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EXECUTIVE SUMMARY

Second largest refiner in Asia

- In FY16, India had 232.1 MMTPA of provisional refining capacity, making it the second largest refiner in Asia. By 2017, the oil refining capacity of India is expected to rise and reach more than 310 million tonnes. Private companies own about 38.21 per cent of total refining capacity

World's fourth-largest energy consumer

- India's energy demand is expected to double to 1,516 Mtoe by 2035 from 700.50 Mtoe in 2015. Moreover, the country's share in global primary energy consumption is projected to increase by two folds by 2035

Fourth-largest consumer of oil and petroleum products

- In 2014, India consumed 3.85 mbpd oil, while the consumption is estimated to reach 4.0 mbpd by FY16, expanding at a CAGR of 3.2 per cent during FY08–16F.
- India was third largest consumer of crude oil and petroleum products in the world in 2015

Fourth-largest LNG importer in 2015

- LNG imports into the country accounted for about one-fourth of total gas demand, which is estimated to further increase by two times, over next five years. To meet this rising demand the country plans to increase its LNG import capacity to 50 million tonnes in the coming years.
- India increasingly relies on imported LNG; the country is the fourth-largest LNG importer in 2015 (As of September 2015) and accounted for 5.68 per cent of global imports

Source: US Energy Information Administration (EIA), Ministry of Petroleum & Natural Gas, TechSci Research
Notes: MMTPA - Million Metric Tonnes Per Annum, Mtoe – Million Tonnes of Oil Equivalent; mbpd – Million Barrels Per Day; Figures mentioned in this slide is as per latest data available

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ADVANTAGE INDIA

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ADVANTAGE INDIA

2015
Oil Consumption: 4 mbpd;
Gas Consumption: 50.5 bcm

Growing demand

- India is the world's fourth-largest energy consumer (2014); oil and gas account for 37 per cent of total energy consumption
- Demand for primary energy in India is to increase threefold by 2035 to 1,516 million tonnes of oil
- Equivalent from 637 million tonnes of oil equivalent in 2014

- About 136,347 people were employed in the petroleum industry at the end of FY13
- The University of Petroleum and Energy Studies in Dehradun, Uttarakhand, is Asia's first and only energy university

FY16
Oil Consumption: 4.0 mbpd;
Gas Consumption: 119.05 bcm

Advantage India

Supportive FDI guidelines

- The government allows 100 per cent Foreign Direct Investment (FDI) in upstream and private sector refining projects
- The FDI limit for public sector refining projects has been raised to 49 per cent without any disinvestment or dilution of domestic equity in the existing PSUs

Policy support

- Government has enacted various policies such as the New Exploration Licensing Policy (NELP) and Coal Bed Methane (CBM) policy to encourage investments
- New domestic natural gas pricing guidelines has been enforced on 10th January 2014

Source: Business Monitor International (BMI), World Oil Outlook 2012, Ministry of Petroleum & Natural Gas, BP Statistical Review 2015, TechSci Research
Notes: mbpd – Million Barrels Per Day, bcm – Billion Cubic Metres, F – Forecast;
Figures mentioned in this slide is as per latest data available

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MARKET OVERVIEW AND TRENDS

STATE-OWNED COMPANIES DOMINATE OIL AND GAS IN INDIA

- India has become the third-largest energy consumer in 2015
- In 2015,oil production in the country reached 0.75 mbpd as compared to 0.76 mbpd in 2014. In 2014, country had, 5.7 billion barrels of proven oil reserves
- India had 1.4 tcm of gas proved reserves and produced 33.66 bcm of gas in 2015 which is expected to rise and reach 33.73 bcm in 2016

Indian Oil and Gas sector

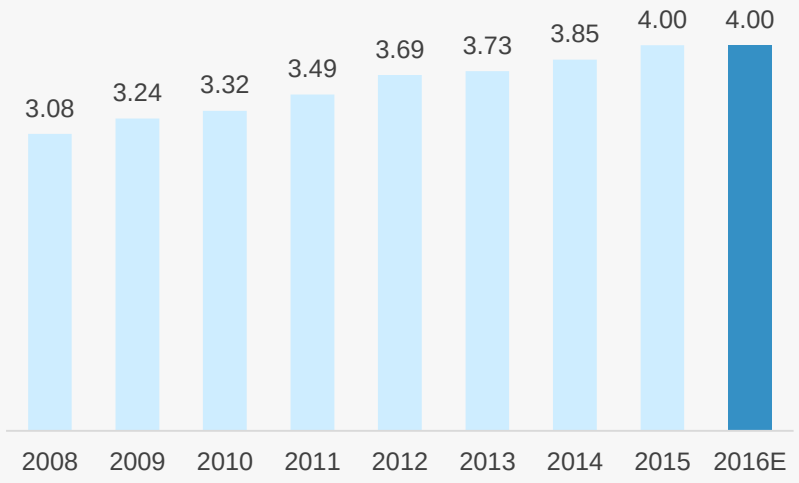
Upstream segment - exploration and production	• State-owned ONGC dominate the upstream segment • It is the largest upstream company in the Exploration and Production (E&P) segment, accounting for approximately 59.43 per cent of the country's total oil output (FY15)
Midstream segment – storage and transportation	• IOCL operates a 11,214 km network of crude, gas and product pipelines, with a capacity of 1.6 mbpd of oil and 10 mmscmd of gas • This is around 30 per cent of the nation's total pipeline network
Downstream segment – refining, processing and marketing	• IOCL is the largest company, controls 10 out of 22 Indian refineries, with a combined capacity of 1.31 mbpd • Reliance launched India's first privately owned refinery in 1999 and has gained considerable market share (30 per cent) • Essar's Vadinar refinery has a capacity of 20 mmtpa, currently accounting for around 10 per cent of total refining capacity

Source: BP Statistical Review 2015, US Energy Information Administration, Ministry of Petroleum & Natural Gas, TechSci Research
Notes: bcm – Billion Cubic Metres, tcf – Trillion Cubic Feet, mbpd – Million Barrels Per Day, mmscmd - Million Metric Standard Cubic Metre Per Day, tcm -- trillions of cubic meters, mmtpa -- million metric tons per annum
ONGC – Oil & Natural Gas Corporation of India, IOCL – Indian Oil Corporation Ltd

OIL SUPPLY AND DEMAND IN INDIA … (1/2)

- Oil consumption is estimated to expand at a CAGR of 3.3 per cent during FY2008–16F to reach 4.0 mbpd by 2016
- Due to the expected strong growth in demand, India's dependency on oil imports is likely to increase further
- Rapid economic growth is leading to greater outputs, which in turn is increasing the demand of oil for production and transportation
- With rising income levels, demand for automobile is estimated to increase, in turn leading to augmented demand for oil & gas.

Oil consumption in India (2008-16)

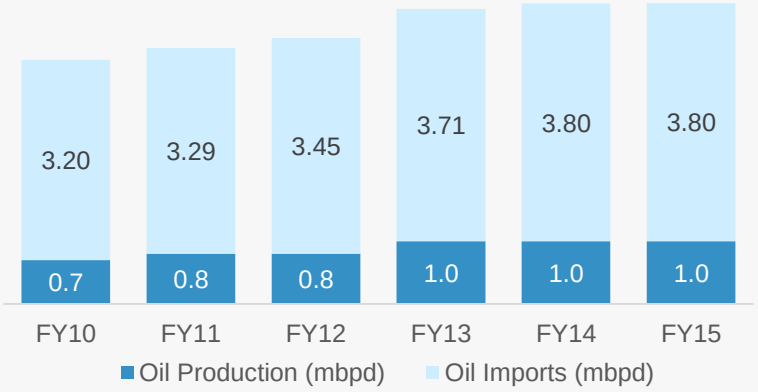


Source: Ministry of Oil & Natural Gas, BP Statistical Review 2015
BMI forecasts, TechSci Research
Notes: F – Forecast, CAGR – Compound Annual Growth Rate, mbpd – Million Barrels Per Day, mn bbl – Million Barrels, E- Estimated

OIL SUPPLY AND DEMAND IN INDIA … (2/2)

- In FY16, total crude oil imports were valued at USD64.4 billion as compared to USD112.7 billion in FY15. In FY14, imports accounted for more than 80 per cent of the country's total oil demand
- Despite being a net importer of crude oil, India has become a net exporter of petroleum products by investing in refineries designed for export, particularly in Gujarat
- Backed by new oil fields, domestic oil output is anticipated to grow to 1.0 mbpd by FY16

Imports and domestic oil production in India

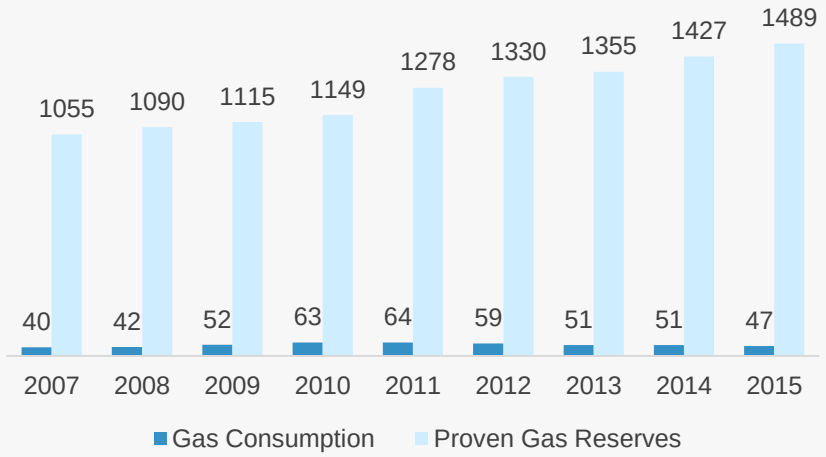


Source: Ministry of Oil & Natural Gas, BMI forecasts, TechSci Research
Notes: F – Forecast, mbpd – Million Barrels Per Day

GAS SUPPLY AND DEMAND IN INDIA … (1/2)

