



### Petrotech 2012, October 2012

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# **Exploring India!**





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# **India** Country profile

India is a part of the south Asia and shares border with seven countries including Pakistan and Afghanistan in the west, China and Nepal in the north and Bangladesh, Bhutan and Myanmar in the east. Its neighbouring countries also include Maldives and Sri Lanka in the south.

The country has the second-largest population (1.24 billion, decadal growth rate of 1.5% per annum) in the world next only to China (1.34 billion, decadal growth rate of 0.6% per annum). The country enjoys a demographic advantage *vis-à-vis* other countries due to its significantly large young population (below the age of 25). More than 50% of its population is below the age of 25 and more than 65% is below the age of 35. It is estimated that by 2030, the country will have 0.95 billion young people in its workforce.<sup>1</sup>

It is the third-largest economy in the purchasing power parity (PPP) index, next to USA and China and the second-largest growing economy based on real GDP.

### GDP (PPP) in trillion USD (2011)



The services sector contributes about 56% to the country's GDP, followed by industry at 26% and agriculture at 17%. The services sector provides employment to 23% of the workforce and is growing quickly.

### Official name: The Republic of India

Capital: New Delhi

Official language: Hindi and English

**Religions:** Hindu (80.5%), Muslim (13.4%), Christian (2.3%), Sikh (1.9%), Buddhist (0.8%), others

Nominal GDP (2011): 1,848 billion

Growth rate: USD 8.24% (2009), 9.55% (2010), 6.86% (2011)

**Exchange rates**: 1 USD = 53.57 INR; 1 Euro = 68.93 INR; 1GBP = 86.58 INR (as on 26 September 2012)\*

Head of State: President, Shri Pranab Mukherjee

Head of Government: Prime Minister, Dr. Manmohan Singh

Minister of Petroleum and Natural Gas: Shri Jaipal Reddy

\* Source: fx-rate.net

# The energy mix

Over the last two decades (1990-2011), India's primary energy mix has not changed much. The country continues to depend, for most of its energy needs, on coal (>50%) and oil (~30%). However, natural gas is emerging as one of the fastest-growing fuels, registering an annual growth rate of 8%. Currently, it accounts for 10% of the total primary energy consumption.

On the other hand, other renewable segments (solar, geothermal, wind energy, etc.) and nuclear energy consumption have also registered an impressive annual growth as compared to the last decade—25% and 6%, respectively. As per the World Energy Outlook 2011, IEA has projected India's energy demand in 2035 at 1,464 MMtoe<sup>2</sup>. The respective shares of coal, oil and natural gas are 42%, 24% and 11%, respectively. Nuclear, hydro and renewable sources put together would account for just 7%. Therefore, fossil fuels are expected to continue fuelling country's economic growth.

Given the increased awareness amongst countries to reduce the carbon footprint of the energy industry, oil and gas are expected to play significant role. Natural gas, with its inherent advantages over other alternatives, is expected to emerge as the preferred fuel. Recent gas discoveries have provided encouraging results for the country and with optimum policy stimulus it is expected that India would substantially increase its domestic gas production.

As can be seen in the below graph, the country will continue to depend on biomass and waste consumed in rural and semi-urban areas, where access to energy remains a challenge. This is a significant portion of the total energy mix and indicates the potential for substitution by other primary energy fuels.





Source: World Energy Outlook 2011 by IEA

# **Regulatory structure**

The following indicates the segment-wise regulatory structure of India:

	Upstream	Midstream	Downstream
Governing ministry	The Ministry of Petroleum and Natural Gas (MoPNG)		
Legal framework	<ul> <li>The Oilfields Regulation and Development Act, 1948</li> <li>The Petroleum and Natural Gas Rules, 1959</li> </ul>	The Petroleum and Natural Gas Regulatory Board (PNGRB)	
Regulator	The Directorate General of Hydrocarbons (DGH)	The Petroleum and Natural Gas Regulatory Board (PNGRB)	
Policies and regulations	<ul> <li>The New Exploration Licensing Policy (NELP)</li> <li>The Coal Bed Methane (CBM) Policy</li> </ul>	<ul> <li>Authorisation</li> <li>Tariff</li> <li>Access code</li> <li>Affiliate Code of Conduct</li> </ul>	<ul> <li>Authorisation</li> <li>Tariff determination</li> <li>Exclusivity for CGD networks</li> <li>Technical standards</li> </ul>
Foreign direct investment (FDI) policy	100% under automatic route	100% under automatic route	Refining: 49% in case of Public sector units (PSU) via FIPB route and 100% in case of private companies Other than refining: 100% under automatic route

The regulatory agencies are supported by some of the following key central government ministries and policy formulating bodies:

- The Empowered Group of Ministers (EGoM): It takes decisions on industry issues that have a strong impact on the country's economy and investment climate.
- The Planning Commission: It is the nodal agency responsible for building a long-term strategic vision for India and deciding its priorities. It works out sector-specific targets and provides promotional stimulus to the economy to grow in the desired direction. For the hydrocarbon sector, the Planning Commission has formulated policies such as the Integrated Energy Policy, Working Group plans for the sector, etc.
- The Ministry of Finance (MoF): It decides on tax and fiscal matters relating to the country's hydrocarbon sector.

- The Ministry of Law (MoL): It advises on legal issues related to various policies and regimes relating to the hydrocarbon sector.
- The Directorate General of Hydrocarbons (DGH): It was established in 1993 under the administrative control of the Ministry of Petroleum and Natural Gas. Its objectives are to promote sound management of the oil and natural gas resources with a balanced consideration for the environment, safety, technological and economic aspects of the petroleum activity.

It has been entrusted with several responsibilities such as implementation of the New Exploration Licensing Policy (NELP), dealing with production sharing contracts (PSCs) for discovered fields and exploration blocks, promotion of investment in the E&P sector and monitoring of E&P activities including review of reservoir performance of producing fields. In addition, it also engages in opening up of new unexplored areas for future exploration and development of non-conventional hydrocarbon energy sources such as coal bed methane (CBM) and futuristic hydrocarbon energy resources such as gas hydrates and oil shale.

• The Petroleum and Natural Gas Regulatory Board (PNGRB): It regulates midstream and downstream activities, which include refining, processing, storage, transportation, distribution, marketing and sale of petroleum, petroleum products and natural gas. It protects the interest of consumers and entities engaged in the specified activities and ensures the uninterrupted and adequate supply of petroleum, petroleum products and natural gas in all parts of the country to promote competitive markets.

## Recent policies

• The New Exploration Licensing Policy (NELP), 1999: It provides a framework (auction mechanism) to award licences to companies for undertaking E&P activities in India under the PSCs. It lays down the bid and block award procedures, bid evaluation criteria, fiscal system, etc.

The NELP was introduced to increase investments in India's domestic E&P sector, especially the private sector investments. A total of nine rounds of acreage awards have since been completed in the last 12 years in which over 260 blocks were licensed out to companies.

Its key features include the following:

- 100% foreign direct investment
- No carried interest of any national oil company (NOC)
- 100% cost recovery
- Biddable production share, annual cost recovery limit and work programme
- No signature, discovery or production bonus
- Fiscal stability provision in the contract, etc.

- The Coal Bed Methane (CBM) Policy, 1997: The policy was formulated by the Ministry of Petroleum and Natural Gas in consultation with the Ministry of Coal to offer coal rich blocks for exploitation of coal bed methane. Under the policy, exploration licences are granted to companies under international competitive bidding. Its key features include the following:
  - No participating interest of the government
  - No upfront payment
  - Production-linked-payments to the government

From its commencement in 2007, four rounds of bidding under the CBM policy have been concluded by the government and a total of 30 blocks have been awarded.

• The Draft Shale Gas Policy, 2012: The Indian government is keen to explore and tap the potential of unconventional hydrocarbons in the country. The government has issued a draft of the policy, which is currently undergoing a stakeholder consultation process.





