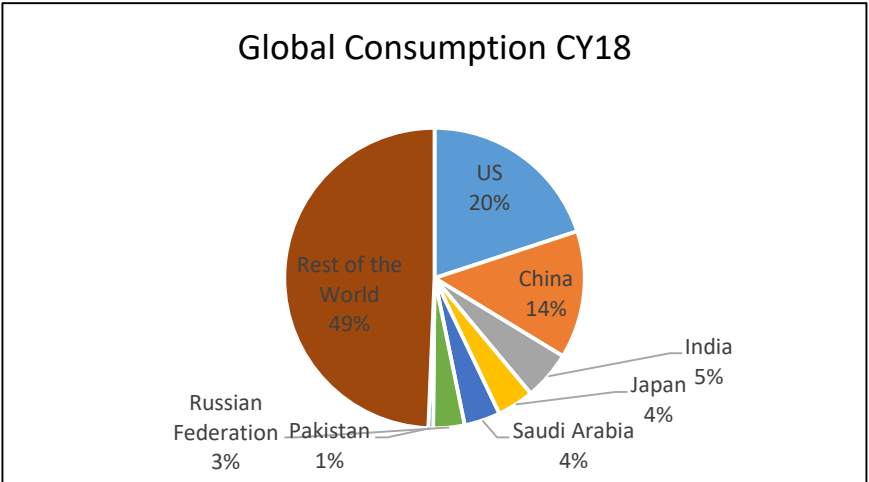
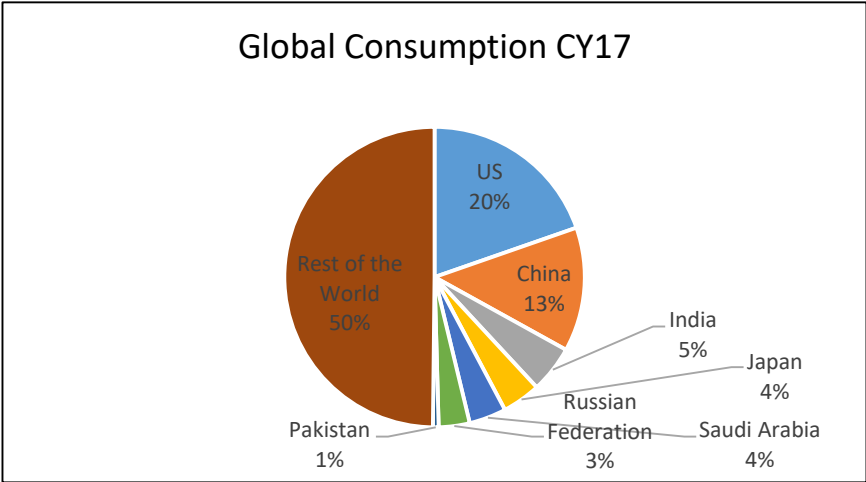
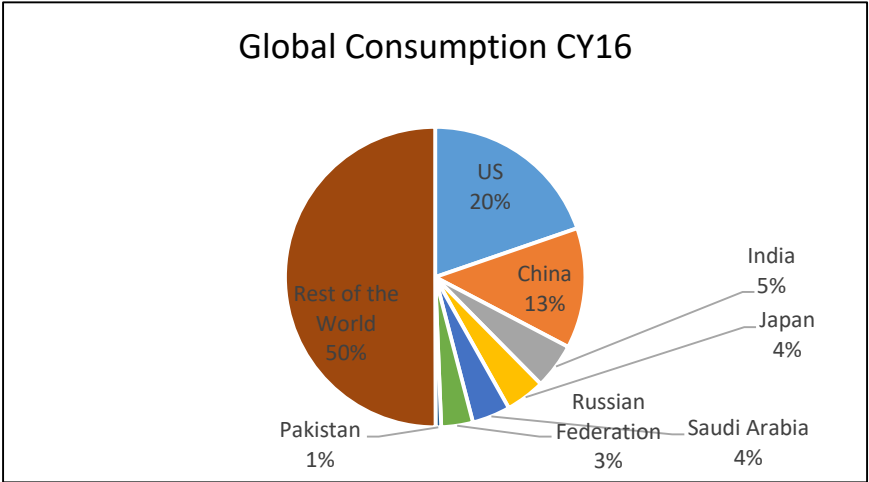
## Global POL Production

- Global oil production for CY19 was 4,485 mln MT out of which US, Russia, Saudi Arabia had the highest share.
- The sharpest decline was observed in Iran's oil production (28.4%) owing to US imposed sanctions due to which its share in the global production fell by ~2%.
- Maintaining a stable share throughout, Russia's production surpassed Saudi Arabia's by 11.5 mln MT in CY19.



## Global POL Consumption

- Global oil consumption for CY19 was 4,893 mln MTs. Growth slowed down compared to CY18 and stood at 0.95%.
- The top 3 consumers i.e. US, China & India consumed almost 40% of the entire volume.
- Although economies slowed down in CY19, China still registered an increase of more than 5% in its oil consumption
- India's growth in consumption for CY19 was 3.1%, which is ~2% less than its previous year growth.



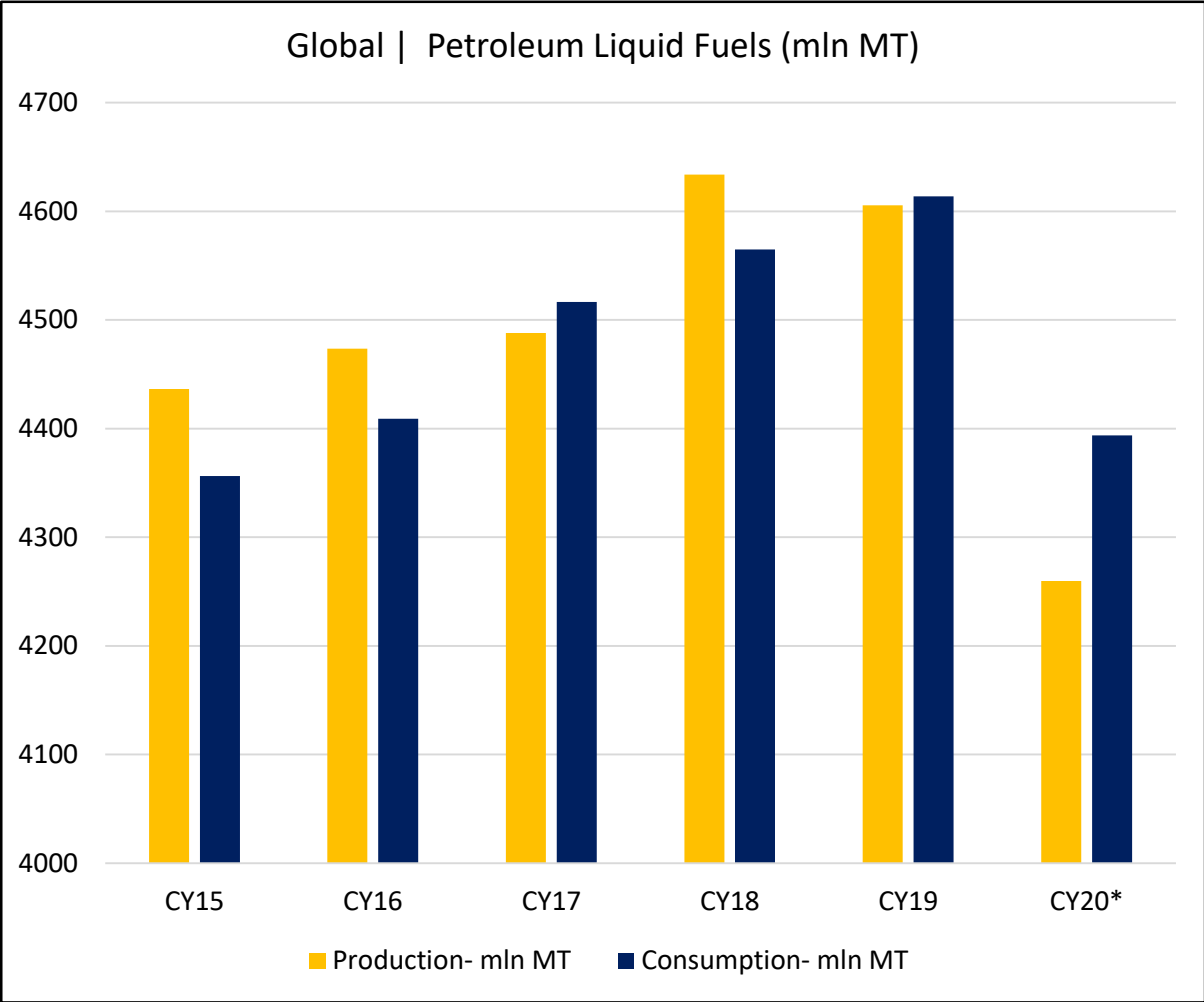
\*Consumption of bio gasoline (such as ethanol) and biodiesel are excluded while derivatives of coal and natural gas are included.