- With India developing gas-fired power stations, consumption is up more than 160 per cent since 1995
- Demand is not likely to simmer down any time soon, given strong economic growth and rising urbanisation. Gas consumption is likely to expand at a CAGR of 2.04 per cent during 2007–15

Proven reserves and total gas consumption in the country (bcm)



Source: PPAC, BP Statistical Review 2015, Ministry of Oil & Natural Gas 2014, TechSci Research

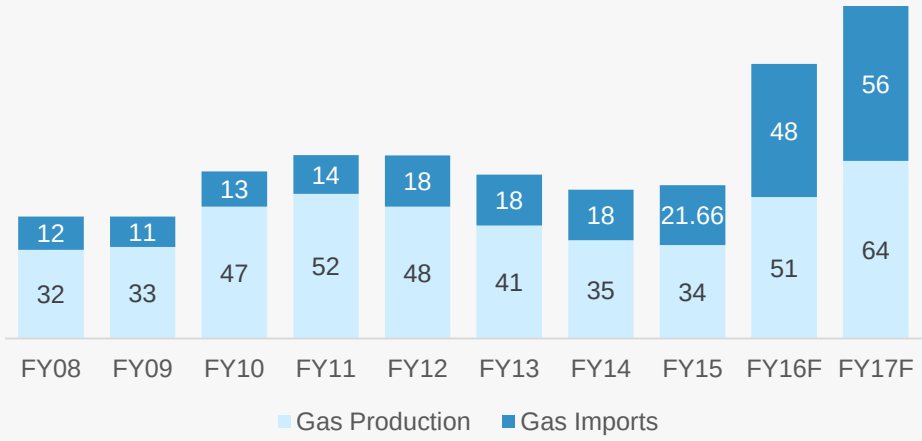
Notes: F – Forecast, bcm – Billion Cubic Metres, CAGR – Compound Annual Growth Rate

Figures mentioned in this slide is as per latest data available

GAS SUPPLY AND DEMAND IN INDIA … (2/2)

- Domestic production accounts for more than three-quarter of the country's total gas consumption
- Demand is expected to increase due to higher economic growth, ensure less dependency on imported crude and a desire to use cleaner fuel
- Reaching 196.48 million tonnes in 2016, fuel sales recorded the highest growth rate of 10.7 per cent since last 16 years.
- India's LNG imports are forecasted to increase at a CAGR of 18.67 per cent during FY2008–FY17
- Domestic gas production in India stood at around 51 BCM in FY16

Domestic gas production and imports (bcm)

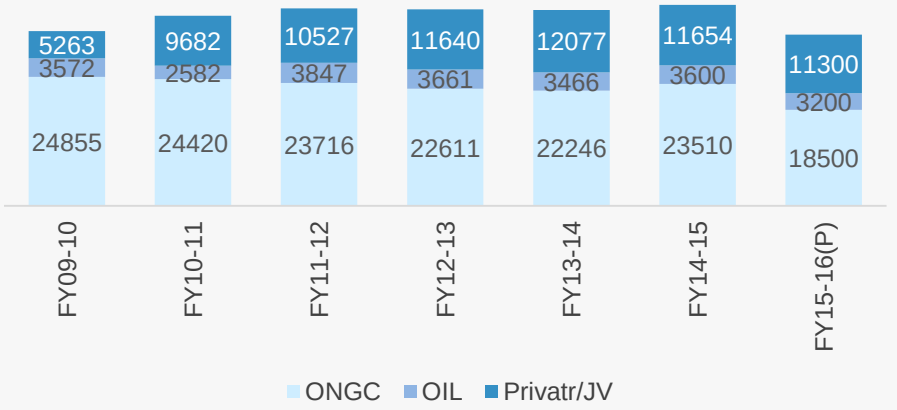


Source: Ministry of Oil & Natural Gas, BP Statistical Review 2015, TechSci Research
Notes: F – Forecast, bcm – Billion Cubic Metres, F- provisional number

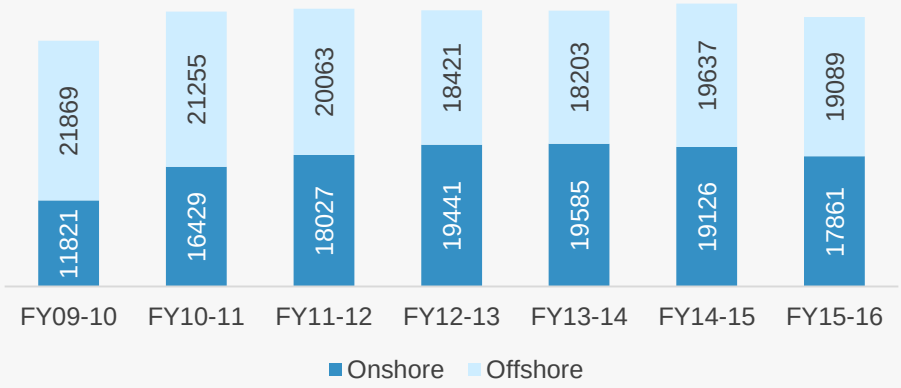
UPSTREAM SEGMENT: CRUDE OIL AND GAS PRODUCTION … (1/2)

- In 2015-2016, crude oil production stood at 33 million tonnes
- ONGC accounted for 60 per cent of total crude oil production in India

Crude oil production (''000" Tonnes)



Annual crude oil production (''000" Tonnes)

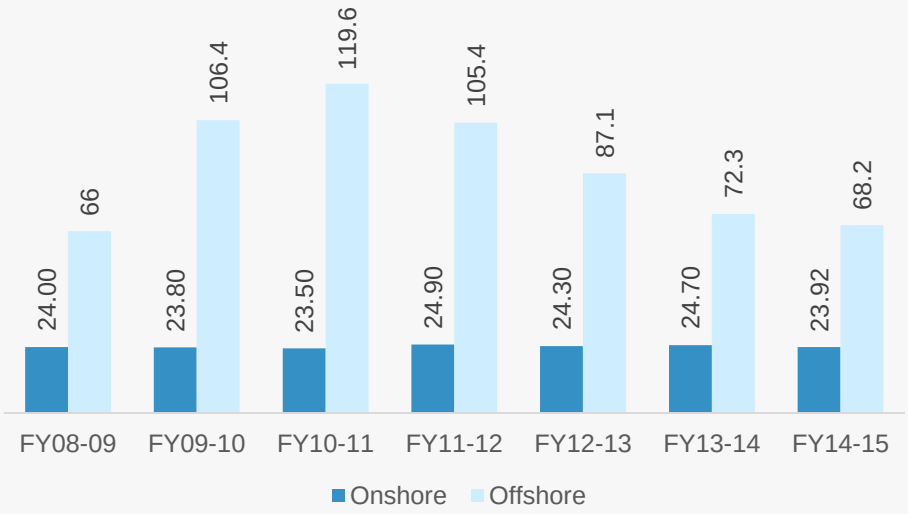


Source: Ministry of Petroleum & Natural Gas, TechSci Research, petroleum.nic.in,
Notes: mmt – Million Metric Tonne, JV – Joint Venture
P - Provisional

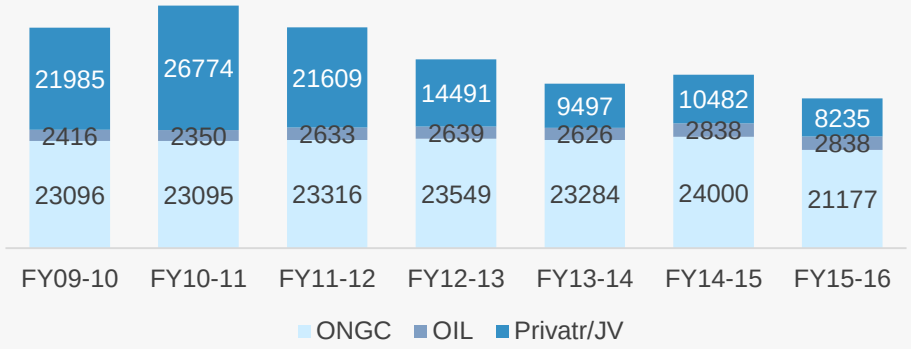
UPSTREAM SEGMENT: CRUDE OIL AND GAS PRODUCTION … (2/2)

- Total gas production in FY16 was 32.25 bcm
- Annual gas production increased between FY09-10 and FY15-16, reaching 32250 mmscmd

Annual gas production
(million metric standard cubic meter per day)



Annual gas production
(million metric standard cubic meter per day)

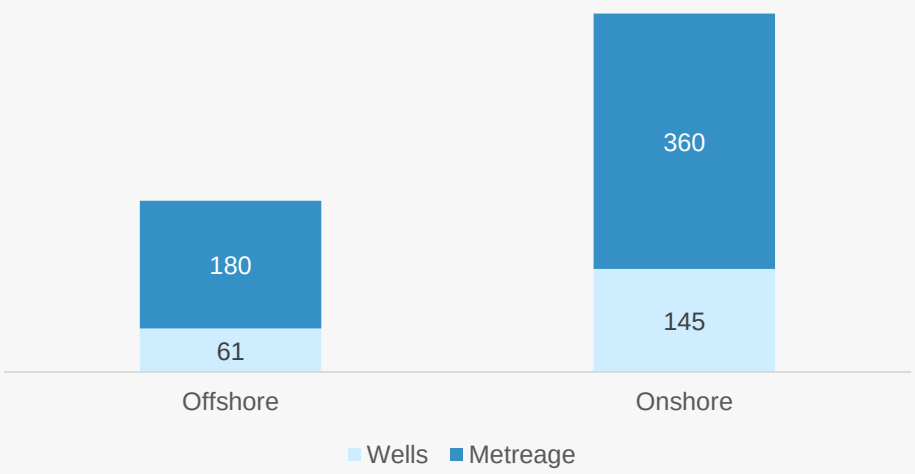


Source: Ministry of Petroleum & Natural Gas; TechSci Research
Notes: bcm – Billion Cubic Metres,
mmscmd-- Million Metric Standard Cubic Meter Per Day,
JV – Joint Venture

