



OIL & GAS

December 2008

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PROFILE OF THE INDIAN OIL & GAS SECTOR

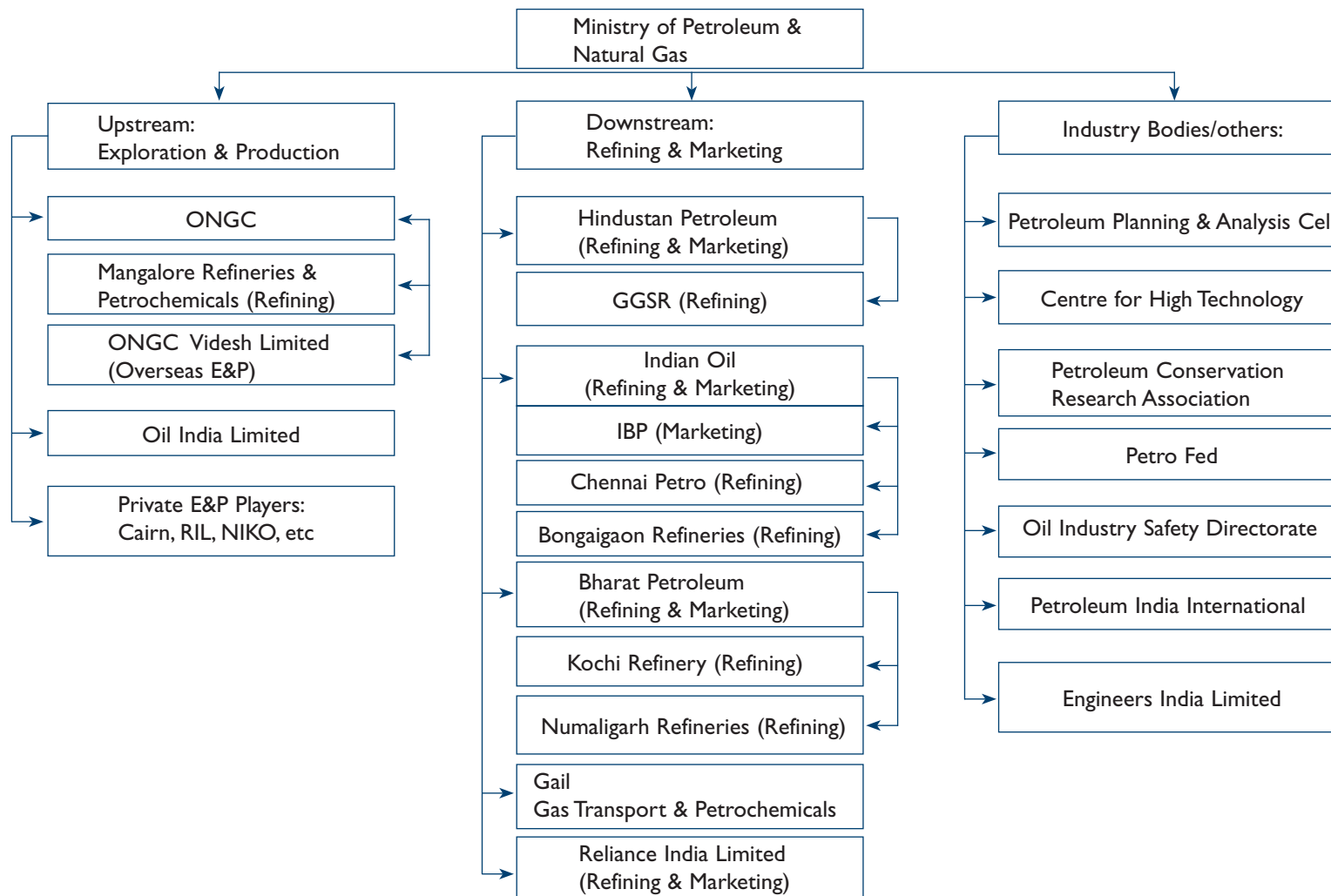
Oil & Gas sector has a long history in India