Source: DGH, PwC Analysis



# Performance of the upstream sector

## India's sedimentary basins

India has an estimated sedimentary area of 3.14 million km<sup>2</sup>, comprising 26 sedimentary basins. As per the statistics of the Directorate General of Hydrocarbons (DGH), at the end of FY 2010-11 about 34% of the total sedimentary area was either unexplored or poorly explored. Given the status of exploration undertaken in the country experts feel that India holds immense potential for hydrocarbon discoveries.

### Status of exploration of India's sedimentary basins, FY 2010-11 Poorly explored Unexplored Moderately to well explored Exploration initiated 449/0

Source: Directorate General of Hydrocarbons

### Reserves accretion

During the period 2002-03 to 2010-11, India's crude oil reserves increased at a CAGR of 0.27% while the natural gas reserves increased at a CAGR of 6.5%.

The reserves growth in natural gas was on account of the significant gas discovery made by RIL in the KG-D6 block on the east coast of India.

### Reserve accretion trend in India (MMtoe)



Source: MoPNG



# Crude oil

India relies heavily on crude imports (~75%) and its consumption has outdone production growth rate in the last decade by about 3.5% per annum. Substantial refinery capacity additions over the years have led this growth in crude oil consumption making India a net exporter of petroleum products.

Crude oil production has remained stagnant over the past decades. Discovered in 1974, Bombay High still continues to produce around 80% of offshore oil production and 45% of the total oil production in the country. Similarly, Cairn's Rajasthan discovery, which currently contributes nearly 20% of the total oil production, is expected to increase and contribute around 30% in the near future.

Domestic crude oil production is dominated by ONGC, which accounts for 65% of the country's total crude oil production. OIL is the oldest E&P company with operations concentrated in the north-east region of India and accounts for 10% of the total oil production. Private and JV companies account for the balance 25%.









Source: MoPNG



## Natural gas and LNG

Natural gas has always been a supply-constraint market in India. The most prolific gas producing fields include Bombay High which is operated by ONGC and contributed  $\sim$ 34% of the total gas production in 2011-12, KG-D6 offshore which is operated by Reliance Industries Ltd and contributed ~33% of the total gas production in 2011-12. The total offshore gas production accounts for 88% of the total production in India. The share of the private sector and JVs in the country's total gas production is expected to increase, owing to recent gas discoveries expected to be monetised by the companies.

The CBM production grew more than 100% over the last year and currently stands at little over 80 MMSCM (2.8 BCF) per annum. CBM production is expected to increase over the years on account of the monetisation of discoveries made by Essar Oil Ltd and Reliance Industries Ltd (RIL). In 2004, RasGas, Qatar delivered India's inaugural LNG parcel to its first LNG re-gasification terminal set up at Dahej, Gujarat by Petronet LNG Ltd. In April 2005, Shell commissioned India's second LNG re-gasification terminal at Hazira, Gujarat. Currently, LNG imports of 46 MMSCMD (1.6 BCFD) constitute roughly 27% of the total gas consumption of India, which was 166 MMSCMD (5.9 BCFD) in 2011.

Going forward, it is expected that the gap between natural gas demand and domestic gas production will increase to 88 BCM<sup>3</sup> (3.1 TCF) by 2015, indicating the potential for LNG imports (considering that the first transnational pipeline is not expected before 2018). According to supply projections for the XII and XIII Five Year Plan, the re-gasification capacity in India is expected to increase from current 18.4 BCM (0.6 TCF) to 27 BCM (1.0 TCF) by 2013 and around 95 BCM (3.4 TCF) by 2017.