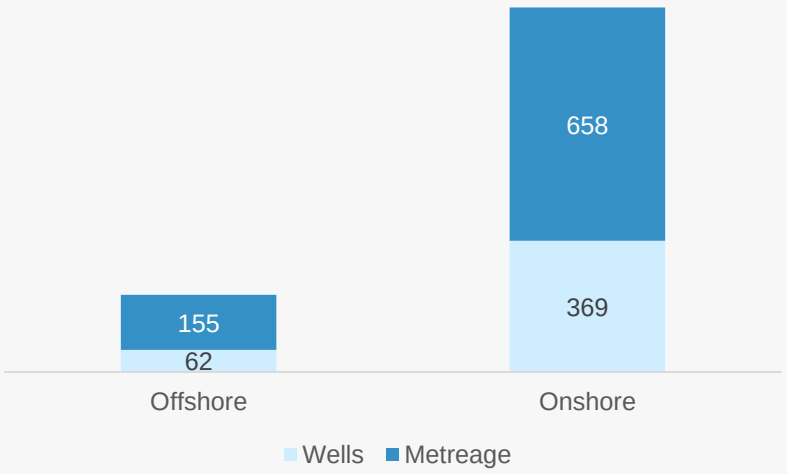
UPSTREAM SEGMENT: EXPLORATION AND DEVELOPMENT ACTIVITIES

- During FY15(1), 1,352,000 metres of wells were explored and developed in India
- During the same period, 637 wells were drilled in the country
- State-owned oil companies undertake most of the upstream drilling and exploration work
- ONGC, the leader in the upstream segment, accounts for 60 per cent of India's total crude oil output

Exploration activities (FY15(1))
('000 metres)



Development drilling activities (FY15(1))
('000 metres)

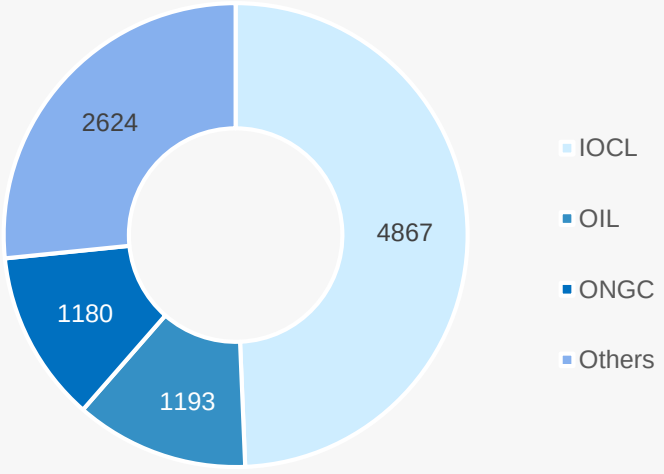


Source: Ministry of Petroleum & Natural Gas, TechSci Research
Note: (1) – Provisional

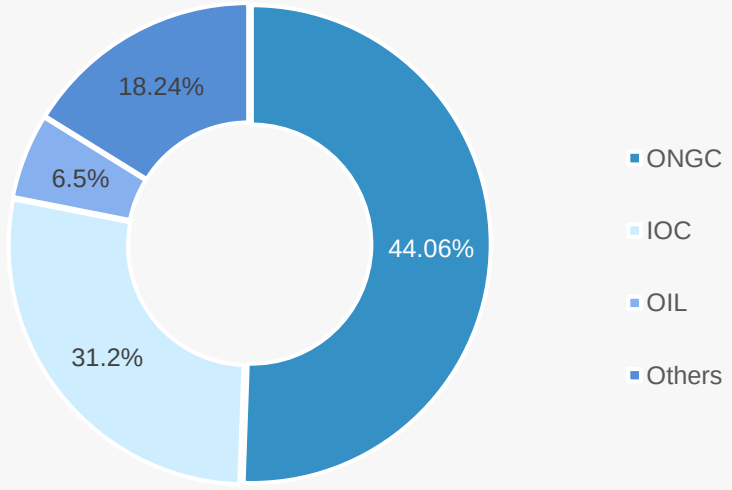
PIPELINES: CRUDE PIPELINE NETWORK

- As on 1st April, 2016, India had a network of 9,864 km of crude pipeline having a capacity of 129.6 mmtpa(1)
- In terms of length, IOCL accounts for 49.34 per cent (4,867 km) of India's crude pipeline network in April 2016. Moreover, the company has the country's longest pipelines: Salaya-Mathura-Panipat Pipeline (1,870 km) and Haldia-Barauni/Paradip-Barauni Pipeline (1,302 km)
- In terms of actual capacities, ONGC leads the pack with a share of 44.06 per cent, followed by IOCL at 31.2 per cent

Shares in crude pipeline network by length (out of 9,864 km) (FY16)



Shares in crude pipeline network by capacity (out of 129.6 MMTPA) (FY16)



Source: Ministry of Petroleum & Natural Gas, TechSci Research
Notes: km – Kilometre, mmtpa – Million Metric Tonnes Per Annum, (1) Approximate

Pipelines: Existing Pipelines in India[4]

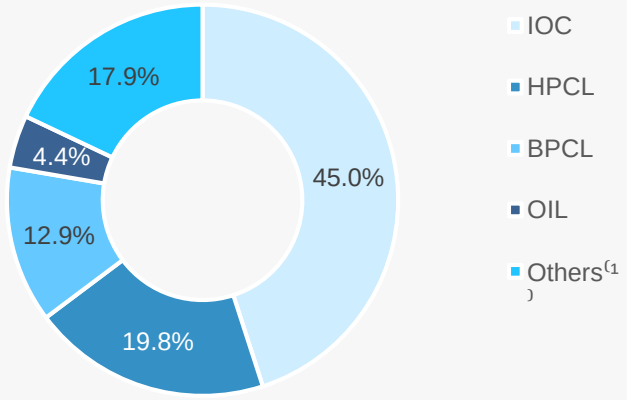
	IOCL	BPCL[1]	HPCL[2]	OIL	ONGC[3]	Cairn	HMEL	Others (GAIL and Petronet India.)	Total industry
Length (Kms)									
Product Pipeline	6,739	1,935	2,957	654	-	-	-	2,687	14,972
Crude oil Pipeline	4,867	937	-	1,193	1,180	670	1,017	-	9,864
Total	11,606	2,872	2,957	1,847	1,180	670	1,017	2,687	24,836
Capacity of Crude Oil Pipelines (MMTPA)									
Product Pipeline	40.2	14.9	31.6	1.7	-	-	-	9.3	97.7
Crude oil Pipeline	40.4	6.0	-	8.4	57.1	8.7	9.0	-	129.6
Total	80.6	20.9	31.6	10.1	57.1	8.7	9.0	9.3	227.3

Source: Ministry of Petroleum & Natural Gas; TechSci Research
Notes: kms – Kilometres, mmtpa – Million Metric Tonnes Per Annum,
[1] Includes Petronet Cochin-Coimbatore-Karur Product pipeline, [2] Includes Petronet Mangalore-Hassan-Bangalore Product Pipeline,
[3] Source: PPAC, [4] Approximately, Data is as on 1st April, 2016

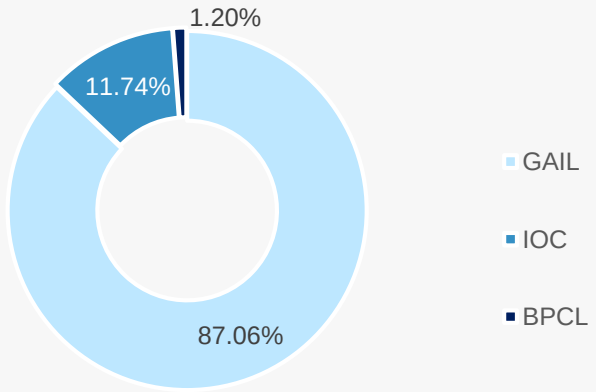
PIPELINES: REFINED PRODUCTS AND LPG PIPELINE NETWORK

- With 14972 km of refined products pipeline network (capacity of 97.7 mmtpa) in India, Indian Oil Corporation (IOC) leads the segment with more than half of the total length of product pipeline network in 2016
- Top 3 companies IOC, HPCL & BPCL contribute 77.7 per cent of the total length of product pipeline network in the country in 2016
- In 2015, Gas Authority of India Limited (GAIL) has largest share (87.06 per cent or 2,032 km) of the country's LPG pipeline network (2,334 km)

Shares in product pipeline network under operation by length (out of 14972 km, FY16)



Shares in LPG pipeline network by length (out of 2,334 km) (FY15)

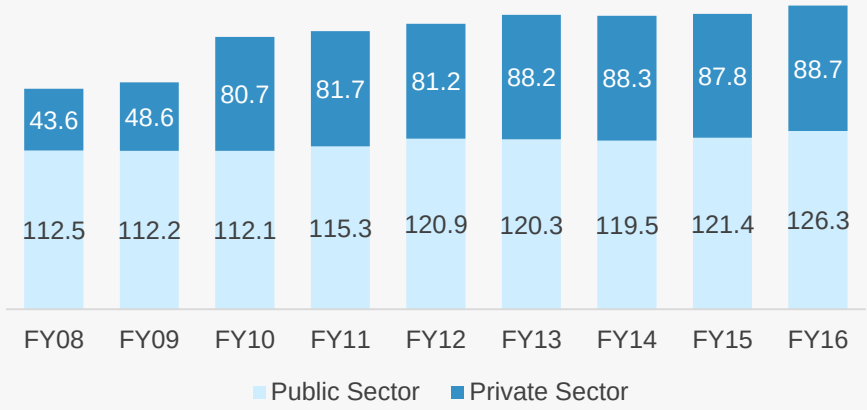


Source: Ministry of Petroleum & Natural Gas, TechSci Research
Notes: km – Kilometre, mmtpa – Million Metric Tonnes Per Annum, LPG - Liquefied Petroleum Gas, IOC - Indian Oil Corporation, HPCL - Hindustan Petroleum Corporation Ltd, BPCL - Bharat Petroleum Corporation Ltd, OIL - Oil India Limited, (1) Others include GAIL and Petronet India