- Oil struck at Makum near Margherita in Assam in 1867
- First commercial oil discovery in Digboi in 1889
- Systematic E&P in 1899 after Assam Oil Company formed
- 1947 India's domestic oil production just 250,000 tonnes per annum
- 1954 IPR - petroleum to be core sector
- 1955 – ONGC set up
- 1958 - First Gas & Oil pool discovered in Jwalamukhi (Punjab) and Cambay. Oil India Limited (OIL) was set up
- Discovery of giant Bombay High field in 1974 – Western offshore highest producer
- 1991 – Liberalized petroleum exploitation and exploration policy

Oil & Gas sector has a long history in India

- 1991-1994 – 4th, 5th, 6th, 7th and 8th Rounds of exploration bidding
- 1999 New Exploration Licensing Policy (NELP)
- 2000 – NELP II
- 2002 – NELP III
- 2003 – NELP IV
- 2004 – NELPV
- 2006 – NELPVI
- 2007 – NELPVII

Institutional arrangements



India has significant oil and gas reserves

Sedimentary Area

- 3.14 Million Sq. Km (four per cent of the world's sedimentary area)

Sedimentary Basins

- 26 (Exploration initiated in 15)

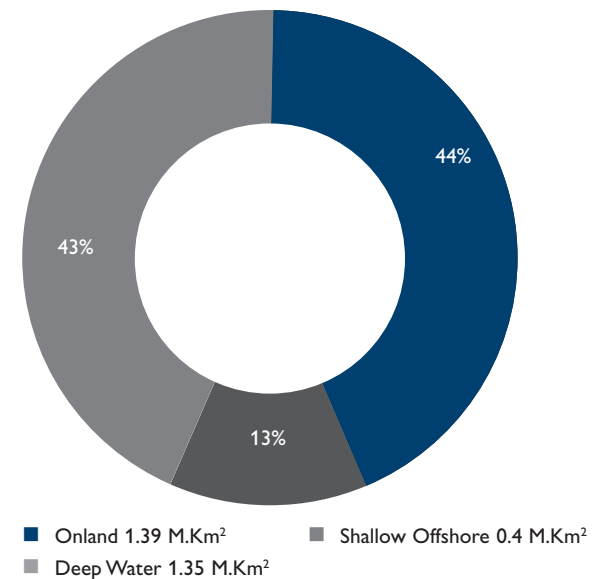
Prognosticated Resources (O+OEG)

- 205 Billion Barrels (For 15 Basins only; needs up-gradation)

Established reserves

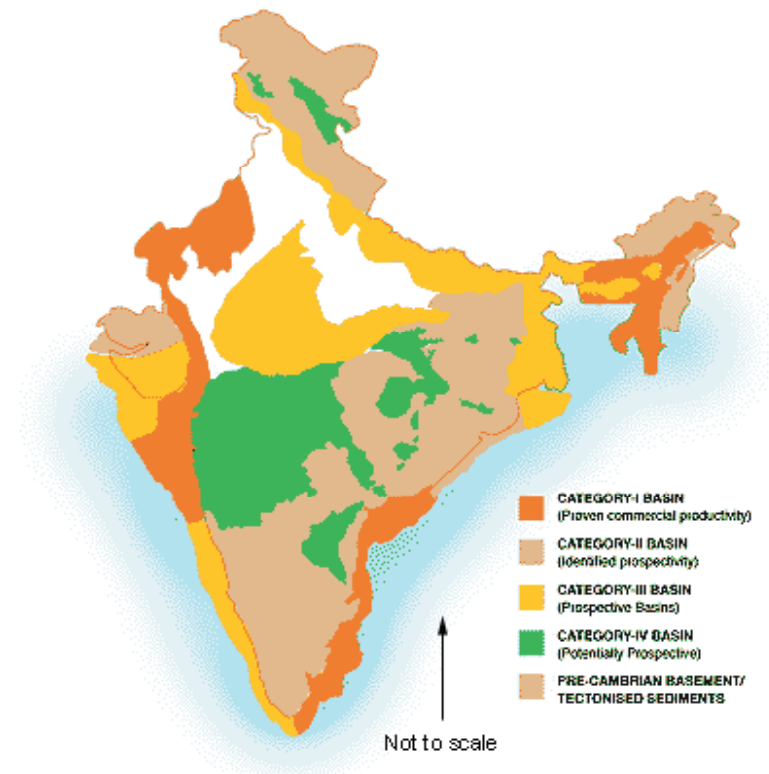
- 65 Billion Barrels (as of April 1,2008)