# REFINERIES | GLOBAL INDUSTRY

## POL Product Mix | Consumption

- Among POL products, HSD is the highest consumed product with a share of ~28%, followed by MOGAS with a share of ~25%. HSD is mainly used as a fuel in engines operating above 750rpm in commercial vehicles, stationery diesel engines, locomotives, pumps, etc.
- Global Production and consumption of liquid fuel are expected to decline by ~7.5% and ~4.8% in CY20 owing to Covid-19 pandemic.

Global   POL Mix					
Period	CY15	CY16	CY17	CY18	CY19
MOGAS	25%	25%	25%	25%	25%
HSD	29%	28%	28%	28%	28%
Ethane & LPG	12%	13%	13%	14%	14%
Jet & Kerosene	8%	8%	8%	8%	8%
Naphtha	7%	7%	7%	7%	7%
Other Fuels	19%	19%	19%	18%	18%

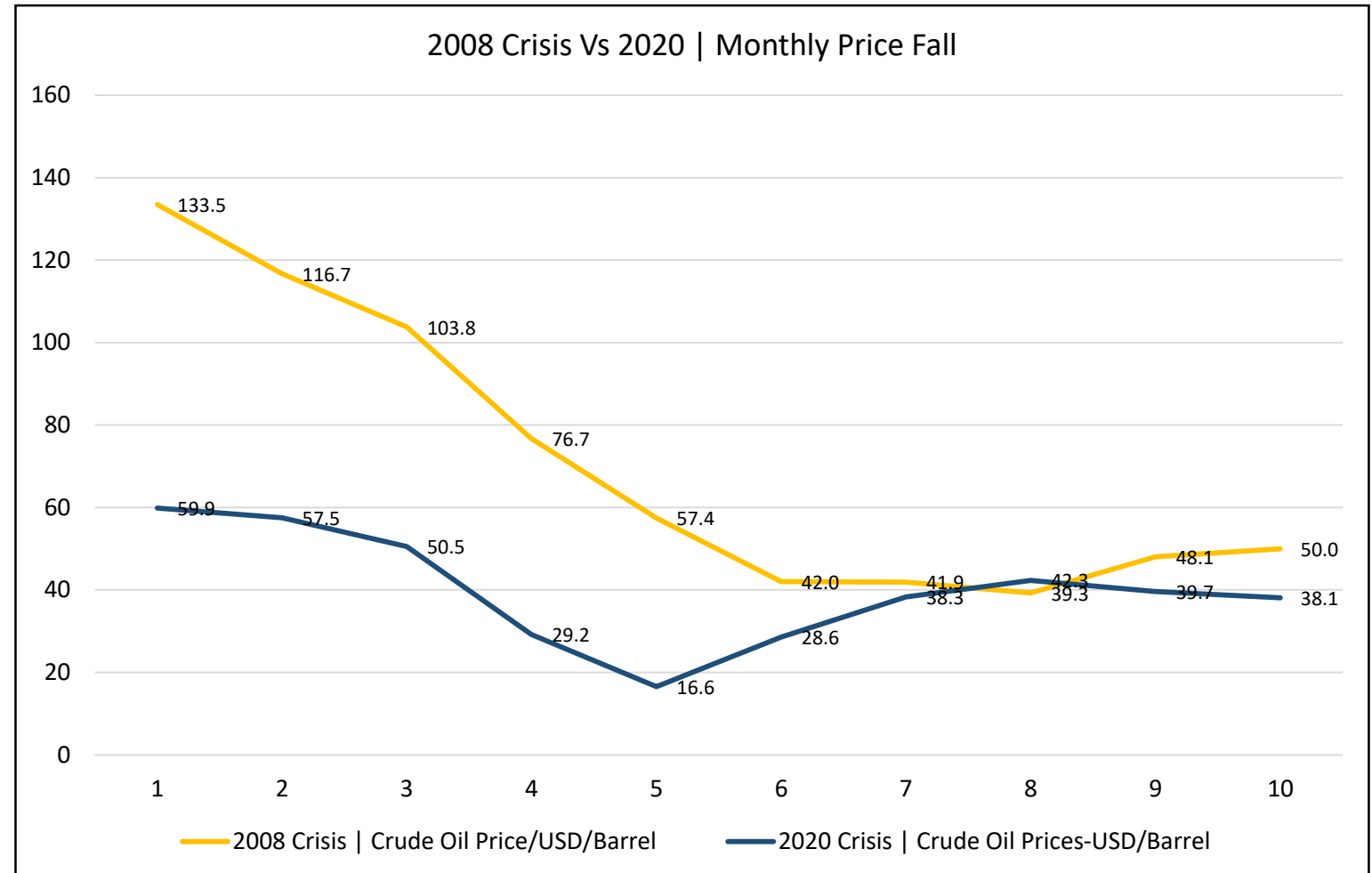


\*Pro-rated

# REFINERIES | GLOBAL INDUSTRY

## Crude Oil | Price Chart | 2008 VS 2020 Crisis

- Though Covid-19 crisis originates from outside the financial system, its consequences on economy are expected to be more long lasting than the 2008 meltdown. One of the major reasons is the high level of uncertainty associated with the havoc.
- Oil is one of those commodities that is impacted with the highest intensity. During 2008 global recession, prices reduced by ~71% from May'08 to Feb'09. Crude oil prices took a recovery trajectory in Mar'09, with a greater pace than the Covid-19 price recovery.
- In the current scenario, prices declined by ~72% from Jan'20 to May'20. Partial recovery began in June'20. However, prices have not been able to recover to pre-pandemic levels.



\*WTI Prices

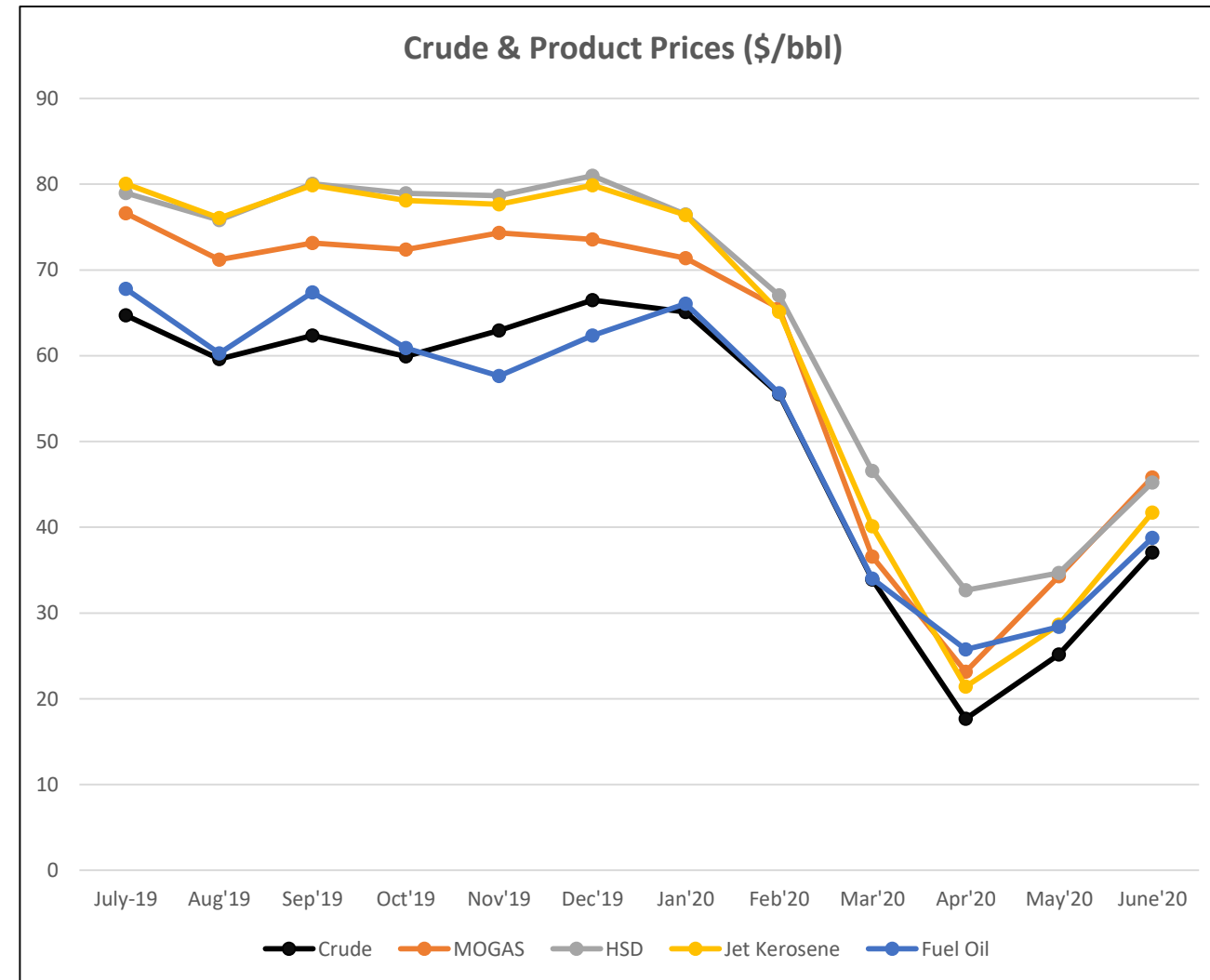
\*\*Starting months for 2008 & 2020 are May & January respectively