DOWNSTREAM SEGMENT: REFINERY CRUDE THROUGHPUT… (1/2)

- State-controlled entities dominate the downstream segment as well
- India has 19 refineries in the public sector and three in the private sector
- Private companies such as Reliance Industries Limited and Essar Oil have become major refiners
- In FY16, public sector refineries accounted for 54.42 per cent of total refinery crude throughput
- Private sector refineries' total crude throughput grew at a CAGR of 9.28 per cent, reaching to 88.7 mmt during FY08-16

Refinery crude throughput (mmt)

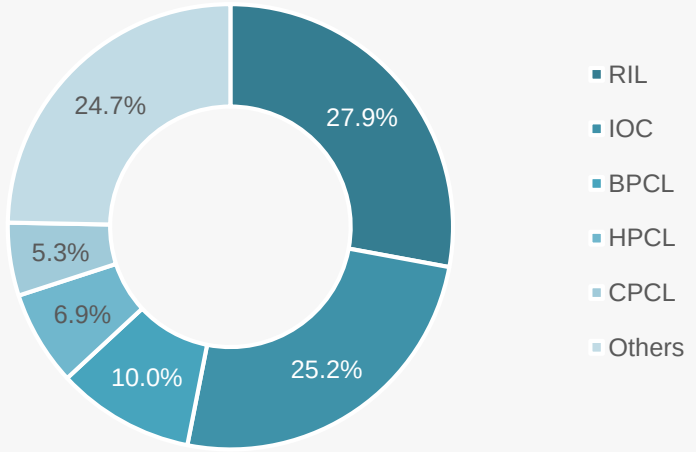


Source: Ministry of Petroleum & Natural Gas, TechSci Research
Note: mmt – Million Metric Tonne

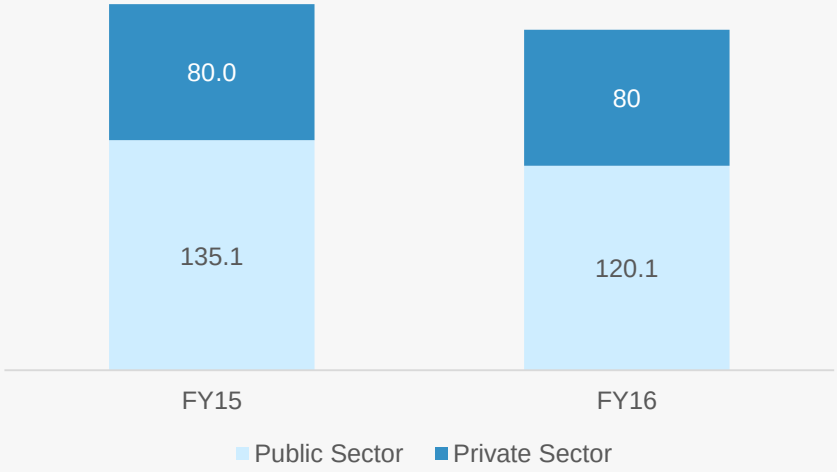
DOWNSTREAM SEGMENT: REFINERY CRUDE THROUGHPUT… (2/2)

- In FY16, the sector's total installed provisional refinery capacity was 215.1 mmt
- In FY16, IOC emerged as the largest domestic refiner with a capacity of 54.2 mmt
- Top three companies RIL, IOC and BPCL contributes around 63 per cent of India's total refining capacity

Shares in India's total refining capacity (FY16)



Total installed capacity FY16 (mmt)



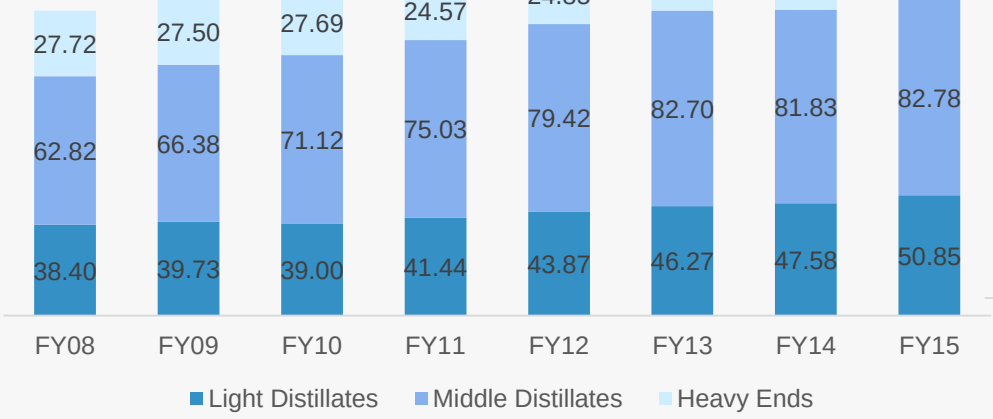
Source: Ministry of Petroleum & Natural Gas, PPAC, TechSci Research

Notes: mmt – Million Metric Tonne; HPCL - Hindustan Petroleum Corporation Ltd, BPCL - Bharat Petroleum Corporation Ltd, OIL - Oil India Limited, ONGC - Oil and Natural Gas Corporation, IOCL - Indian Oil Corporation Ltd, CPCL - Chennai Petroleum Corporation Limited, Others include: NRIL - Numaligarh Refinery Limited, MRPL - Mangalore Refinery and Petrochemicals Limited, RPL - Renegade Petroleum Ltd, EOL - Essar Oil Ltd, ONGC, BORL, HMEL

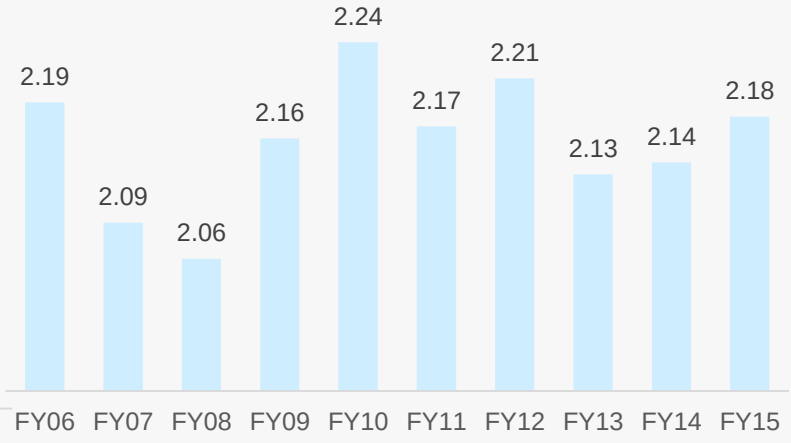
DOWNSTREAM SEGMENT: PETROLEUM PRODUCTS

- During FY15, consumption of petroleum products in India stood at 183.5 mmt
- Petroleum products derived from crude oil include light distillates such as LPG, naphtha; middle distillates such as kerosene; and heavy ends such as furnace and lube oils, bitumen, petroleum coke and paraffin wax
- Light distillates with the highest growth rate grew at CAGR of 4.09 per cent, while middle distillates and heavy end segment witnessed a CAGR of 4.02 per cent and 1.78 per cent respectively, during the year FY08-15
- During the 12th Five-year Plan period (2012–17), production of petroleum products in India is expected to reach 1195.8 mmt

Petroleum Products-wise Consumption from crude oil FY15 (mmt)



Production of LPG By Fractionators (mmt)

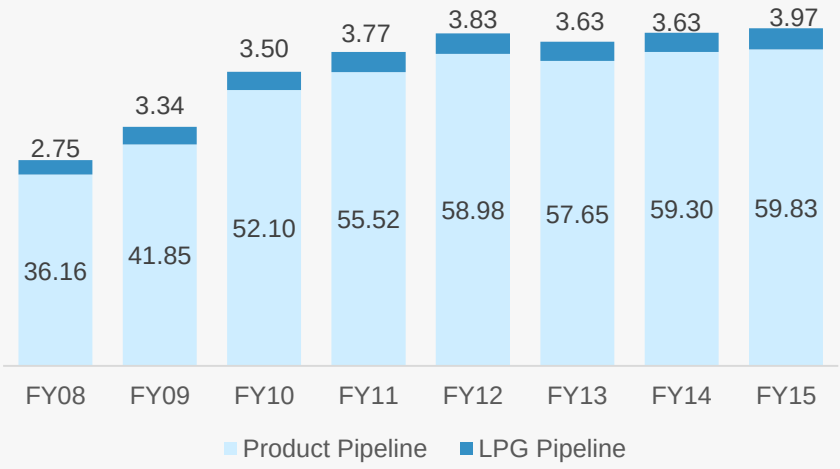


Source: Ministry of Petroleum & Natural Gas; TechSci Research
Notes: mmt – Million Metric Tonne

DOWNSTREAM SEGMENT: DISTRIBUTION AND MARKETING

- In FY16, total consumption of petroleum products by companies stood at around 183.5 MMT, higher by 11.2 per cent in comparison with the previous fiscal year
- The total number of retail outlets increased to 56190 (including private) in April 2016 (Provisional) from 53419 in April 2015
- IOC, as of April 1, 2016, (Provisional), owned the maximum number of retail outlets in the country (45.14 per cent of total), followed by HPCL (24.56 per cent) and BPCL (23.92 per cent); the remaining being owned by private firms
- As of April 1, 2016 (Provisional), there were 17,916 LPG distributors in India

Downstream distribution statistics (MMT)