India's Oil & Gas Reserves



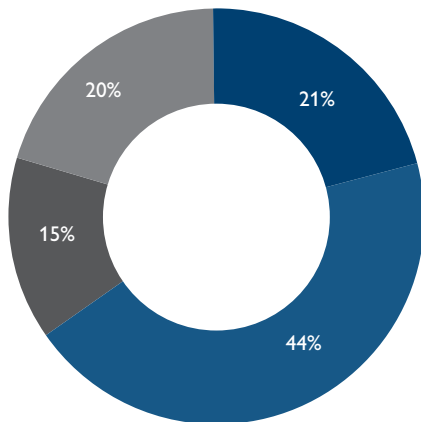
Sedimentary basin distribution

The sedimentary basins of India, onland and offshore up to the 200m isobaths, have an areal extent of about 1.79 million Sq.km. So far, 26 basins have been recognized and they have been divided into four categories based on their degree of prospectively as presently known. In the deep waters beyond the 200m isobaths, the sedimentary area has been estimated to be about 1.35 million Sq.km. The total, thus works out to be 3.14 million Sq.km.



Just over 60% of potential in oil sector has been explored so far

Status of exploration in India



■ Poorly explored ■ Exploration initiated
■ Unexplored ■ Moderate explored

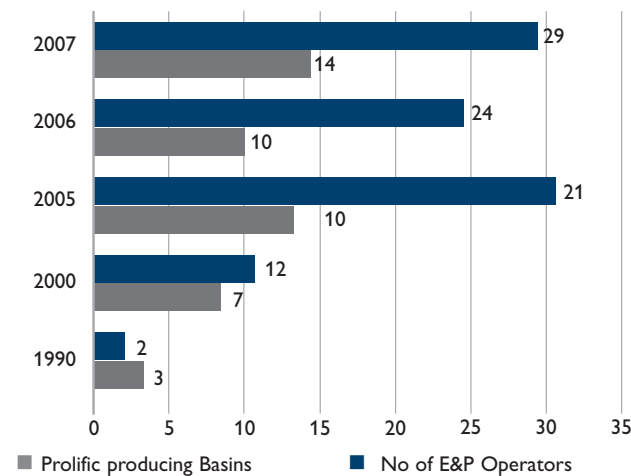
Extensive discoveries have been made in recent years

	Pre-NELP (1993–2006)–13 Yrs.	NELP- I, II & III, IV,V (2000-06)-6 Yrs.
2D Seismic Survey (LKM)	24,091	1,09,305
3D Seismic Survey (SKM)	5,304	67,773
Exploratory Wells (No.)	167	93
PSC Blocks	28	138
No. of Discoveries (Up to 15-04-2007)	25	40
Investment made on Exploration (US\$ MM)	781.65	1451.18

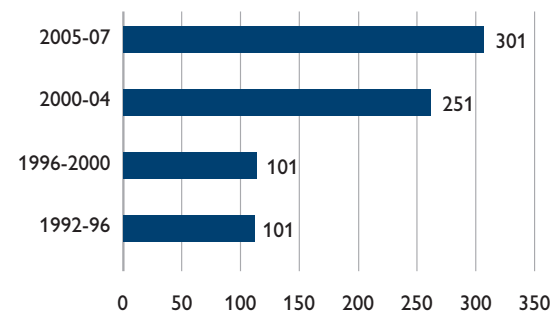
Exploration status by basin and E&P operators

- The total number of significant discoveries made during the past five years now stands at 97. The most noteworthy of these discoveries are located in the offshore east coast basins of Krishna-Godavari and Mahanadi-NEC basins; Western offshore and onland in the Rajasthan, Cambay and Assam-Arakan basins