# REFINERIES | GLOBAL INDUSTRY

## Crude Oil & POL Products Price Volatility

- Historically, crude and fuel oil are traded at the lowest prices, while MOGAS, HSD and Kerosene are traded at a premium from crude. Kerosene fuel is the highest premium product followed by HSD.
- Oil prices have remained dramatically volatile over the outgoing FY20. Prices lost ~60% of their value in FY20 mainly due to conflict between OPEC and NON-OPEC crude oil producers on cutting world production. Industrial demand weakening due to COVID-19, further reduced the prices.
- Oil prices fell from USD 63/Barrel in May'19 to USD 16/Barrel in May'20.
- Since May'20, crude oil prices have been partially recovering, i.e., increased by 40%.
- Jet Kerosene hit an all time low of \$21/barrel in May'20, as airline business has been the hardest hit by the pandemic. This was lowest among all other POL products
- According to EIA's forecast crude oil prices may rise by ~10% till December'21 i.e. to USD 44/Barrel given the world economy continues to recover and second wave does not hit hard; otherwise, the prices will remain subdued.

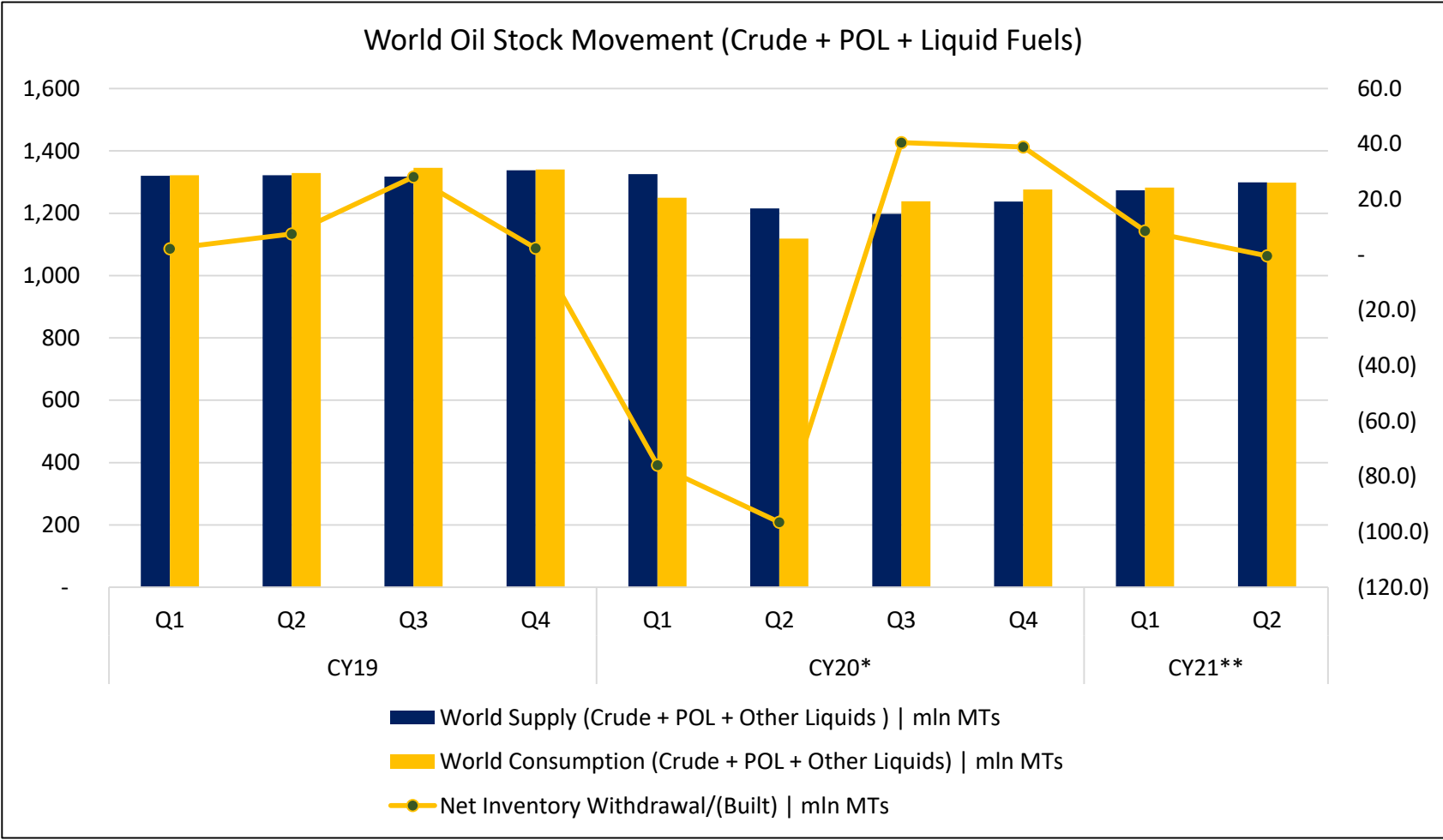
\*An average of North European, South European, US East Coast, Singapore and Middle East Gulf has been taken for POL Product Prices



# REFINERIES | GLOBAL INDUSTRY

## Oil Stock Analysis (Crude + Products)

- In CY19, world oil consumption surpassed world oil supply, keeping average oil prices intact and a net inventory withdrawal position for the year.
- The situation turned upside down in Q1 and Q2 of CY20 where a dramatic dip in oil consumption led to stock build-ups of 76mIn MTs and 97mIn MTs in Q1 and Q2 respectively.
- A partial improvement was witnessed in Q3 of CY20 following supply cut decisions by OPEC+ and gradual revival of demand.
- Projecting on the current scenario, global oil market is expected to revive gradually in CY21. Pre-pandemic demand levels are not expected to be achieved anytime earlier than Q4 of CY21.



\*CY20: Estimated Q4  
 \*\*CY21: Forecast

# REFINERIES | GLOBAL INDUSTRY

## Trade | Crude & Products

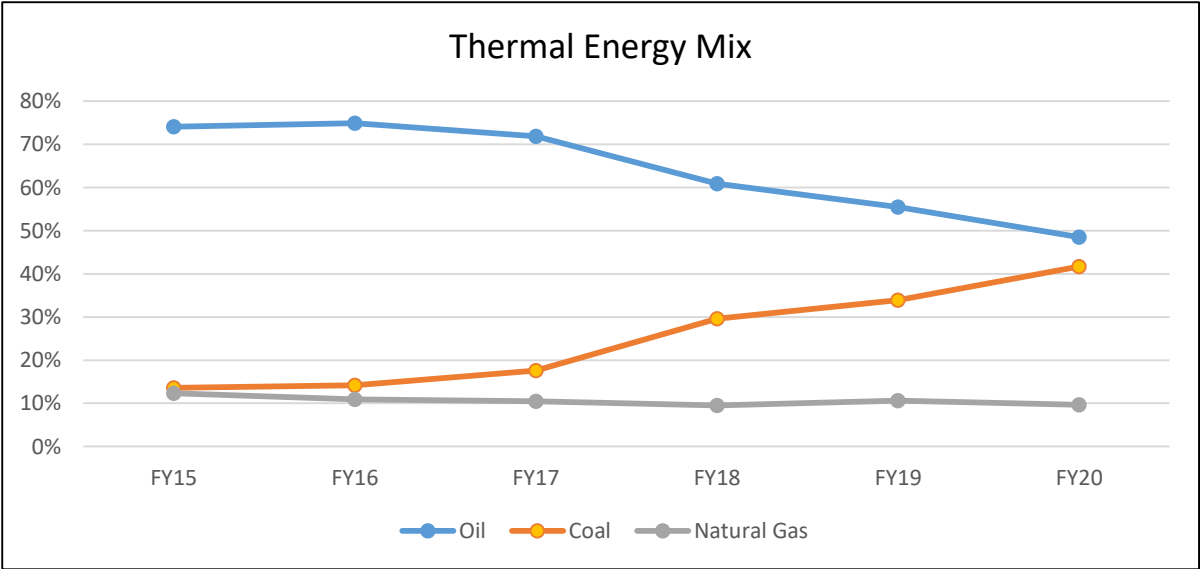
- Saudi Arabia has the highest share of world crude exports (~16%), followed by Russia and America. In products market, USA has emerged the largest exporter on a timeline basis, followed by Russia.
- A major portion of world crude and products import is dominated by Europe and China. India is emerging as a net crude importer and product exporter on with a share of ~10% in crude imports and ~1% (Net basis) in products export.