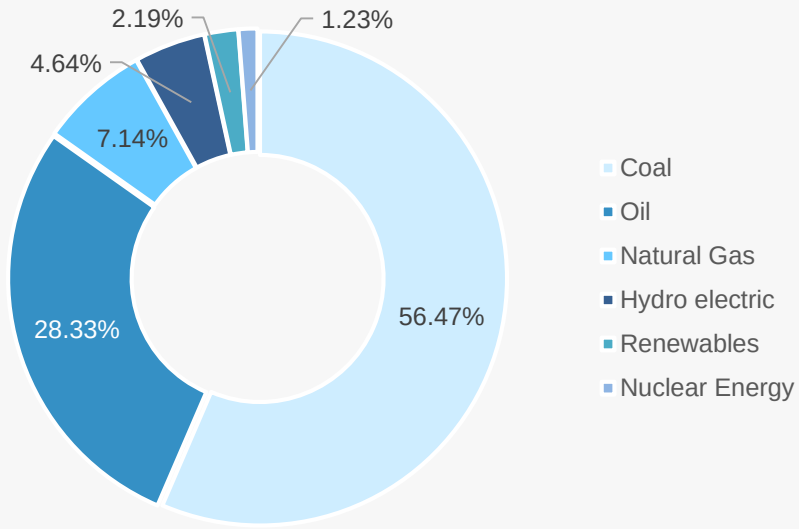
Pipeline	Capacity (mmtpa) As of April 1, 2016	Length (km) As of April 1, 2016
Product Pipeline	97.7	14972
LPG Pipeline(1)	5.330	2334

Source: Ministry of Petroleum & Natural Gas, TechSci Research
Notes: MMT – Million Metric Tonne, mmtpa – Million Metric Tonnes Per Annum, (1) – Data is as of April 1, 2015

INDIA'S ENERGY CONSUMPTION MIX … (1/2)

- In 2014, coal accounted for 56.47 per cent of total primary energy demand
- Energy demand in the Asia-Pacific region is estimated to be around 5,498.5 Mtoe in 2015 and is expected to reach 5,627 Mtoe by 2020 and 6,861 Mtoe by 2035
- India's energy demand is projected to double to 48.7 quadrillion BTU by 2035
- The primary energy consumption of India rose by 5.2 per cent in 2015
- In 2015, coal maintained its dominancy and accounted for 58 per cent of total primary energy demand

Energy consumption pattern in 2014

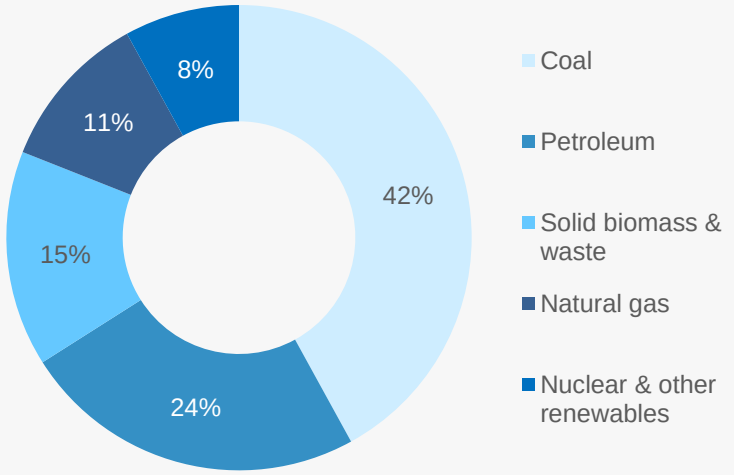


Source: US Energy Information Administration (EIA), BP Statistical Review 2015, Asia-Pacific Economic Cooperation (APEC), TechSci Research
Notes: Mtoe – Million Tonne of Oil Equivalent, BTU – British Thermal Unit; Figures mentioned in this slide is as per latest data available

INDIA'S ENERGY CONSUMPTION MIX … (2/2)

- Over the next few years, dependence on gas, hydro power and nuclear power is expected to increase relative to oil and coal
- The government aims to quadruple India's nuclear power generation capacity to 20 GW by 2020; currently, seven nuclear power reactors of 4,930 MWe capacity are under construction
- In coming decades, a major portion of consumption dependability of energy mix is expected to shift from coal and petroleum to other resources like natural gas, solid biomass & waste and nuclear & other renewable sources

Consumption pattern expected in 2035



Source: International Energy Agency (IEA), TechSci Research

STATE-WISE CRUDE RESERVE, CAPACITY AND THROUGHPUT

State	Balance recoverable reserves of crude oil, 2015 (MMT)
Assam	169.42
Gujarat	138.49
Rajasthan	37.33
Andhra Pradesh	1.63
Tamil Nadu	10.80
Arunachal Pradesh	1.63
Nagaland	2.69
Tripura	0.07
Total Onshore	**373.61**
Western Offshore	333.42
Eastern Offshore	56.42
Total Offshore	**389.86**

State	Installed capacity, as of April 2015 (mt)	Crude throughput for 2015 (mt)
Gujarat	93.7	100.19
Maharashtra	18.5	20.46
Haryana	15.0	15.5
Karnataka	15.0	14.59
Tamil Nadu	11.5	10.6
Kerala	9.5	10.29
Andhra Pradesh	8.37	7.83
Uttar Pradesh	8.0	8.16
West Bengal	7.5	7.95
Assam	7.0	6.38
Bihar	6.0	6.48
Punjab	9.0	9.27
Madhya Pradesh	6.0	5.45
Total	**215.07**	**222.50**

Source: Ministry of Petroleum & Natural Gas, TechSci Research
Notes: Mmt – Million Metric Tonne, mt – Million Tonne

KEY DOMESTIC OIL & GAS COMPANIES

Company	Ownership (per cent) as on FY14-15	FY16 turnover (USD billion)
Indian Oil Corporation Limited	68.57% state-owned	61.04
Reliance Industries	Public Listed	45.23
Bharat Petroleum Corporation Limited	54.93% state-owned	28.79
Hindustan Petroleum Corporation Limited	51.1% state-owned	32.49
ONGC	68.94% state-owned	20.10
GAIL India Limited	56.11% state-owned	7.88
Oil India Limited[1]	67.64% state-owned	1.00

Source: Bloomberg, TechSci Research
Note: FY – Indian Financial Year, April–March
[1] - Data for half year ended September 2015

KEY INTERNATIONAL OIL & GAS COMPANIES OPERATING IN INDIA

Company	Ownership (per cent)	Global turnover (FY16) (USD billion)
Cairn Energy India Pvt Ltd	Private Sector	1.62
Shell	Private Sector	211.98
BG Group	Private Sector	121.19
BP	Private Sector	55.88

Source: - Indian counterpart, Bloomberg; TechSci Research, Company websites

NOTABLE TRENDS IN THE OIL AND GAS SECTOR

Coal Bed Methane (CBM)

- Government approved the CBM policy in 1997 to boost the development of clean and renewable energy resources
- CBM is an eco-friendly natural gas (methane), which is absorbed in coal and lignite seams
- The CBM policy was designed to be liberal and investor friendly; the first commercial production of CBM was initiated in July 2007 at about 72,000 cubic metres per day

Underground Coal Gasification (UCG)

- The technology was first widely used in the US in the 1800s, and in India (Kolkata and Mumbai) in the early 1900s
- UCG is currently the only feasible technology available to harness energy from deep unmineable coal seams economically in an eco-friendly manner
- The technology reduces capital outlay, operating costs and output gas expenses by 25–50 per cent vis-à-vis surface gasification

Gas hydrates and bio-fuels

- The government initiated the National Gas Hydrate Programme (NGHP), a consortium of national E&P companies and research institutions, to map gas hydrates for use as an alternate source of energy
- Bio-fuels (bio-ethanol and bio-diesel) are alternate sources of energy from domestic renewable resources; these have lower emissions compared to petroleum or diesel

Open Acreage Licensing Policy

- The Open Acreage Licensing Policy (OLAP) has been initiated in parallel with NELP to increase foreign participation by global E&P companies like Shell, BP, Conoco Phillips etc.

OIL & GAS

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PORTER FIVE FORCES ANALYSIS

PORTER'S FIVE FORCES ANALYSIS

Competitive Rivalry

- Competitive rivalry is low as just one-two players operate in Upstream, Midstream and Downstream segments
- Although a few private operators have entered the industry in the last couple of years, they do not pose any major threat as of now

Threat of New Entrants

- Threat of new entrants continues to be low, due to the capital intensive nature of the industry and economies of scale

Substitute Products

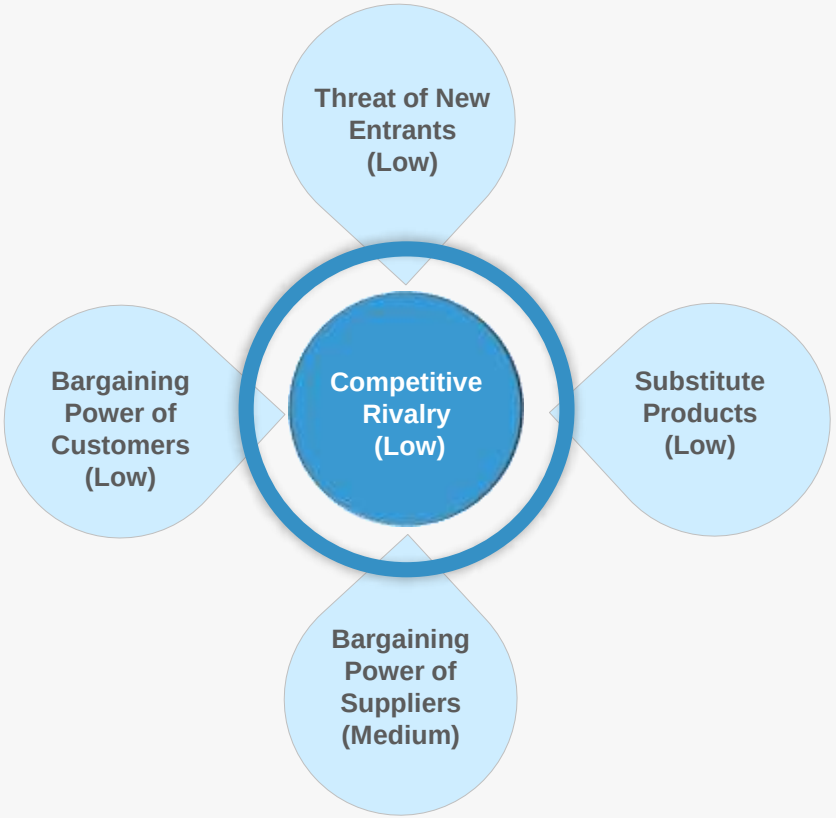
- Threat is low, as other sources of energy like solar, wind, coal and hydro electric power are less developed. Pressure from alternative sources might rise in future