Exploration status by Basin and E&P operators



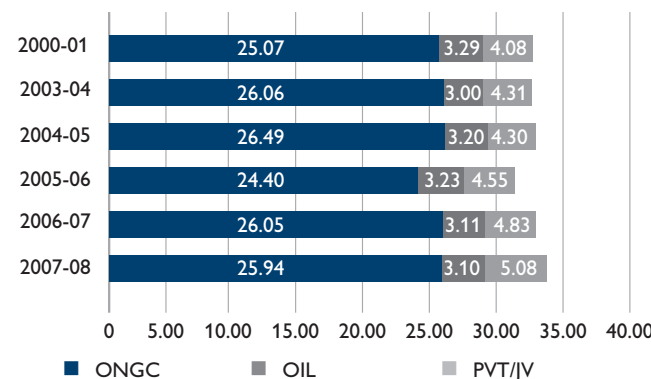
Average Annual inplace reserves accretion in MMT (O+OEG)



Annual crude oil production (MMT)

- Total production of crude oil during 2007-08 is 34.12 MMT
- Contribution from Pvt./JV small, medium and discovered fields during the year is 5.08MMT of oil which accounts for about 15 per cent of the national oil production.

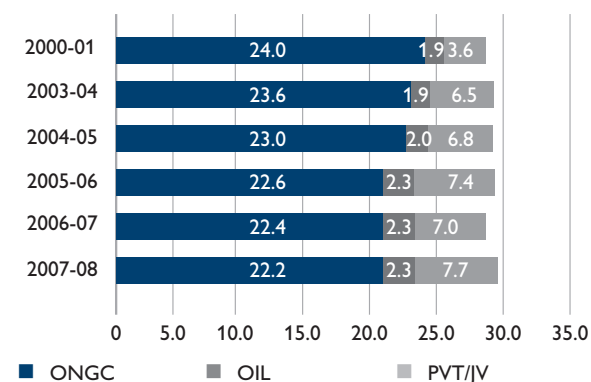
Annual crude oil production (MMT)



Annual gas production (BCM)

- Total production of natural gas in 2007-08 is 32.3 BCM
- Contribution from Pvt./JV small, medium and discovered fields during the year is 7.727 BCM of gas, which accounts for about 24 per cent of the national gas production.

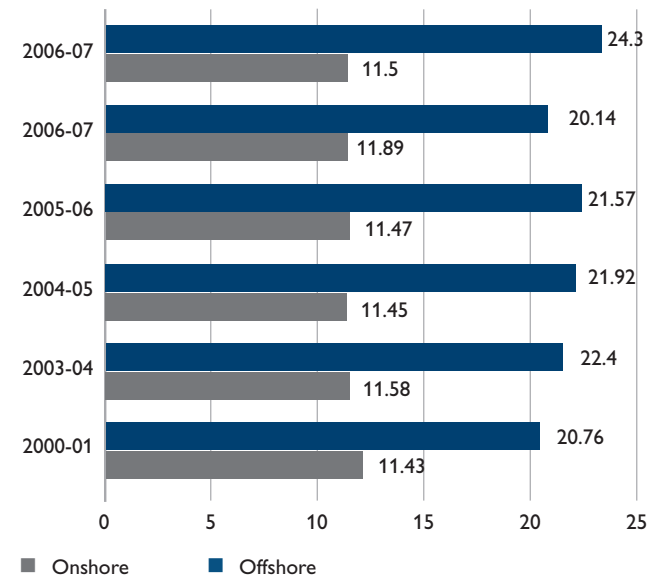
Annual gas production (BCM)



Annual crude production by off and onshore operations

- Annual crude oil production ratio of off-to-onshore operations has largely remained static