# Transnational pipeline

### Turkmenistan-Afghanistan-Pakistan-India Pipeline

The proposed TAPI Gas Pipeline is expected to be approximately 1,680 km, with a distance of approximately 145 km in Turkmenistan, 735 km in Afghanistan and 800 km in Pakistan. The total contracted volume for 30 years for all three buyer countries together is 0.98 TCM. The source of the gas is the South Yolotan Osman field, recently re-named Galkynysh, which is expected to hold proven recoverable gas reserves of about 16 TCM. The estimated cost of the project is approximately 7.6 billion USD and the commercial operation is expected to commence in the year 2017. The governments of India, Pakistan, Afghanistan and Turkmenistan have signed the Inter-Governmental Agreement (IGA) and Gas Pipeline Framework Agreement (GPFA). In May 2012, India and Turkmenistan entered into a Gas Sale and Purchase Agreement (GSPA).



## Marketing of Gas in India

Gas produced in India by NOCs from fields which were awarded to them on nomination basis (called APM<sup>4</sup> gas) is allocated to priority sectors identified by the government. These priority sectors include fertiliser, power, city gas distribution (CGD) projects and other small-scale units. A Gas Linkage Committee (GLC) was constituted by the government to allocate APM gas amongst the priority sector, which was later disbanded since the allocable gas far exceeded the allocations made by the GLC.

For gas produced under NELP by RIL, the government constituted an EGoM, which decided the marketing priority of gas to be produced from RIL's field, keeping in view the larger public interest.

### EGoM's allocation of RIL's KG-D6 gas



Source: MoPNG

### **CGD business**

PNGRB has kick-started the process of authorising entities for laying, building, operating and expanding CGD networks in various cities across India. Before PNGRB came into existence, the government had identified cities including Delhi and Mumbai and authorised companies to operate CGD networks in those cities.

Increased gas availability, improved gas pipeline coverage and gas being one of the priority sectors are the major drivers of the CGD business in India. The government has aggressive plans to develop CGD network in more than 200 cities across India. Each city would warrant an investment ranging between 65 million USD to 100 million USD. The first round of bidding is complete and the companies have been authorised by PNGRB. In the second round the bids have been received but authorisation is still awaited. The third (8 cities) and fourth (8 cities) rounds of CGD bidding launched by PNGRB are currently underway.

# Performance of the downstream sector

# **Refining sector**

India has emerged as a global refining hub on the back of major refining capacity additions involving massive investments. The domestic demand of petroleum products is expected to grow at a CAGR of 7.5% during the next five years. The projected expansion of refinery capacity from 232 MMTPA (4.66 MMbbls per day) in 2012-13 to 311 MMTPA (6.3 MMbbls per day) in 2016-17 is in line with India's aspiration of becoming a global refining hub. Though the current refining capacity stands at 3.8 MMbbls per day, the throughput in 2011 exceeded 4 MMbbls per day, indicating more than 100% capacity utilisation.





India refining capacity trend (in MMTPA),

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Public sectorPrivate sector

198

2017e

Source: MoPNG

16.9

2011

2011



Source: BP's statistical report on World Energy 2012



133

2012e

# Pipeline infrastructure

## Port infrastructure

## Consumption of petroleum products

The country's pipeline infrastructure spans 19,300 km for crude oil, 16,293 km for gas and 15,903 km for products. However, the pipeline density in the country is still among the lowest in the world with onshore natural gas pipeline density being 3 km per 1,000 km<sup>2</sup> of area as compared to 50 km per km<sup>2</sup> in the USA, China and the UK.

The country has close to 13 major and 176 non-major ports. The total volume of traffic handled by the ports during 2010-11 was 850 million metric tonnes (MMT), out of which major ports handled traffic close to 570 MMT. The petroleum, oil and lubricants (POL) traffic handled during the same period was close to 180 MMT.

The trend for petroleum products has not changed much in the last five years. The production for middle distillates (kerosene, aviation turbine fuel, high speed diesel, light diesel oil, etc.) accounts for more than 50% of the total production, with light distillates (LPG, motor spirit, naphtha, etc.) accounting for 29% and heavy ends (furnace oil, low sulphur heavy stock, lube oil, bitumen, etc.) making up the remaining 19%.