Bargaining Power of Suppliers

- Bargaining power is medium as despite few players operating, government at times delays subsidy payment to oil companies, thereby increasing losses

Bargaining Power of Customers

- Customers have low/non existent bargaining power
- Customers are price-taker not a price maker



Source: TechSci Research

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STRATEGIES ADOPTED

STRATEGIES ADOPTED … (1/2)

Expansions

- Companies in India are currently setting up bases in newer geographies like Africa and thereby increasing their global footprints. For example, ONGC Videsh Limited (OVL), which is ONGC's subsidiary, has acquired significant space in Africa
- As of April 2016, Indian Oil Corporation is estimated to spend USD3.06 billion to expand its Gujarat refinery. The expansion is anticipated to be commissioned in 2020
- In 2016, Indian Oil Corporation is planning to expand its LPG bottling plant capacity at its Cherapally plant, from 250 TMT per annum in 2016 to 120 TMT. This project would cost around USD4.58 million and is expected to be commissioned in March 2017
- They are forming JVs and strategic tie ups with foreign companies to increase their technical know-how and knowledge base
- Indian Oil Corp plans to make an investment of USD22.91 billion, including USD7.64 billion for expanding its existing brownfield refineries, in the next five to seven years
- State run energy firms Bharat Petroleum, Hindustan Petroleum and Indian Oil Corporation plan to spend USD20 billion on refinery expansions to add units, by 2022
- Indian Oil Corporation plans to lay the nation's longest LPG pipeline of 1987 km, from Gujarat coast to Gorakhpur in eastern Uttar Pradesh, to cater to growing demand for cooking gas in the country
- India targets US$100 billion worth investments in gas infrastructure by 2022, including an addition of another 228 cities to city gas distribution (CGD) network. This would include setting up of RLNG terminals, pipeline projects, completion of the gas grid & setting up of CGD network in more cities.

Diversification

- Oil companies are focusing on vertical integration for next stage of growth. For instance, oil producer Oil India Ltd is planning to build and operate refineries, while Indian Oil is planning to enter oil & gas exploration
- Companies are diversifying into alternative energies such as wind power, solar & bio-fuels

Source: TechSci Research

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STRATEGIES ADOPTED … (2/2)

Move to non-conventional energy resources	• Most Indian companies are now targeting shale gas reserves as a source of energy in future • Companies are looking forward to developing JVs and technical partnership with foreign companies to improve capabilities to develop shale reserves
Investments to enhance production	• Indian companies are enhancing production through redevelopment plans to increase recovery rates of hydrocarbon from oil wells; ONGC in Mumbai High achieved success in implementing this • With exploration increasing not only in the country but also in outside geographies, companies are pumping up R&D to focus on gasification technology and bio energy • Bharat Petroleum Corporation (BPCL) has planned to invest USD1.53 billion during FY17 to enhance & expand its refining capacity
More focus upon small companies	• In recent years, major discoveries in the Barmer basin in Rajasthan & the offshore Krishna-Godavari basin by smaller companies such as the Gujarat State Petroleum Corporation & Andhra Pradesh Gas Infrastructure Corporation hold some potential to diversify the country's production • Private sector units like Adani, Sun Petrochemicals & few new entrants have bagged 1/3rd of small oil & gas fields. In February 2017, the government approved 31 contracts to be developed, comprising 44 small fields. • In February 2017, Genesis, London, bagged a contract from RIL's (Reliance Industries) to design deep water field front end engineering at KG Basin in West India.
Focus on City Gas Distribution Network	• Government of India has come up with guidelines on allocation of domestic gas for household and transportation sectors(1) , to boost the demand of natural gas in India
Pilot project Initiated for Shale Gas Production in India	• Oil and Natural Gas Corp (ONGC) has started Shale Gas exploration by spudding the first Shale Gas well RNSG-1 in Burdwan District of West Bengal.
Piped Cooking Gas	• By March 2017, state-owned natural gas company, GAIL, plans to start distributing piped cooking gas in Bhubaneswar and Varanasi.

Source: TechSci Research; (1) -22nd August 2014

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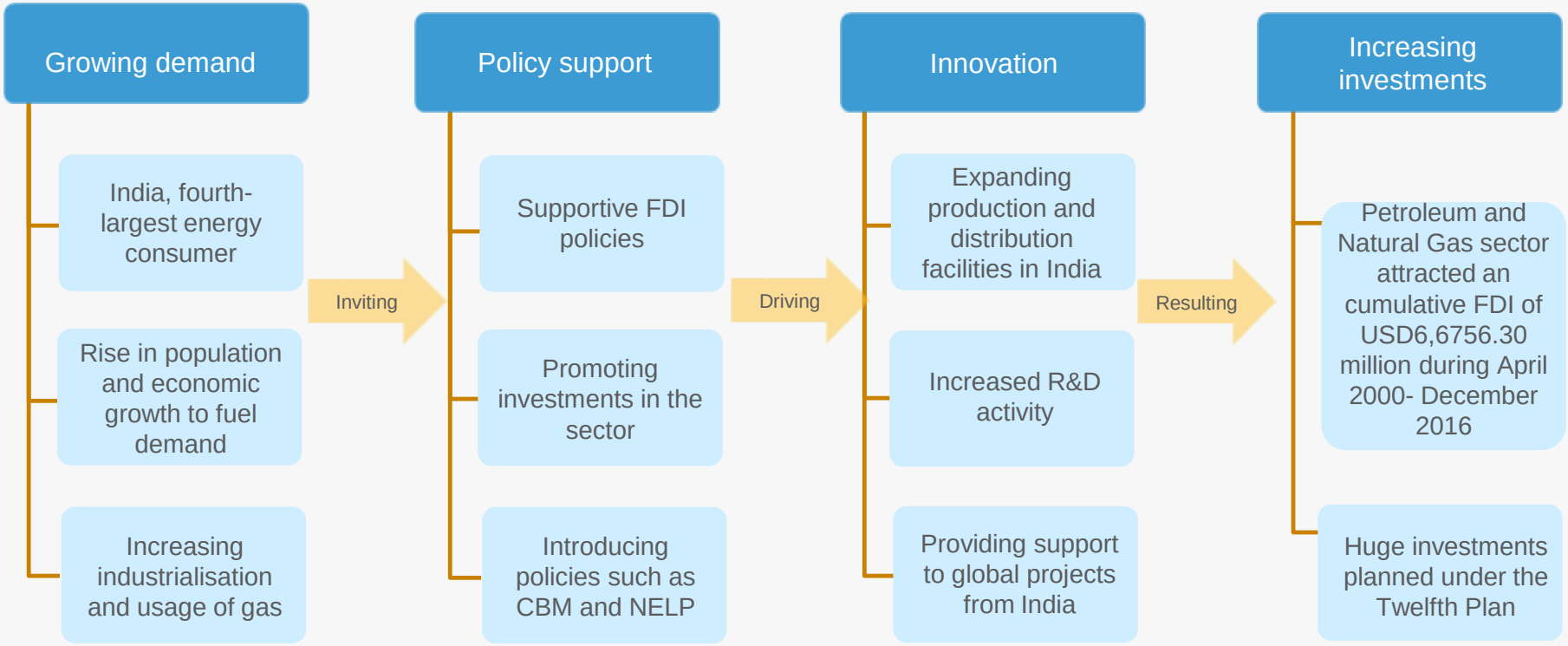
GROWTH DRIVERS

PERSISTENT DOMESTIC DEMAND TO DRIVE THE MARKET



Source: Ministry of Petroleum & Natural Gas, TechSci Research

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GROWTH DRIVERS … (1/2)

Robust domestic market; expected to expand

- India is the world's fourth-largest energy consumer
- Oil consumption is expected to rise by 42.5 per cent during 2010–20
- The country is the fifth-largest importer of LNG

Increasing demand for natural gas

- Several industries are increasing the usage of natural gas in operations; this has boosted natural gas demand in India
- Some of the main industries that use natural gas are pulp and paper, metals, chemicals, glass, plastic and food processing

Abundant raw material

- The nation has large coal, crude oil and natural gas reserves
- Oil reserves amounted to 763.476 MMT in FY15
- Proved reserves of natural gas stood at 1.48 tcm in FY15

Favourable policies

- The government has allowed 100 per cent FDI in E&P projects/companies; and 49 per cent in refining under the automatic route from the earlier approval route
- It has also introduced policies to promote investments in the industry such as New Exploration Licensing Policy (NELP) and Coal Bed Methane (CBM)

Source: Ministry of Petroleum & Natural Gas, US Energy Information Administration, BP Statistical Review of World 2015 Energy, June 2012; BMI, TechSci Research,
Notes: TCM - Trillion Cubic Metres, E&P - Exploration and Production

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GROWTH DRIVERS … (2/2)

Huge investments

- Investments worth USD75 billion is expected across the oil & gas value chain under the erstwhile 12th Plan (2012–17)
- ONGC plans to incure capital expenditure of US$ 4.31 billion in FY2017-18, for developing their offshore oil & gas fields in Gamji, Bassein, Daman on the West coast & Vasishta & Nagyalanka on the East coast.