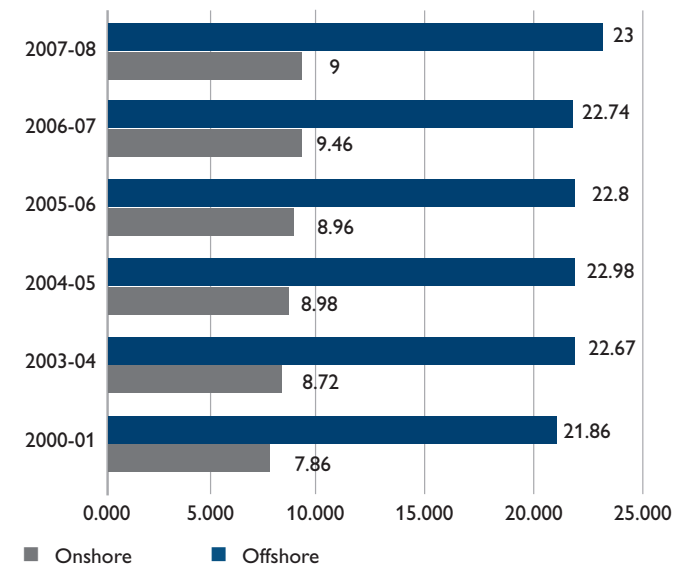
Annual crude production in MMT



Annual gas production (BCM) by off and onshore operations

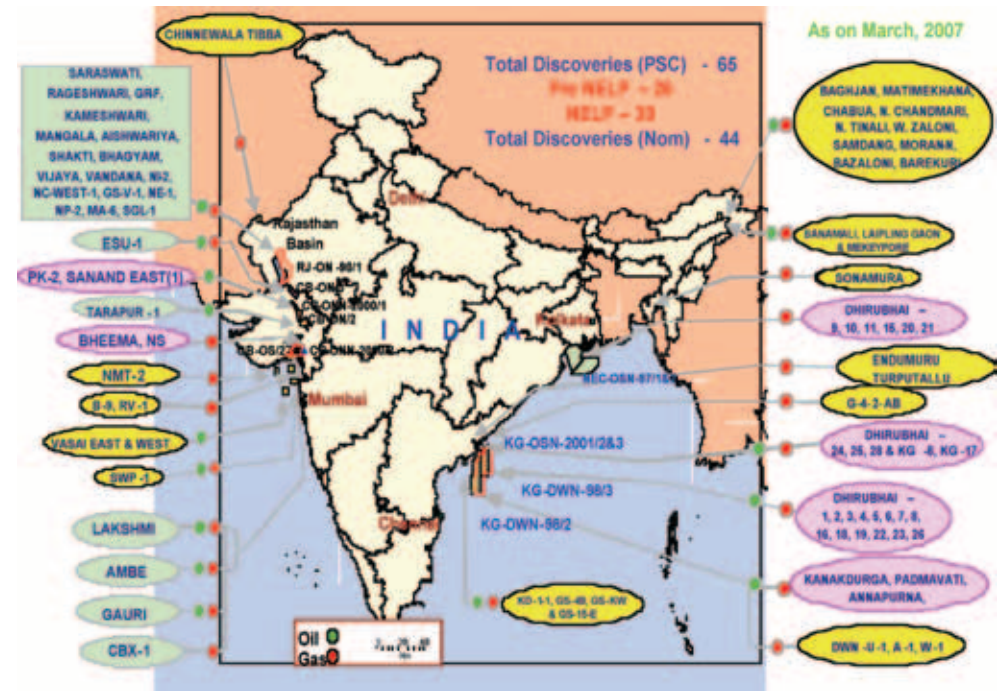
- Likewise, annual gas production ratio of off to onshore operations has also largely remained static

Annual gas production (BCM)



Significant discoveries – 2000 to 2007

- Last seven years have seen significant discoveries of oil and gas, largely due to liberalised exploration regimes



Refining activity has been steadily growing

- 19 refineries: 17 in Public Sector, 2 in Private Sector
- Capacity had grown from 62 MMT in April 1998 to 149 MMT in Jan 2007
- Refining capacity expected to reach 235 MMT by April 2012
- Surplus refining capacity of 86 MMT projected in 2011-12
- Large export potential

	Refining capacity MMT
April 1998	62.2
April 2001	114.6
April 2004	127.0
April 2005	127.4
April 2006	132.5
April 2007	149.0
April 2012 (Forecast)	235.0

Most of it is in public sector, with Reliance Petroleum as a major player in the private sector

- In the liberalised scenario, the Gol has opened the refining sector to “Joint Sector” as well as to the private sector for achieving faster growth
- About 53.49 MTPA additional capacity is planned to come up under PSUs between 2008-2012.
- Under joint venture, 24 MTPA capacity will be added between 2008-2012 by private players.