However, these segments are witnessing the following trends:

- Increase in production of motor spirit, high speed diesel and aviation turbine fuel due to increase in demand from automotive and transport sector and a booming aviation sector
- Relative slowing of growth in naphtha production on account of substitution by natural gas
- Absolute reduction in kerosene production due to environmental concern
- Relative balancing out of demand factors (pull) and usage factors (push) to stabilised production trend for lube oil



Production of petroleum product (MMTPA)



Source: Petroleum statistics (MoPNG)

Import and export of crude oil and petroleum products In 2010-11, India imported about 80% of the total crude processed in its refineries requiring an outgo of 83 billion USD. During the same period, the country imported 17.3 MMT of petroleum products and exported 60 MMT of petroleum products. Earnings on account of export of petroleum products were to the tune of 36 billion USD.



### India pipeline transmission network and existing, under construction and proposed LNG terminals, 2012



# India's global foray

Indian companies have made significant overseas investments in all parts of the hydrocarbon value chain with bulk of the investments dollars being pumped into the E&P sector.

# ONGC Videsh Limited

ONGC Videsh Limited (OVL) is a wholly-owned subsidiary of ONGC. Over a period of time, OVL has grown to become the second-largest E&P company in India both in terms of oil production and oil and gas reserve holdings. Currently it operates 33 projects in 14 countries. Out of 33 projects, OVL is operator in 11 projects and joint operator in six projects.



Source: OVL Annual Report, 2010-11

# Reliance Industries Ltd

RIL has 13 blocks in its international conventional portfolio, amounting to a total acreage of over 99,145 km<sup>2</sup>.

RIL has invested in Gulf Africa Petroleum Corporation (GAPCO), which owns and operates storage facilities and a retail distribution network.

#### **RIL's overseas E&P assets**



Source: RIL's website

# GAIL (India) Ltd

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GAIL, the state-owned gas transportation and marketing company, has made overseas investments in the gas value chain.

> Investment through a WoS

- GAIL has formed GAIL Global (Singapore) Pte Ltd in Singapore for pursuing overseas business opportunities including LNG and petrochemical trading.
- GAIL has also established GAIL Global (USA) Inc in Texas, USA. The US subsidiary has acquired 20% working interest in an unincorporated joint venture with Carrizo Oil and Gas Inc in the Eagle Ford shale acreage in the state of Texas.
- In addition to having two wholly-owned subsidiaries in Singapore and USA, GAIL has a representative office in Cairo, Egypt to pursue business opportunities in Africa and Middle East.

Source: GAIL website

Essar Oil is part of the diversified Essar Group and has interests in both upstream and downstream hydrocarbon sector. Essar Group has invested in five overseas E&P assets. In the refining sector, it has taken 50% stake in the Kenya Petroleum Refineries Ltd (KPRL).

Other companies which have invested in overseas E&P assets include state-owned Gujarat State Petroleum Corporation, Videocon Industries Ltd and Bharat Petro Resources Ltd, which is a wholly-owned subsidiary of BPCL.

### Investment through parent company or JV route

- Direct investment as an equity partner in three retail gas companies in Egypt
- Direct investment as an equity partner in China Gas holdings ltd. (China Gas)-a retail gas company
- Direct investment as a 50-50 JV between GAIL and China Gas–GAIL China Gas Global Energy Holdings Ltd, registered in Bermuda, for pursuing gas sector opportunities in China
- Direct investment as part of consortium in two offshore E&P assets in Myanmar
- Direct investment as holder of PI in JV company – South East Asia Gas Pipeline Company Ltd

### Essar Oil Ltd

# Key players in the petroleum sector

The Indian hydrocarbons market has evolved over the years. From a largely NOC-dominated market it has gradually moved to a structure where both NOCs and private sector players are playing important roles. Among the domestic private sector players, Reliance Industries and Essar Oil have made significant contributions to the hydrocarbon sector both in the upstream and downstream segments. Notable foreign players include Cairn Energy, Shell, BP, BG, BHP Billiton, ENI, Santos and Niko. The NOCs include ONGC and OIL in the upstream sector and IOCL, BPCL, HPCL in the downstream sector. Out of the eight Indian companies appearing in the Fortune 500 list, five belong to the oil and gas sector. These include IOCL, RIL (both in Fortune 100), BPCL, HPCL and ONGC.