Skilled labour

- The nation offers abundant skilled labour at much competitive wages compared to other countries
- The University of Petroleum and Energy Studies in Dehradun, Uttarakhand, is Asia's 1st & only energy university

Massive gas pipeline network

- In 2016, country's natural gas pipeline network spanned over 16,251 km in length & the proposed expansion of 30,000 kms is envisaged by 2018-19

Natural gas discoveries

- Several domestic companies (such as ONGC, Reliance & Gujarat State Petroleum) have reportedly found natural gas in deep waters
- This offers significant expansion opportunity over the next decade

Source: Ministry of Petroleum & Natural Gas, BMI, TechSci Research
Note: Kms- Kilometres

REGULATORY OVERVIEW OF THE INDUSTRY… (1/2)

Pricing of CNG and PNG by CGD Entities (2014)	• In 2014, the pricing for CNG (transport) & PNG (domestic) were examined by the Ministry of Petroleum & Natural Gas while the disclose of prices of the CNG & PNG commodities were made compulsory
The Policy on Shale Gas & Oil, 2013	• Allows companies to apply for shale gas & oil rights in their petroleum exploration licenses & petroleum mining leases
Shale Gas & Oil Exploration Policy	• Approved in September 2013, it allows companies to explore energy resources trapped within rocks to meet India's growing energy needs
The National Biofuel Policy, 2009	• Promotes bio-fuel usage, the Government of India has provided a 12.36 per cent concession on excise duty on bio-ethanol & exempted bio-diesel from excise duty
Integrated Energy Policy (IEP), 2006	• Outlines goals to deal with challenges faced by India's energy sector

Source: Ministry of Petroleum & Natural Gas, TechSci Research

REGULATORY OVERVIEW OF THE INDUSTRY… (2/2)

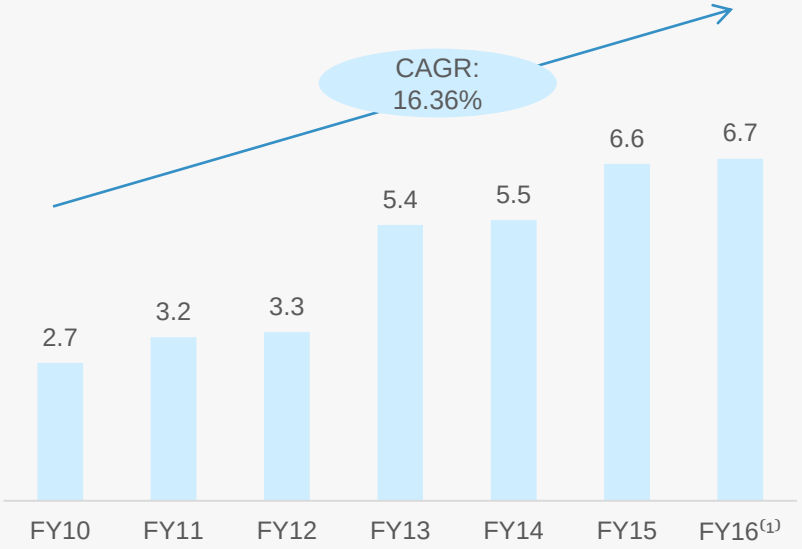
Petroleum and Natural Gas Regulatory Board (PNGRB) Act, 2006	• Regulate refining, processing, storage, transportation, distribution, marketing and sale of petroleum, petroleum products and natural gas
Auto Fuel Policy, 2003	• Provide a roadmap to comply with various vehicular emission norms and corresponding fuel quality upgrading requirements over a period of time
National Biofuel Policy, 2002	• A 16 per cent concession on the excise duty on bio-ethanol and exemption of bio-diesel from excise duty to promote bio-fuel usage
Freight Subsidy (for far-flung areas) Scheme, 2002	• Compensate public sector Oil Marketing Companies (OMCs) for the freight incurred to distribute subsidised products in far-flung areas
Domestic Natural Gas Pricing Formula, 2014	• New domestic natural gas pricing formula has been formed, which will be revised on an half yearly basis.

Source: Ministry of Petroleum & Natural Gas, TechSci Research
Note: NELP - New Exploration Licensing Policy

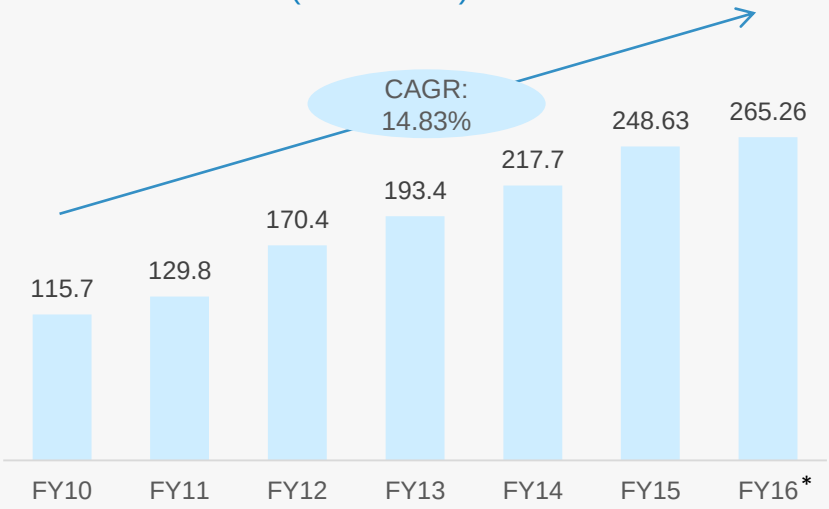
FDI INVESTMENTS IN PETROLEUM AND GAS IN INDIA

- Cumulative FDI inflows in India's petroleum and natural gas sector stood at USD6,756.30 billion (2.08 per cent of total FDIs) during April 2000–December 2016
- In Oil & Gas, FDI inflows into the sector totalled USD6.7 billion and USD6.6 billion in FY16 and FY15, respectively
- Between FY10 and FY16(1) , FDI inflows into petroleum and natural gas sector grew at CAGR 16.06 per cent

FDI inflows into petroleum and natural gas
(USD billion)



FDI inflows into India
(USD billion)



Source: Department of Industrial Policy & Promotion, TechSci Research
Note:FY16* –Up to September 2015, (1) – April 2000 - March 2016

M&A ACTIVITIES IN THE INDIAN OIL AND GAS SECTOR

Date announced	Acquirer name	Target name	Value of deal (USD million)
Dec 2016	Oil & Natural Gas Corp's	Gujarat State Petroleum Co's	1200
Dec 2015	ONGC Videsh Ltd (OVL)	Vankor oil field	1260
Jan 2015	Bharat Forge	Mecanique Generale Langroise	12.82
Jun 2014	Gulf Petrochem Ltd	Sah Petroleums Limited	7.13
Mar 2014	IOCL	Progress Energy Canada Ltd	Not disclosed
Oct 2013	ONGC Videsh Ltd	Parque das Conchas, Brazilian Oilfield	529
Jun 2013	ONGC Videsh Ltd (in partnership with Oil India Ltd)	Rovuma Area 1 Offshore Block	2640
Nov 2012	ONGC Videsh	ConocoPhillips (Kashagan Field)	5,000.0
Nov 2012	Inpex Corp	Oil and Natural Gas Corp's exploration block KG-DWN-2004/6	Not disclosed
Sep 2012	ONGC Videsh	Hess Corp (Azrei oilfield)	1,000.0
Apr 2012	Trafigura Pte Ltd	Nagarjuna Oil Co Ltd	130.0
Apr 2011	Sesa Goa Ltd	Calm India Ltd	1,492.0
Feb 2011	BP PLC	Reliance Industries Ltd	9,000.0
Aug 2010	BPRL	EP413	13.4
Aug 2010	Sesa Goa Ltd	Cairn India Ltd	1,180.8
Aug 2010	Vedanta Resources PLC	Cairn India Ltd	6,568.5
Aug 2010	Reliance Industries Ltd	Marcellus Shale Natural Gas	391.6

Source: Thomson Banker, TechSci Research

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OPPORTUNITIES

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OPPORTUNITIES

Upstream segment	Midstream segment	Downstream segment
• Locating new fields for exploration: 78 per cent of the country's sedimentary area is yet to be explored • Development of unconventional resources: CBM fields in the deep sea • Opportunities for secondary/tertiary oil producing techniques • Higher demand for skilled labour and oilfield services and equipment	• Expansion in the transmission network of gas pipelines • LNG imports have increased significantly; this provides an opportunity to boost production capacity • In light of mounting LNG production, huge opportunity lies for LNG terminal operation, engineering, procurement and construction services	• India is already a refining hub with 21 refineries and expansions planned for tapping foreign investment in export-oriented infrastructure, including product pipelines and export terminals • Development of City Gas Distribution (CGD) networks, which are similar to Delhi and Mumbai's CGDs • Expansion of the country's petroleum product distribution network

SHALE GAS PROSPECTS OF INDIA

- India has technically recoverable shale gas resources of nearly 96 tcf
- The Cambay, Krishna Godavari, Cauvery, and the Damodar Valley are the most prospective sedimentary basins for carrying out shale gas activities in the country
- Around 20 tcf of gas has been classified as technically recoverable reserves in the Cambay basin in Gujarat (the largest basin in the country) spread across 20,000 gross square miles with a prospective area of 1,940 square miles
- It is estimated that the Krishna Godavari (KG) basin encloses a series of organically rich shales, containing around 27 tcf of technically recoverable gas. KG basin, located in Eastern India, holds the country's largest shale gas reserves, extending over 7,800 gross square miles with a prospective area of around 4,340 square miles
- In April 2013, the Directorate General of Hydrocarbons (DGH) submitted its policy on exploitation of shale gas to the Ministry of Petroleum and Natural Gas
- India launched its policy on shale gas exploration to tap the non-conventional energy resource in order to boost output

Source: E&Y; Ministry of Petroleum & Natural Gas, TechSci Research
Note: tcf – Trillion Cubic Feet