Playerwise details (As on)

'000 Tonnes

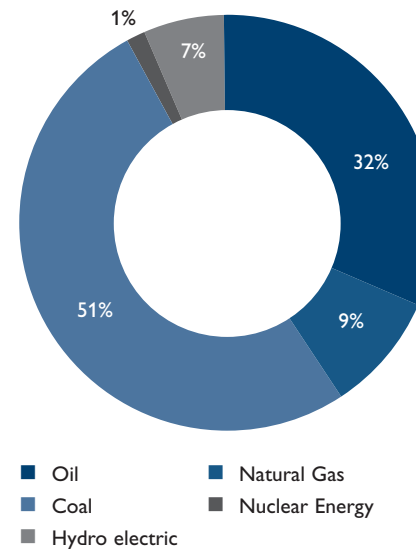
	Installed capacity	Refinery crude throughput
Public sector		
IOCL	47,350	47,401
BPCL	12,000	12,746
HPCL	13,000	16,818
KRL	7,500	8,134
CPCL	10,500	10,266
BRPL	2,350	2,020
NRL	3,000	2,568
ONGC	78	63
MRPL	9,690	12,525
Private sector		
Reliance	33,000	36,931
Essar	10500	6,631

Source: Ministry of Petroleum

Energy consumption mix in India

- India still largely remains dependant upon coal and oil
- The growth in demand is projected to catapult the overall demand to 196 MMT in 2011-12 and 250 MMT in 2024-25
- Growing demand-supply gap has led the Indian government to open up exploration and production to private participants through NELP and develop a more holistic strategy for acquisition of equity oil abroad

Energy consumption mix in India



Growth in consumption of petroleum products has been encouraging

- The consumption growth has slowed down in the last few years because of substitution of naphtha by Liquefied Natural Gas
- According to the estimates by the Integrated Energy Policy Report, Planning Commission of India, 2006, the total energy requirement (including oil, gas, coal, nuclear and hydro energy sources) in the country by 2032 would be 1,651 million tonnes of oil equivalent (MTOE). This assumes a eight per cent GDP growth rate through 2032

Year	Consumption MTPA
1980-81	30.9
1984-85	38.8
1989-90	54.1
1996-97	79.2
2001-02	100.4
2002-03	104.1
2003-04	107.7
2004-05	111.6
2005-06	111.9
2006-07	117.5
2007-08	131.01

* Estimated

Source: PPAC, Ministry of Petroleum and Natural Gas

The demand – supply gap has been increasing

- Oil comprises about 33 per cent of India’s primary energy consumption at present
- Growth in demand is projected to catapult the overall demand to 199 MMT in 2011-12 and 376 MMT in 2024-25
- Likewise, demand for NG i.e. Natural Gas (at more than 231 mmscmd) in the country has far outstripped supply (about 95 mmscmd), and there has an increasing trend towards emergence of new NG demand as well as conversion from existing fuels to NG

Year	Crude oil MMT		
	Demand	Supply	Gap
2001-02	99.70	32.03	67.67
2002-03	114.30	33.05	81.25
2005-06	140.00	33.98	106.02
2011-12	199.60	33.47	166.13
2024-25	376.50	61.4	315.1

Year	Natural gas (MMSCMD)		
	Demand	Supply	Gap
2001-02	151.00	81.40	69.60
2006-07	231.00	94.84	136.16
2011-12	313.00	158.05	154.95
2024-25	391.00	170.00	221.00

Alternative fuels scenario

Coal Bed Methane (CBM)

- Methane trapped in coal seams. 26 blocks awarded in three rounds of bidding. Production potential of over 25 MMSCMD

Underground Coal Gasification (UCG)

- Huge potential in India to get natural gas through UCG. ONGC has signed agreement with Sckochinsky Institute of Mining, Russia to harness world class technology to tap this energy source

Gas Hydrates

- National Gas Hydrate Programme and Steering Committee in place

Alternative fuels scenario

- Agreement on Collaborative Research on drilling of experimental wells with USA, Canada and Japan
- Road map for gas hydrates is in place