Country Shares	Imports (mln MTs)				Exports (mln MTs)			
	CY18		CY19		CY18		CY19	
	Crude	Products	Crude	Products	Crude	Products	Crude	Products
Canada	1%	3%	1%	3%	9%	3%	9%	3%
US	17%	8%	15%	9%	4%	20%	6%	20%
South & Central America	1%	9%	1%	9%	7%	2%	7%	2%
Europe	23%	18%	23%	17%	1%	11%	1%	10%
Russia	0%	1%	0%	1%	12%	14%	13%	13%
Saudi Arabia	0%	1%	0%	1%	16%	5%	16%	5%
Iraq	0%	0%	0%	0%	9%	1%	9%	1%
UAE	0%	3%	1%	3%	6%	6%	6%	6%
Other Middle East	1%	1%	1%	1%	9%	5%	6%	5%
China	21%	7%	23%	6%	0%	4%	0%	5%
India	10%	3%	10%	4%	0%	5%	0%	5%
ROW	26%	48%	25%	47%	28%	25%	28%	25%
<b>Total WORLD</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>

## Energy Mix

- Over the last ten years, Pakistan has been facing energy crisis in terms of demand and supply gap. Bottlenecks of energy sector have had adverse effects on industries of Pakistan. Energy-mix is another concern for Pakistan due to availability of limited reserves.
- Pakistan is dependent upon thermal energy with a share of ~59% in FY20 (~69% in FY19). Though oil has the greatest contribution in thermal energy (~49%) in FY20, its share is gradually being substituted by coal. Oil contribution to overall energy mix is ~29%.
- Since FY15 coal’s share in Pakistan’s energy sector has increased by ~29%. Renewables have gained share ~2% in FY20 (~0.4% in FY15) over the last five years as a result of “Integrated Energy Plan” in order to cater energy crisis. Hydro energy’s share has boosted to ~31% in FY20 (~22% in FY19).

Energy Generation   Commercial Mix						
Period	FY15	FY16	FY17	FY18	FY19	FY20
Hydro	30.5%	31.3%	26.4%	21.6%	21.8%	31.1%
Thermal	63.7%	63.7%	66.8%	69.4%	69.0%	58.9%
Nuclear	5.4%	4.2%	5.8%	7.7%	7.9%	8.0%
Renewables	0.4%	0.8%	1.0%	1.3%	1.4%	1.9%

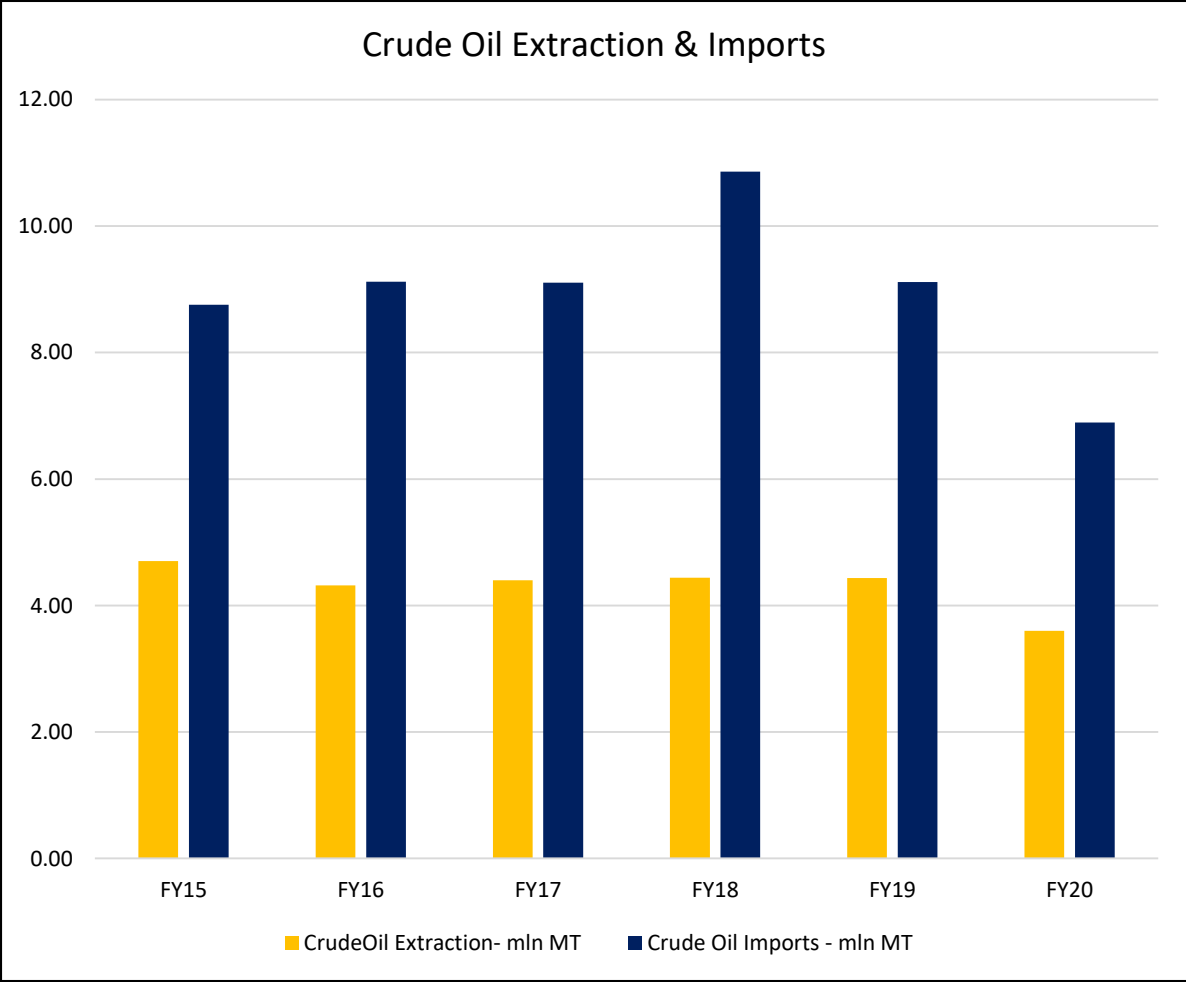


# REFINERIES| LOCAL INDUSTRY

## Crude Oil

Crude Oil Reserves & Extraction						
Period	FY15	FY16	FY17	FY18	FY19	FY20
Oil Reserves -mln MT	50.47	47.74	47.74	45.01	46.38	46.38
Usage (Extraction)	9.3%	9.0%	9.2%	9.9%	9.6%	7.8%

- Pakistan’s crude oil reserves have reduced at a CAGR of ~1.7%.
- Crude oil extraction declined at a CAGR of ~5.2% since FY15. Crude oil is also imported in order to bridge the gap between demand and supply.
- Imports constitutes of ~66% in FY20 (~67% IN FY19) of the total crude oil consumption.
- Total crude oil consumption (extraction & imports) is estimated to be ~10.5 mln metric tons in FY20 (~13.55 in FY19).
- Despite availability of reserves ~50%-60% of oil consumption of the country is imported due to lack of advanced technology and financial resources



# REFINERIES| LOCAL INDUSTRY

## Industry Snapshot

- Pakistan’s requirement for POL Products hovers around 19-20mln MTs per annum (FY20). The demand is majorly met through imports (~67%) and partially catered by local supply, i.e., through local refineries.
- Currently, there are five (5) refineries operating in the country namely (i) Pak-Arab Refinery (PARCO) (ii) National Refinery (NRL) (iii) Attock Refinery (ARL) (iv) Pakistan Refinery (PRL) and (v) Byco Petroleum.
- The Sector is highly regulated with the prices of two major products, i.e, MOGAS and Diesel being determined by the Oil & Gas Regulatory Authority (OGRA).
- Oil refineries had an aggregate revenue of PKR~883bln in FY20 ***which is ~2.7% of GDP.***

Synopsis		
Period	FY19	FY20
Total Refineries	5	5
Listed Refineries	4	4
Country POL Products Supply	~58% Imports, ~42% Local Refineries	~67% Imports, ~33.8% Local Refineries
Refining Capacity	19.5 mln MT	19.5 mln MT
Revenue	PKR~1,071 bln	PKR~883 bln
GDP Contribution	2.2%	2.7%
Regulatory Authority	OGRA	OGRA
Association	OCAC	OCAC

\*PARCO revenues have been pro-rated on the basis of 9MFY20

# REFINERIES | LOCAL INDUSTRY

## SUPPLY

- **Crude Oil:** Pakistan majorly relies on imports to meet its crude oil demand. Country demand for Crude Oil was recorded at ~11mln MTs in FY20 of which ~4mln MTs were locally produced (*upstream oil sector*) and ~7mln tons was imported.
- **Petroleum Products:** Pakistan's demand for Petroleum Products clocked in at 19mln MTs in FY20 (20mln MTs in FY19), of which ~6mln MTs was locally produced and ~13mln MTs were imported. Locally, refined POL products are produced by the following refineries in the country:



Incorporated in 1995



Incorporated in 1974



Incorporated in 1963



Incorporated in 1978



Incorporated in 1960

# REFINERIES | LOCAL INDUSTRY

## Supply | Capacity Utilization

Utilization in mln MT

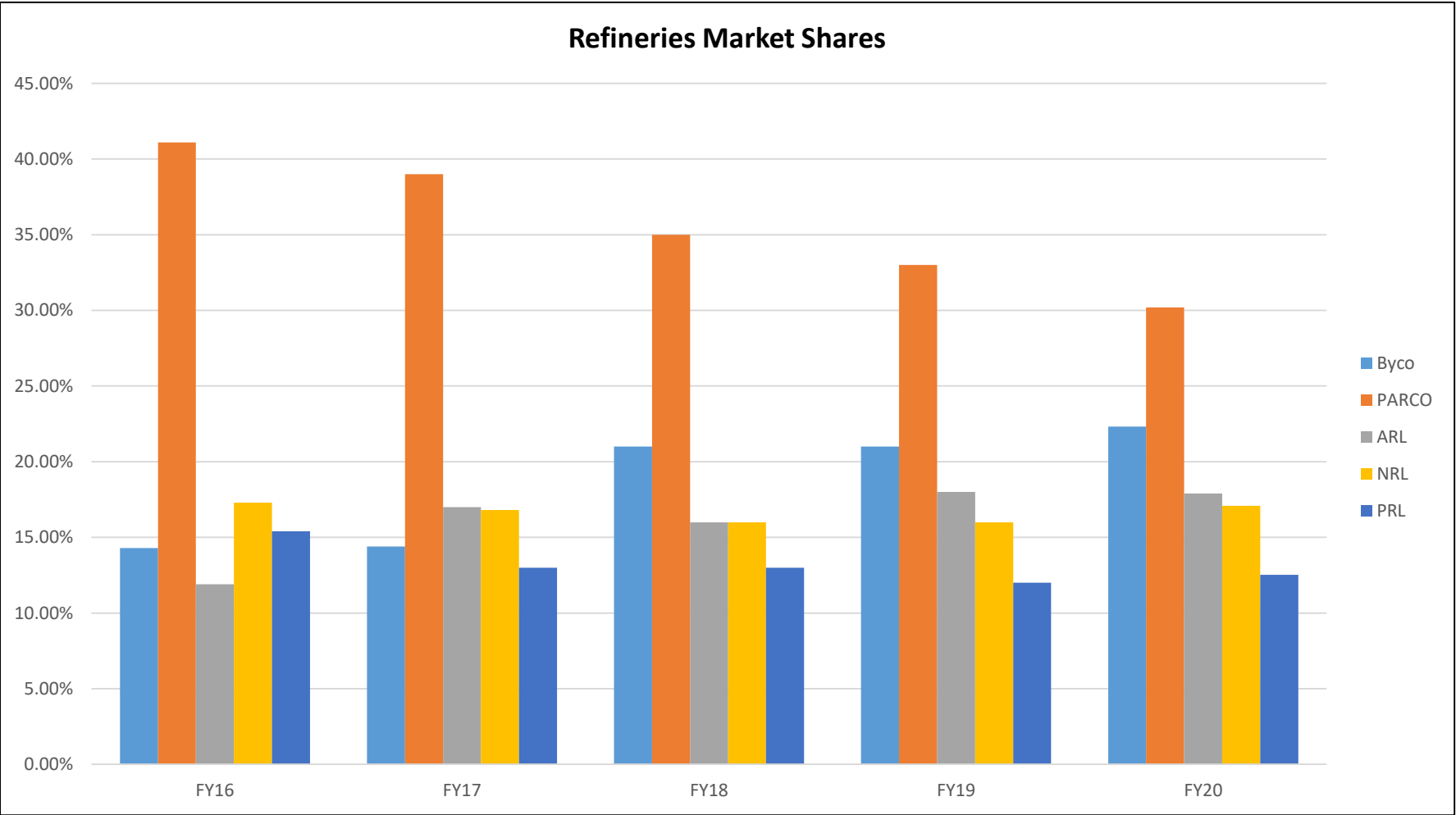
	FY16		FY17		FY18		FY19		FY20	
	Capacity	Utilization	Capacity	Utilization	Capacity	Utilization	Capacity	Utilization	Capacity	Utilization
Byco	1.8	65.0%	7.5	14.9%	7.5	35.6%	7.5	33.5%	7.5	31.7%
PARCO	4.5	100.0%	4.5	104.5%	4.5	95.1%	4.5	88.0%	4.5	75.0%
NRL	2.7	81.4%	2.8	82.9%	2.8	84.8%	2.9	77.0%	2.9	57.0%
PRL	2.1	79.3%	2.1	77.0%	2.1	79.4%	2.1	93.0%	2.1	59.2%
ARL	2.0	87.0%	2.5	91.5%	2.5	93.9%	2.5	76.0%	2.5	69.4%
<b>Total</b>	<b>13.1</b>	<b>86%</b>	<b>19.5</b>	<b>62.0%</b>	<b>19.5</b>	<b>69.0%</b>	<b>19.5</b>	<b>64.0%</b>	<b>19.5</b>	<b>53.0%</b>

- Pakistan's total Refining Capacity stands at ~20mln MTs per annum (FY20), almost equal to the country's POL demand. However, capacity utilization levels remain low on account of the Sector's necessity to operate at an optimum level.
- Demand for Furnace Oil has declined due to the governments policy of reducing reliance on furnace oil for electricity generation

# REFINERIES | LOCAL INDUSTRY

## Demand | Market Shares (Volume Based)

- PARCO carries the highest market share but it has been gradually reducing.
- Byco’s market share has consistently increased owing to addition in their production capacity.
- Other refineries have maintained their market share with negligible variance.



# REFINERIES | LOCAL INDUSTRY

## Demand | Product Wise POL Consumption

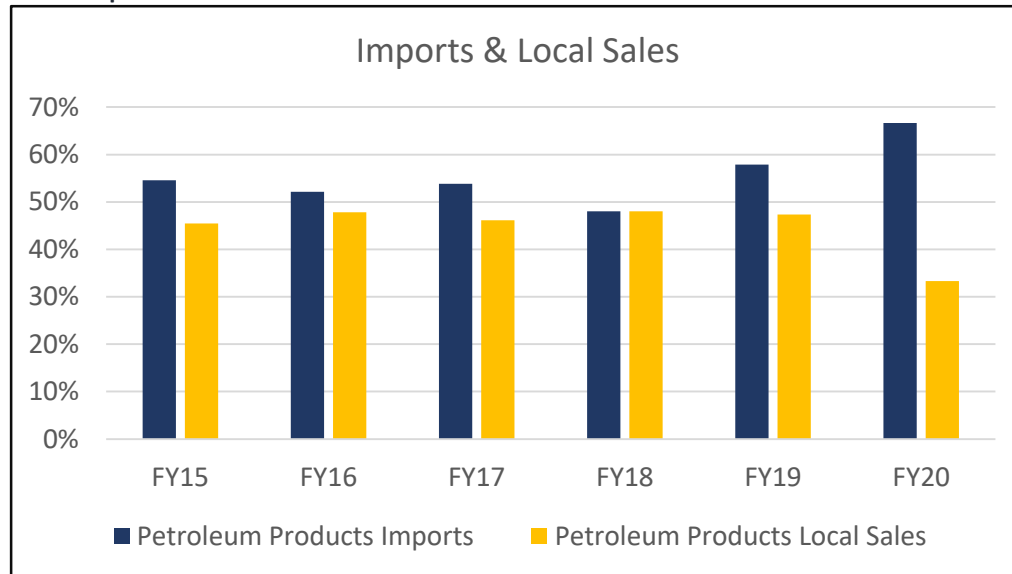
- Pakistan's POL market is significantly dependent upon its transportation sector and level of Industrial activities in the country. Major drop is witnessed from FY19 onwards when consumption drastically dropped due to reduced economic activities in FY19, substitution of FO by imported LNG in the power sector, and the emergence of Covid-19 in 2HFY20 adversely impacting the MOGAS consumption.
- Total Petroleum Products consumption in FY20 was ~19 mln tons (~20mln in FY19, down by 1mln tons).
- The three major products, HSD, MOGAS and Furnace Oil account for ~84% of the total POL consumption in the country. Historically, Furnace Oil (FO) was the highest consumed product with a share of ~42%. Its consumption has drastically declined by a CAGR of ~30% mainly due to government's decision to reduce reliance on oil as fuel for power sector plants.