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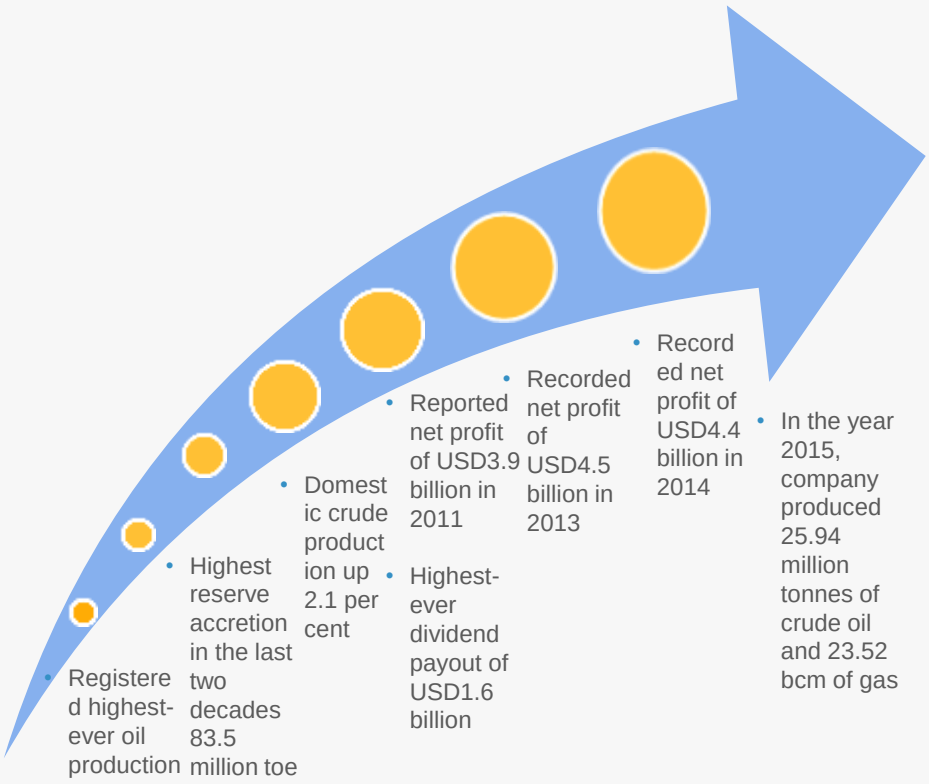
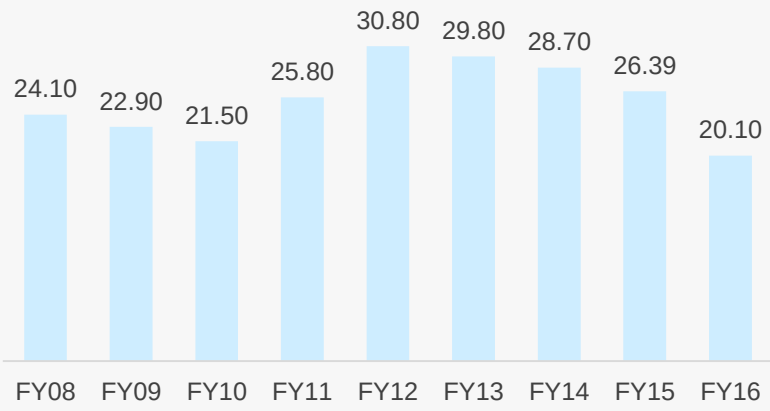
SUCCESS STORIES

ONGC: CONTINUING ON STRONG GROWTH PATH



ONGC revenue growth (USD billion)



ONGC's position in the Indian market

- ONGC is the largest upstream oil company
- It accounts for 59.43 per cent of India's total crude oil output and 65.43 per cent of total gas production (FY15)

Source: Company reports, TechSci Research
Notes: TOE – Tonne of Oil Equivalent

IOCL: FLAGSHIP OF INDIAN REFINING

- Indian Oil Group of Companies owns and operates 10 of India's 22 refineries with a capacity of 1.30 mbpd
- In 2015, Its network of crude oil and product pipelines runs to about 11081 Km
- Subsidiary CPCL accounts for 49 per cent of market share in petroleum products
- In FY16, the gross refining margin (GRM) was estimated to be 5.06 per bbl as compared to USD0.27 per bbl in FY15

- Second-largest player in India's petrochemical market
- Has interests in 13 domestic and 11 overseas blocks
- Foraying into alternative sources of energy like wind and solar

	FY15	FY16
Turnover	USD73.57 billion	USD61.04 billion
EBITDA	USD1.7 billion	USD2.7 billion
Net profit	USD0.8 billion	USD1.6 billion

Source: Company reports, TechSci Research
Note: bbl - barrel

RELIANCE INDUSTRIES: WELL POSITIONED FOR GROWTH

- Reliance Industries has the biggest petrochemical refining complex in the world
- It contributes 14 per cent to India's exports and is going to invest around USD30 billion to improve its businesses in the next three years
- For December quarter 2016, Reliance Industries recorded profit of US$ 1.11 billion.

- Exports surged by 4.5 per cent to USD46 billion in 2016
- Record crude throughput at 69.6 million tonnes
- US shale: Shale Gas Production in FY16 205 Bcf.

	FY15	FY16	FY17[(1)]
Turnover	USD61.4 billion	USD45.23 billion	USD10.92 billion
EBITDA	USD6.1 billion	USD7.9 billion	USD2.1 billion
Net profit	USD3.8 billion	USD4.2 billion	USD1.1 billion

- Reliance Industries has entered into JVs with various companies across segments to align growth opportunities; it signed JVs with Atlas, Pioneer, Carrizo SIBUR, and D.E. Shaw as well as entered into a strategic alliance with BP recently

Source: Company reports, TechSci Research
Note: [(1)] Revenue fallen due to negative translation effect, Data from April – June 2016

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USEFUL INFORMATION

INDUSTRY ASSOCIATIONS

Name	Address	Contact person	Telephone	E-mail
Oil Industry Development Board (OIDB)	301, World Trade Centre, Babar Road, New Delhi – 110001	Mr T S Balasubramanian, Financial Adviser and Chief Accounts Officer	91-11- 23413298 91-11- 23414692	oidb@hotmail.com
Petroleum Conservation Research Association (PCRA)	Sanrakshan Bhavan, 10 Bhikaji Cama Place, New Delhi – 110066	Mr Arun Kumar, ED	91-11- 26198799 Ext.301	pcra@pcra.org
Bureau of Energy Efficiency (BEE)	Ministry of Power, 4th floor, SEWA Bhawan, RK Puram, New Delhi – 110066	Dr Ajay Mathur, Director General	91-11- 26178316, 91-11- 26179699	dg-bee@nic.in, amathur@beenet.in
Oil Industry Safety Directorate	Ministry of Petroleum & Natural Gas, 7th floor, "New Delhi House", 27 Barakhamba Road, New Delhi – 110001	Mr J B Verma, ED	91-11- 23316798	verma.jb@gov.in
Petroleum Planning and Analysis Cell (PPAC)	Ministry of Petroleum & Natural Gas, 2nd floor, Core-8, SCOPE Complex, 7 Institutional Area, Lodhi Road, New Delhi – 110003	Dr Basudev Mohanty, Director	91-11- 24362501, 91-11- 24361380	-
Directorate General of Hydrocarbons	Ministry of Petroleum & Natural Gas, C-139, Sector 63, Noida – 201301	Mr S K Srivastava, Director General	0120 - 4029401	dg@dghindia.org

GLOSSARY… (1/3)

- **B/D (or bpd):** Barrels Per Day
- **MBPD (or mbpd):** Million Barrels Per Day
- **BCM (or bcm):** Billion Cubic Metres
- **CBM**: Coal Bed Methane
- **CGD**: City Gas Distribution
- **E&P**: Exploration and Production
- **FDI**: Foreign Direct Investment
- **FY**: Indian Financial Year (April to March)
  - So FY12 implies April 2011 to March 2012
- **GoI**: Government of India
- **INR**: Indian Rupee
- **LNG**: Liquefied Natural Gas

GLOSSARY… (2/3)

- **MMT (or mmt)**: Million Metric Tonne
- **MMTPA (or mmtpa)**: Million Metric Tonnes Per Annum
- **EBITDA:** Earning Before Interest Taxes Depreciation Amortisation
- **NRL**: Numaligarh Refinery Limited
- **CPCL**: Chennai Petroleum Corporation Limited
- **HPCL**: Hindustan Petroleum Corporation Limited
- **BPCL**: Bharat Petroleum Corporation Limited
- **IOC**: Indian Oil Corporation Ltd
- **EOL**: Essar Oil Ltd
- **RPL**: Reliance Petroleum Limited
- **MRPL**: Mangalore Refinery and Petrochemicals Limited
- **PCCK**: Petronet Cochin-Coimbatore-Karur
- **PMHB**: Petronet Mangalore-Hassan-Bangalore

GLOSSARY… (3/3)

- **NELP**: New Exploration Licensing Policy
- **TOE (or toe)**: Tonnes of Oil Equivalent
- **USD**: US Dollar
- **ONGC**: Oil and Natural Gas Corporation of India
- **IOCL**: Indian Oil Corporation Limited
- **mn bbl**: Million Barrels
- **CAGR**: Compound Annual Growth Rate
- **JV**: Joint Venture
- **UCG**: Underground Coal Gasification
- **NGL**: Natural Gas Liquids
- **OMCs**: Oil Marketing Companies
- **NHGP**: National Gas Hydrate Programme
- Wherever applicable, numbers have been rounded off to the nearest whole number

EXCHANGE RATES

Exchange rates (Fiscal Year)

Year	INR equivalent of one USD
2004–05	44.81
2005–06	44.14
2006–07	45.14
2007–08	40.27
2008–09	46.14
2009–10	47.42
2010–11	45.62
2011–12	46.88
2012–13	54.31
2013–14	60.28
2014-15	61.06
2015-16	65.46
2016-2017E	67.23

Exchange rates (Calendar Year)

Year	INR equivalent of one USD
2005	43.98
2006	45.18
2007	41.34
2008	43.62
2009	48.42
2010	45.72
2011	46.85
2012	53.46
2013	58.44
2014	61.03
2015	64.15
2016 (Expected)	67.22

Source: Reserve bank of India, Average for the year

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