Ethanol Blended Petrol

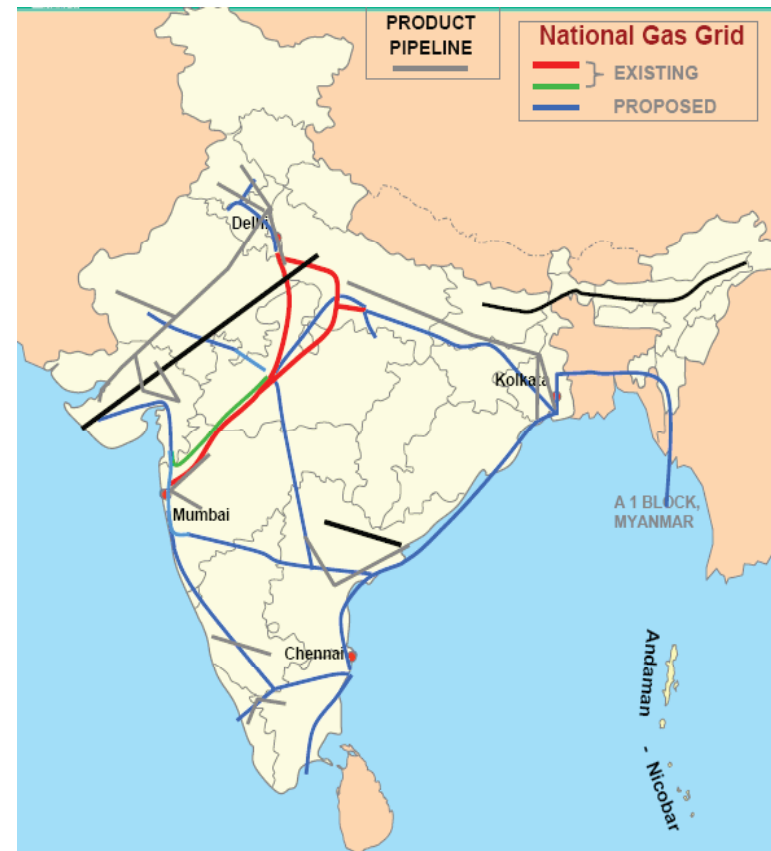
- Marketing of petrol with up to 5 per cent ethanol blending being undertaken. Percentage of ethanol in petrol is proposed to be increased to 10 per cent in future

Bio-Diesel

- Government has already decided to introduce five per cent blended bio-diesel

Extensive distribution & marketing networks

- Petroleum products marketing largely done by four PSUs: IOC, HP, BPCL, and IBP
- Extensive retail network – over 16000 outlets, 6000 kerosene agencies and 5000 LPG distributorships
- Requirements of industrial units met through direct supplies
- National Gas Grid planned
- Approximate movement - railways – 40 per cent; pipelines – 30 per cent; coastal tankers – 12 per cent; balance by road



Key issues confronting the sector

- Absence of statutory framework in the upstream industry
- Incidence of cross subsidy due to social obligations
- Domestic reserves/production will not be sufficient
- Cross-border gas pipelines facing uncertainty, but attracting interest
- Inability to take international prices

POLICY & REGULATION

Policy regimes favourable for investments

- Refinery sector delicensed in 1998
- New Exploration Licensing Policy (NELP) announced by Govt. in the year 1999
- Administered Pricing Mechanism (APM) dismantled from April 2002
- Marketing of transport fuels (Petrol, Diesel & Aviation Fuel) is now permitted subject to meeting minimum investment of about US\$ 0.44 billion in oil and gas sector

Policy regimes favourable for investments

- 100 per cent FDI is permitted in Exploration, Refining, Pipelines (both petroleum products & gas) & Marketing
- Six rounds of NELP (I to VI) completed
- Over 150 exploration blocks awarded under five rounds of NELP to domestic and foreign private companies
- Investment commitment of more than US\$ 12 billion