# **Opportunities in the Indian hydrocarbon sector**

Given the energy demand of a fast-growing nation such as India, there are plenty of opportunities in the hydrocarbon space. The current regulatory framework in place duly supports the market conditions and provides an environment suitable for investment and participation.

### Opportunities in the E&P sector

- Conventional
- The Indian sedimentary basins are largely unexplored or poorly explored, which indicates that there is a potential for large hydrocarbon discoveries. The next bidding round will be soon rolled out providing opportunities to investors to participate in India's E&P sector.
- The deepwater areas remain untapped owing to technological challenges. This creates opportunities for strategic investors possessing relevant technical expertise to invest in the country through partnerships with local public and private sector companies.
- The Indian companies are pursuing overseas E&P opportunities to pick equity oil or strategic stakes in unconventional acreages to acquire technology and expertise for similar developments back home.

#### Unconventional

- Given the substantial coal resources, the country boasts of significant CBM potential. The CBM policy introduced by the government encourages investment and provides favourable investment climate.
- The draft policy on shale gas licencing has been circulated to various industry members. The government proposes to conduct the first licensing round in 2013.
- The underground coal gasification (UCG) has been notified as one of the end uses under the Indian government's captive mining policy.

#### Services

- Considering the country's energy security agenda and the need to boost domestic hydrocarbon supplies, India offers a plethora of opportunities to the services industry and to equipment suppliers of the E&P industry.
- Companies, including ONGC and OIL, are giving emphasis to improve recovery factor from their existing producing fields and are investing heavily in increased oil recovery (IOR) and enhanced oil recovery (EOR) techniques.



### Opportunities in the refining, marketing and pipelines sector

#### Refining

- Besides emerging as a refining hub, the country is developing value-added products such as petrochemicals in an integrated manner. The increased refining capacity provides opportunities to strategic investors, technology licencors, service providers, equipment suppliers and EPC contractors.
- Most of the existing refineries in India are old and need massive investments to make them compliant with the stringent fuel emissions norms introduced in the country.
- The country is proposing to set up at least three petroleum, chemicals and petrochemicals investment regions (PCPIR). In the PCPIR policy, the government will facilitate investment (through fiscal incentives) in industries which fall in the downstream of a refinery. Therefore, the latter will serve as the anchor, and the downstream industry will be set up (including petrochemicals) to gain from the value addition.

#### Pipelines and storage infrastructure

- Refinery capacity additions will require the setting up of new crude and product pipelines in India or capacity augmentation of the existing ones.
- India realises the need for strategic crude oil storage given the global events that have unfolded in the last decade. The country has decided to build up a strategic inventory of crude oil and is in the process of creating necessary infrastructure for storage. The underground cavern storages are being planned in at least three locations across the country.

#### Marketing

• The state-run oil marketing companies continue to expand their marketing and retail infrastructure necessitating the development of the required infrastructure including storage depots, supply chain linkages and retail stations infrastructure.





### Opportunities in the gas and LNG sector

#### Infrastructure

- Large domestic natural gas discoveries as well as addition in LNG import capacity have necessitated the development of gas pipeline infrastructure. The PNGRB has approved the laying of a number of gas pipelines providing a significant opportunity for strategic investors as well as service providers and equipment suppliers.
- A decline in the domestic gas supply coupled with increase in gas demand has created opportunities for developing LNG import facilities in the country, providing opportunities to investors, service providers, equipment suppliers and EPC contractors.
- The Indian government is promoting gas distribution in urban cities and prioritising its allocation. The development of city gas distribution (CGD) projects provides gas to retail consumers and opens up a large market for gas-based equipment (previously non-existent in India), e.g. compressed natural gas (CNG) kits for automobiles, gasbased water heaters in homes, etc.

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