Energy   Refined Petroleum Products Consumption (mln MT)						
Period	FY15	FY16	FY17	FY18	FY19	FY20
<b>MOGAS</b>	5	6	7	7	8	7
<b>HSD</b>	7	8	9	9	5	7
<b>FO</b>	9	9	10	6	3	2
<b>Kerosene</b>	0.2	0.1	0.1	0.1	0.1	0.1
<b>JP-1</b>	0.6	0.8	0.8	0.9	0.8	0.6
<b>Others</b>	0.2	-	-	2	3.1	2.3
<b>Total POL Consumption</b>	<b>22</b>	<b>23</b>	<b>26</b>	<b>25</b>	<b>20</b>	<b>19</b>

# REFINERIES | LOCAL INDUSTRY

## Demand | Imports VS Local Consumption

- Local Consumption has reduced by a CAGR of ~10 over the last five years.
- Imports share in total consumption has increased to ~67% in FY20 (~65% in FY19).
- ~57% of MOGAS & HSD consumption is catered through import.



Petroleum Products   Imports Vs Total Consumption (mln MT)						
Period	FY15	FY16	FY17	FY18	FY19	FY20
Petroleum Products Imports	12	13	15	13	13	13
Petroleum Products Local Sales	10	10	11	12	7	6
Total	22	23	26	25	20	19

Petroleum Product Mix   Imports VS Local Consumption						
Imprts	FY15	FY16	FY17	FY18	FY19	FY20*
MOGAS	3	4	5	5	5	4
HSD	3	3	4	4	2	4
FO	6	6	7	4	2	1
Other	-	-	-	-	4	4
Total Imports	12	13	15	13	13	13
Local Consumption	FY15	FY16	FY17	FY18	FY19	FY20*
MOGAS	2	2	2	2	3	3
HSD	4	5	5	5	3	3
FO	3	3	3	3	2	-
Other	1	1	2	2	-	-
Total Local Consumption	10	10	11	12	7	6

# REFINERIES | LOCAL INDUSTRY

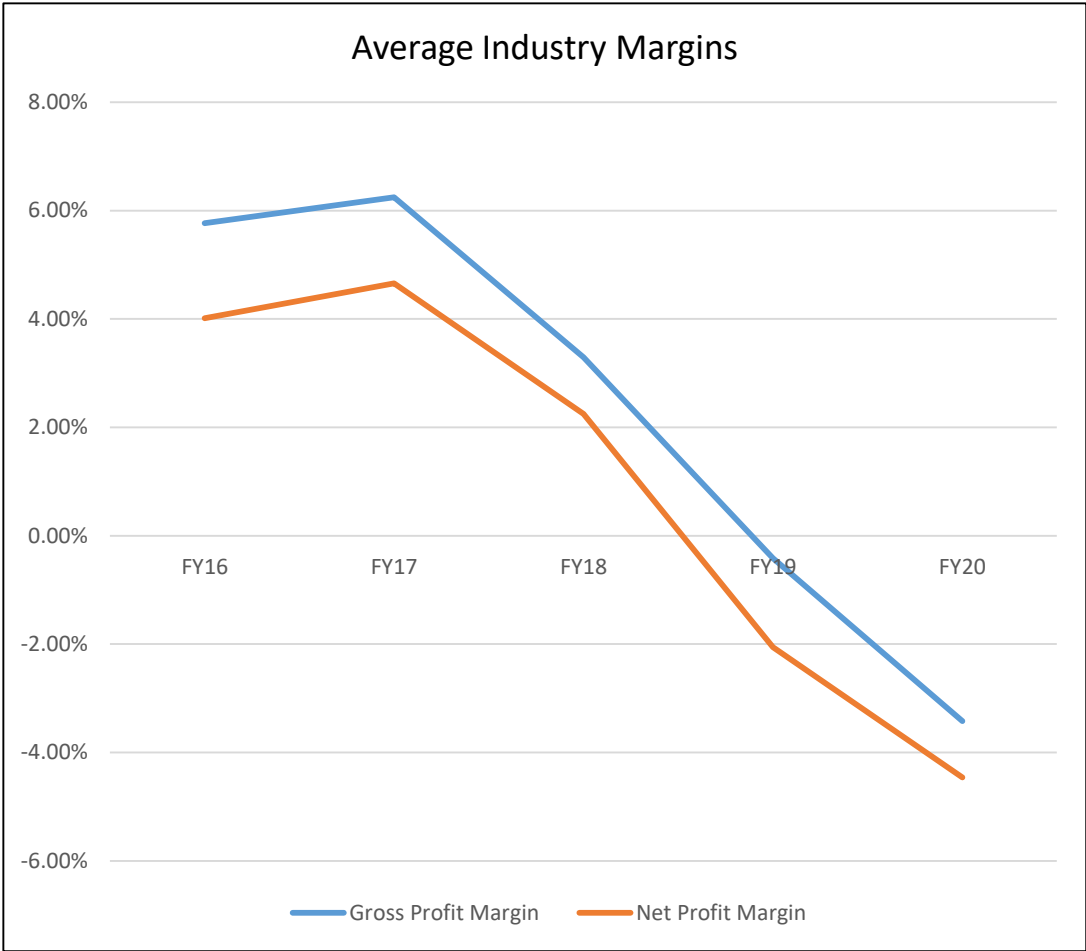
## Demand | Sector Wise

POL Products   Sector Wise Consumption							
	Transport	Power	Industry	Other Govt.	Households	Agriculture	Total
<b>FY15</b>	51%	41%	6%	2%	0.4%	0.2%	100%
<b>FY16</b>	56%	33%	9%	2%	0.3%	0.1%	100%
<b>FY17</b>	57%	33%	8%	1%	0.3%	0.0%	100%
<b>FY18</b>	65%	26%	7%	2%	0.3%	0.1%	100%
<b>FY19</b>	76%	14%	7%	2%	0.3%	0.1%	100%
<b>FY20</b>	80%	11%	7%	2%	0.3%	0.1%	100%

- Transport sector consumes the highest of the oil and petroleum products ~78% in FY20 (~76% in FY19).
- Oil consumption by power sector has reduced to ~11% in FY20 from ~14% in FY19.
- Since FY15, power sector’s oil consumption has reduced at a CAGR of ~24% due to shift from Furnace Oil consumption to imported LNG.

## Business Risk: Operating Risk

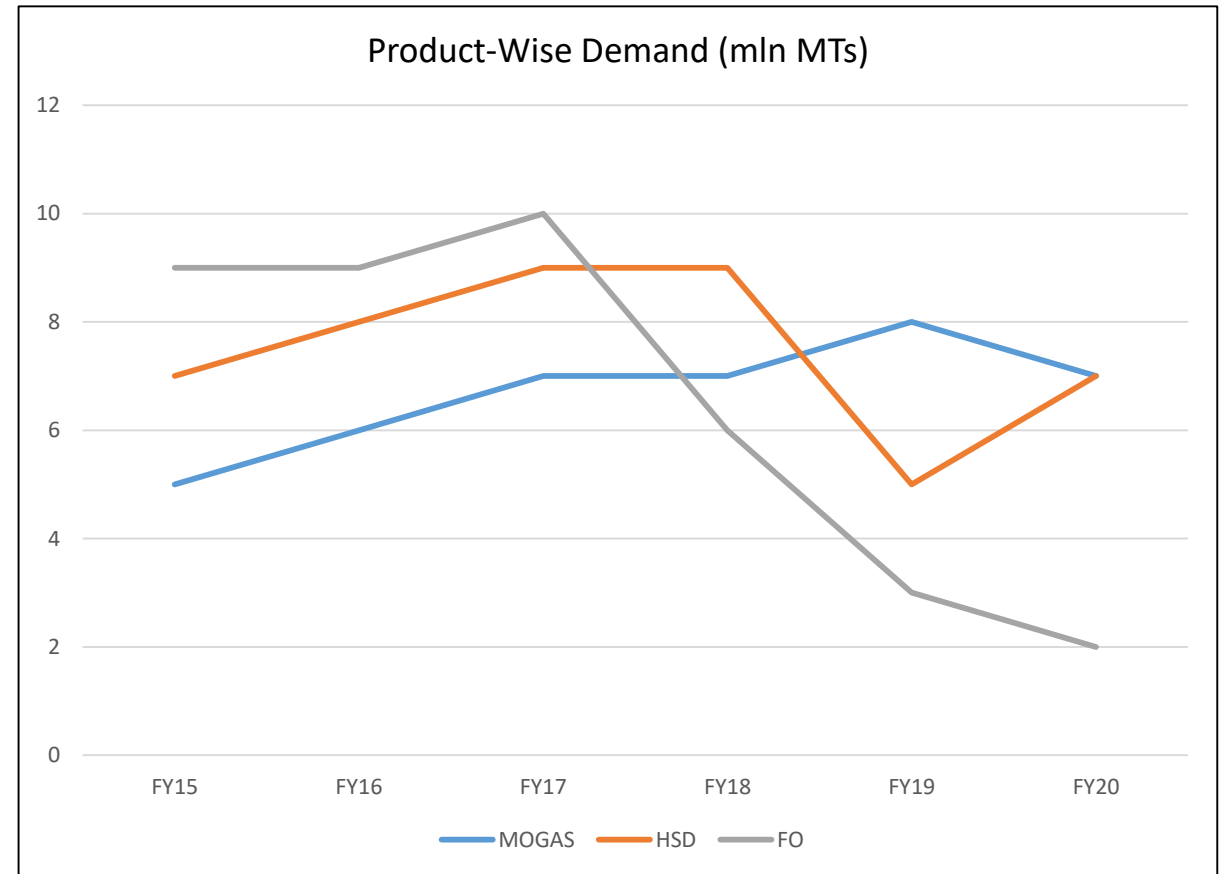
- Refinery Business Risk can be classified into **operating risk** and **sales risk**.
- Oil Industry follows a complex price regime; refineries import crude oil at spot rates and sell POL products to OMCs at “Ex-refinery” price, which is determined through a mechanism of Import price parity. Prior to Sep 1, 2020, this pricing mechanism was based on monthly pricing frequency underpinned to PSO’s average import price of the preceding month. The GoP has now changed the product pricing frequency from monthly to fortnightly basis and these are now linked with Import Parity Price of Arab Gulf Platts daily FOB average effective September 2020. This development is expected to benefit the Sector in terms of reduction in pricing lag.
- Other factors impacting input cost of the Sector include exchange rate volatility and little or no strategic buying. In a country with a demand of around ~20ml MTs (POL products), refineries’ storage capacity does not exceed ~2mln MTs of Oil. The Sector is therefore, continually exposed to fluctuations in International prices.
- Another major risk to the refining sector is little technological upgradation hindering the quality of product slate of the Sector. With increasing environment protection initiatives, dramatic dip in demand amid Covid-19 pandemic and uncertainty relating to FO offtake, stock pile ups and inventory losses are one of the key risks haunting the sector time and again.