Long-term policy directions are favourable

- Planning Commission report on Integrated Energy Policy in August 2006
- Oil and gas are expected to be the key drivers of energy consumption growth
- Faster exploration of entire domestic sedimentary basins to augment domestic availability of oil and gas
- Improvement in oil and gas recovery levels
- Acquisition of equity oil and gas abroad

Long-term policy directions are favourable

- Exploitation of alternative fuel sources such as CBM, Gas Hydrates, Hydrogen fuel cell and blending of bio-fuels
- Improvement in energy efficiency and conservation
- Maintenance of strategic reserves in oil and petroleum
- Products
- Protection of Environment

New downstream regulatory regime introduced in 2006

- New regulatory regime – The petroleum and Natural Gas Regulatory Board Act, 2006 to regulate activities in the downstream oil and gas sector
- Board consisting of Chairperson and four members constituted
- Bench consisting of Member (Legal) and another member of the Board to decide on settlement of disputes between parties
- Appeals against order or decision made by Board will be considered by Appellate Tribunal established under Electricity Act, 2003
- Board and Appellate Tribunal shall exercise powers and authority of a Civil Court

Key functions of Regulatory Board

In the case of city or local natural gas distribution network :-

- Decide on the period of exclusivity for building and operating the network.

In the case of petroleum, petroleum products and natural gas :-

- Ensure availability
- Monitor prices and transportation rates to check restrictive trade practices
- Secure equitable distribution
- Enforce retail service obligations for retail outlets and marketing service obligations for entities

Key functions of Regulatory Board

- Lay down technical standards including safety standards for pipelines and other infrastructure projects
- Affiliate code of conduct for an entity combining both pipeline and marketing activities in natural gas, which may require separation of ownership and management of above

Evolution of upstream regulatory regime

- The Oil Fields (Regulation and Development) Act, 1948 and the Petroleum and Natural Gas Rules, 1959 made by Gol provide regulatory framework for domestic exploration and production of Oil & Gas
- April 1993 – Directorate General of Hydrocarbons (DGH) set up under administrative control of the MoPNG to promote sound management of domestic oil and gas resources keeping in view the environmental safety, technological and economic aspects of upstream activities
- September 2006 – Gol designated DGH as the authority or agency under the 1948 Act to exercise statutory powers to carry out its functions

OPPORTUNITIES IN THE INDIAN OIL & GAS SECTOR

Various opportunities in the oil and gas sector

Oil

- Investments under NELP
- Destination India as refining hub
- Increased investment in fuel quality upgradations
- Building strategic petroleum reserve through public private partnership
- Acquisition of overseas oil assets
- Competition in the downstream (retail and institutional) segment

Gas

- Domestic exploration of NG, development of Liquefied Natural Gas (LNG) markets
- Coal Bed Methane (CBM), Underground Coal Gasification, Gas Hydrates
- Development of National Gas Grid

Private & foreign investments are on the rise

- Many Indian private sector players (RIL, PetroNet, Essar, etc)
- Under seven rounds of NELP, 212 blocks were awarded, of which 56 blocks went to private companies & JVs
- International players and approx. investments in India: Cairn Energy Plc – over US\$ one billion, British Gas - over US\$ 800 million, Shell - US\$ 650 million, BP - US\$ 444 million
- Other global players with India operations - Total, Exxon Mobil, Gaz De France, and Chevron

Foreign (FII) holdings in select Indian Oil & Gas companies

	31 March 2001	31 March 2002	31 March 2003	31 March 2004	31 March 2005	31 March 2006	31 March 2007
Reliance	24.50	25.34	21.41	29.62	30.93	26.70%	23.70%
ONGC	0.22	0.17	0.46	6.18	8.13	8.5%	8.5%
Gail India	16.61	16.09	14.1	17.72	21.47	23.59%	23.59%
Essar Oil	16.68	22.18	22.19	22.45	70.59	77.93%	74.93%
Indian Oil	0.04	0.02	0.17	1.05	1.92	1.95	1.95
BPCL	15.43	14.36	10.29	15.37	14.83	17.5%	17.5%
HPCL	12.86	13.43	10.53	20.03	22.06	23.57%	21.57%

Private/JV operations have been increasing

PEL& ML areas as on 01.06.1996



PEL& ML areas as on 01.04.2006



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