# REFINERIES | LOCAL INDUSTRY

## Business Risk: Sales Risk

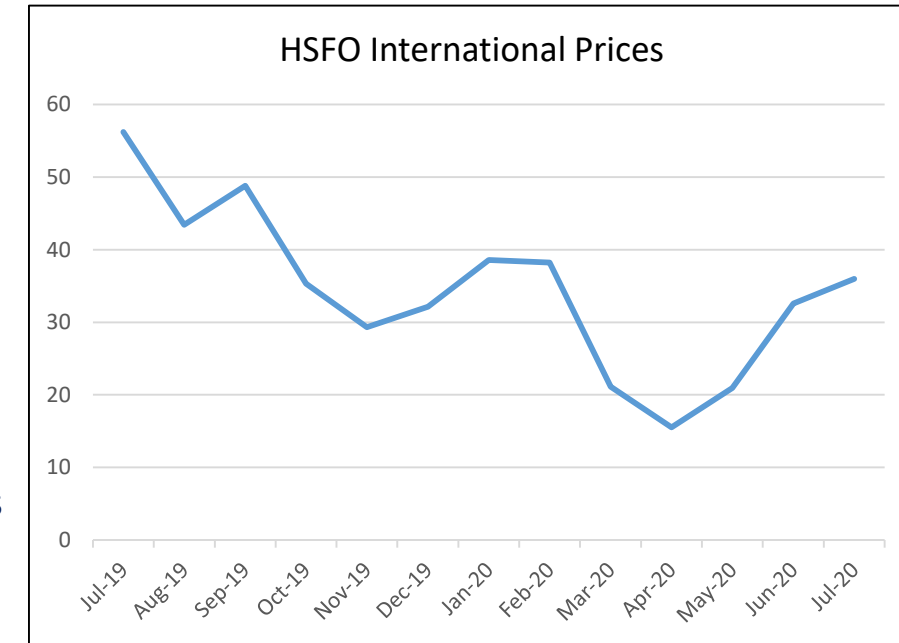
- The demand of Petroleum Products is highly dependent on the Transportation Sector and Industrial Activities in the Country.
- Due to the Outbreak of Covid-19 in 2H FY20, the demand for POL products slumped to a historical low due to imposition of Covid-19 induced lockdowns across the Country. Resultantly, Refinery throughputs were significantly reduced.
- MOGAS, which had historically witnessed rapid growth declined due to the country-wide lockdown severely affecting its sales.
- Demand for FO has been declining significantly in recent years declined due to IMO restrictions on its usage and governments policy of reducing reliance on it for Furnace Oil.
- Due to slowdown of economic activity in FY19, HSD consumption also declined.



# REFINERIES | LOCAL INDUSTRY

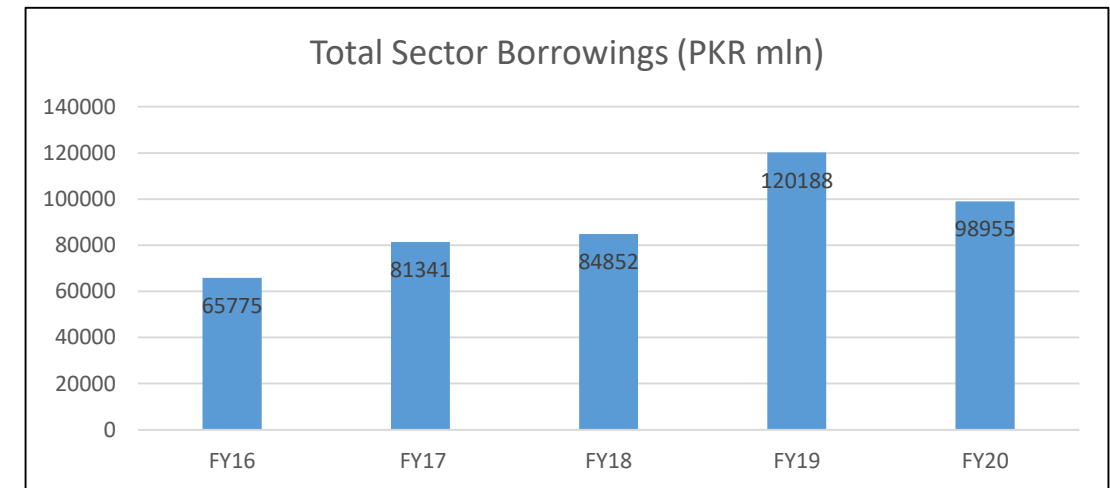
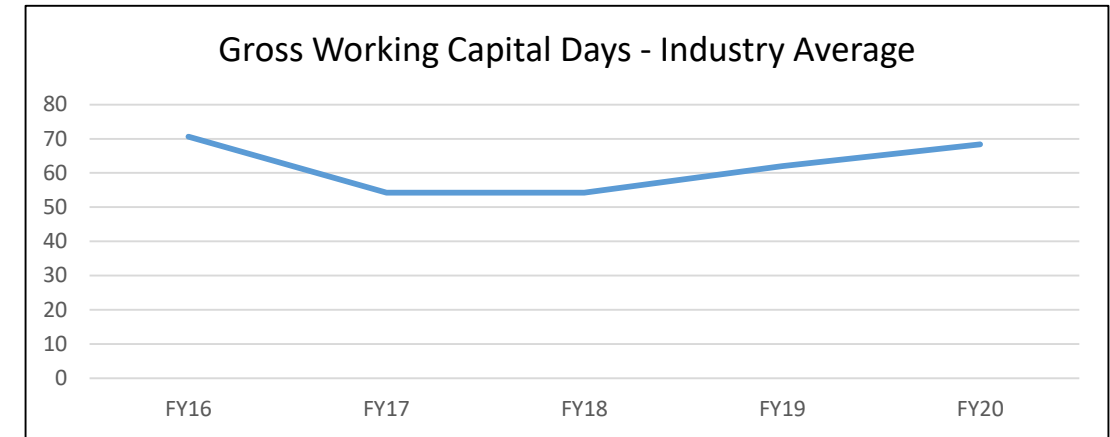
## Furnace Oil | The Short Term Fix

- Furnace Oil (FO) is one of the major products of Oil refineries in Pakistan and accounts for ~25%-30% of the Average Product Slate of the Sector.
- With the advent of GoP's policy of reducing Pakistan's dependence on HSFO for power generation, FO's local consumption has significantly reduced over the years. Currently, FO offtake is just at 1/3rd of its volume of about 9 million MTs in FY17. This slow uplift of FO has been adversely impacting the Oil refineries. Stock management remains the key issue. The GoP had imposed a ban on import of FO previously in order to exhaust the stocks of local refineries.
- Lately, the ban has again been uplifted; it is expected that a demand of around ~1.1mln MTs of FO would be generated from the Power Sector from Oct-20 to Jan-20 due to shift of gas to other Industries in winter Season. Inventory available with the Local Refiners is quoted to be approx. 260,000 MTs as at 1<sup>st</sup> July, 2020, thus creating a large room for imports.
- Moreover, international HSFO prices nosedived due to International Maritime Organization's (IMO) 2020 restriction on the usage of HSFO as bunker fuel from January 2020, which makes it unfavorable to export either.
- On the other hand, hefty CAPEX are needed to convert FO into other useful products through hydrocracker plant. Several negotiations are underway with the GoP to reach to a solution.



## Financial Risk | Working Capital & Borrowings

- The Sector's Working Capital needs emanate from financing Inventories and Receivables. Most of the Sector player suppliers are foreign (Saudi Aramco and UAE ADNOC), against which a supplier credit of 60-90 days is available. Meanwhile, credit terms with OMCs generally encompass a 30-60 days credit period. The Sector's Gross Working Capital Days have shown an increase in FY19 and the situation worsened in FY20 owing to COVID-19 resulting in huge inventory block.
- Average inventory days across the industry have steadily increased over the past years and stand at ~40 days this year reflecting the declining liquidity situation in the industry.
- As demand shrank by ~35%, inventories started to pileup. With crude oil prices crashing in the global market, the Industry booked an inventory loss of PKR~10bln in FY20.
- The sudden plunge in the crude oil prices amplified the need for short-term borrowing.
- Companies had to resort to borrowing in order to finance their working capital needs due to declining demand and rising inventories. The Sector's total Borrowing book stood at PKR~98bln as at End-Oct'20 (As per SBP's Report). This is almost equal to ~11% of the Sector's topline.

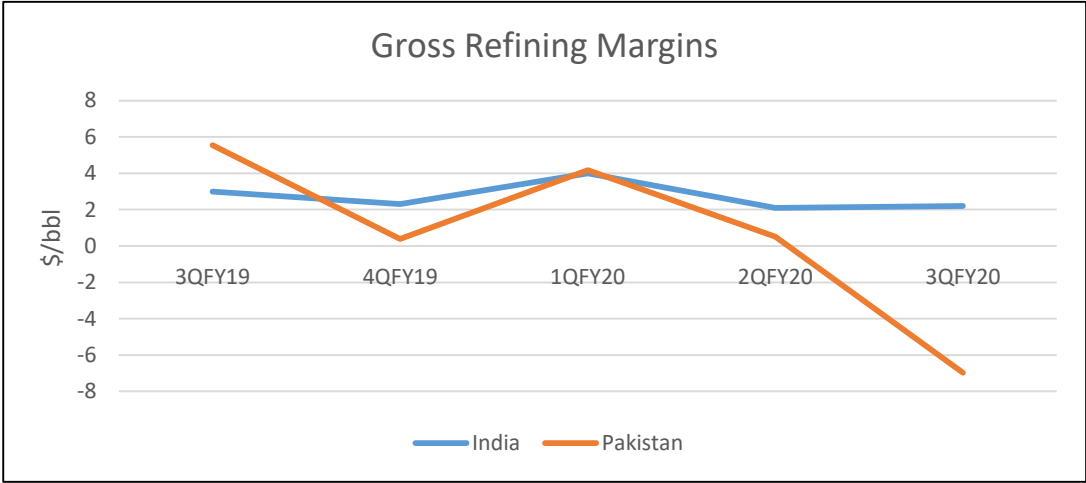


# REFINERIES | LOCAL INDUSTRY

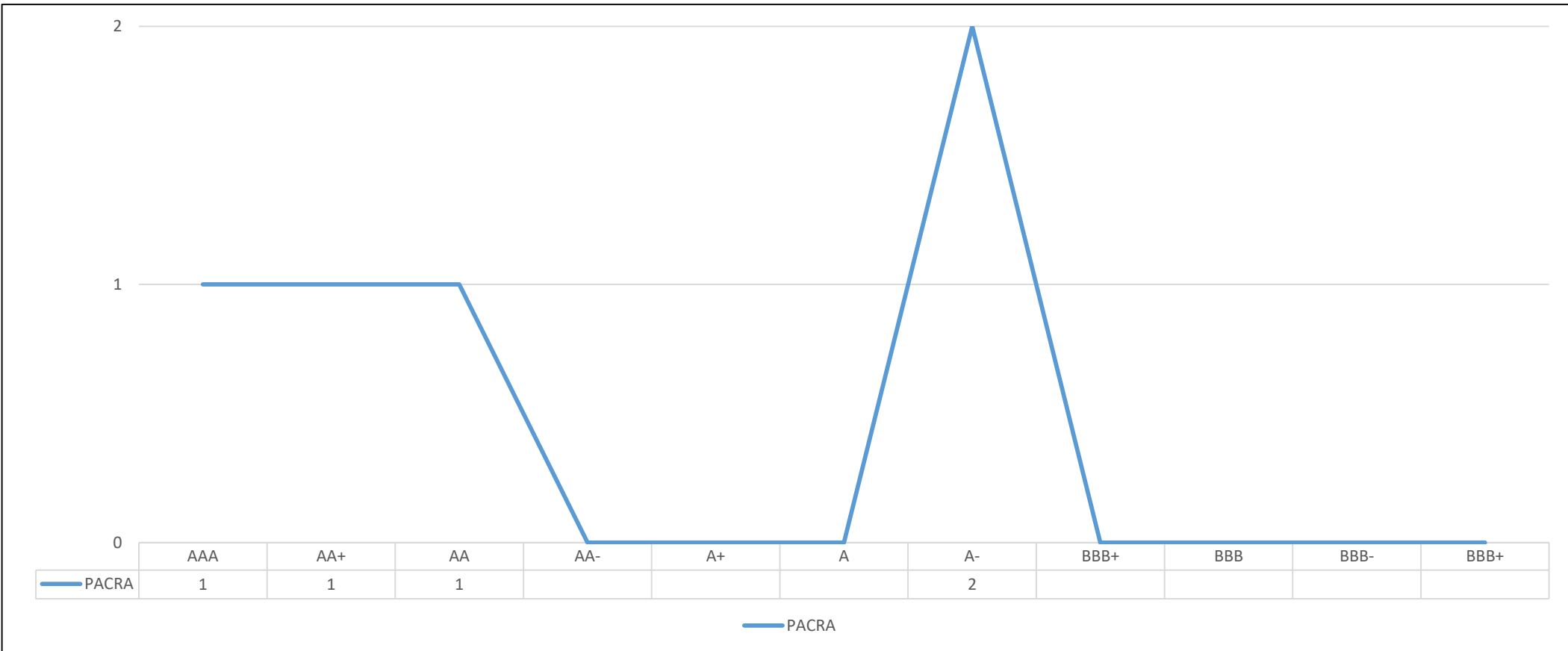
## Regional Comparison

- The worlds largest refinery, Jamnagar Oil Refinery, is based in India and owned by Reliance Industries. It has a huge refining capacity of ~60 mln MT.
- GRMs in India moved in tandem with international crude oil prices. The appreciating crude oil prices in the latter half of FY19 were also followed by GRMs in India. GRMs in Pakistan projected changes in crude prices more sharply compared to India.
- A significant fall on account of lower spread between international prices of petroleum products and crude owing to COVID-19 was witnessed during the second quarter of FY20 as crude oil prices touched lows of ~\$20/bbl.

	Pakistan	India
Total Capacity	19 mln MT	250 mln MT
Total Demand	19 mln MT	262 mln MT



## Rating Curve



- PACRA rates all five refineries in Pakistan.

## SWOT Analysis



## OUTLOOK: Negative

### Positive

- The exchange rate has been stable and is expected to improve due to increasing remittances and building up of foreign exchange reserves.
- Oil price recovery has resulted as a reliever to the Sector margins in 1QFY21. Further stabilization of prices is expected to benefit the margins.
- GoP decision to reduce policy rate by 625bps is expected to provide relief to the finance cost burden of the Sector.
- With effect from 1<sup>st</sup> Sep, 2020, the GoP has changed the product pricing frequency from monthly to fortnightly basis and these are now linked with Import Parity Price of Arab Gulf Platts daily FOB average. This development is expected to benefit the Sector in terms of reduction in pricing lag.

### Negative

- Though, the demand for oil is recovering since June subsequent to the easing of restrictions worldwide, the effects of a second wave could be equally or even more adverse. While demand for Petrol may remain stagnant, HSD and Jet Fuel market are expected to remain under pressure. Early arrival of a vaccine, can still, turn the tables.
- Owing to lower demand, supply surplus situation could result in lower prices and lower GRMs for refining sector.
- Almost 30% of the output of local refineries (except PARCO) is FO which is the lowest value product. The IMO has placed restriction on the usage HSFO as bunker fuel from January 2020 making it even less attractive for export.
- Government changed the specification of imported MS and HSD to Euro V from August 2020 and January 2021 respectively. Local refineries are allowed to supply as per their existing product grades till the time they upgrade their refineries to be able to produce Euro V specifications. The upgradation will have a toll on the already stressed financials of oil refineries.

- World Bank
- OGRA
- OCAC
- BP STATS
- EIA
- OPEC
- Pakistan Bureau of Statistics (PBS)
- Business Recorder
- State Bank of Pakistan (SBP)
- Pakistan Stock Exchange (PSX)
- Statista.com
- Financial Statements
- PACRA in-house Database

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