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OIL & GAS

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The focus of this presentation is to discuss…

- Profile of Indian oil and gas sector
- Policies and regulations
- Opportunities in the Indian oil and gas sector

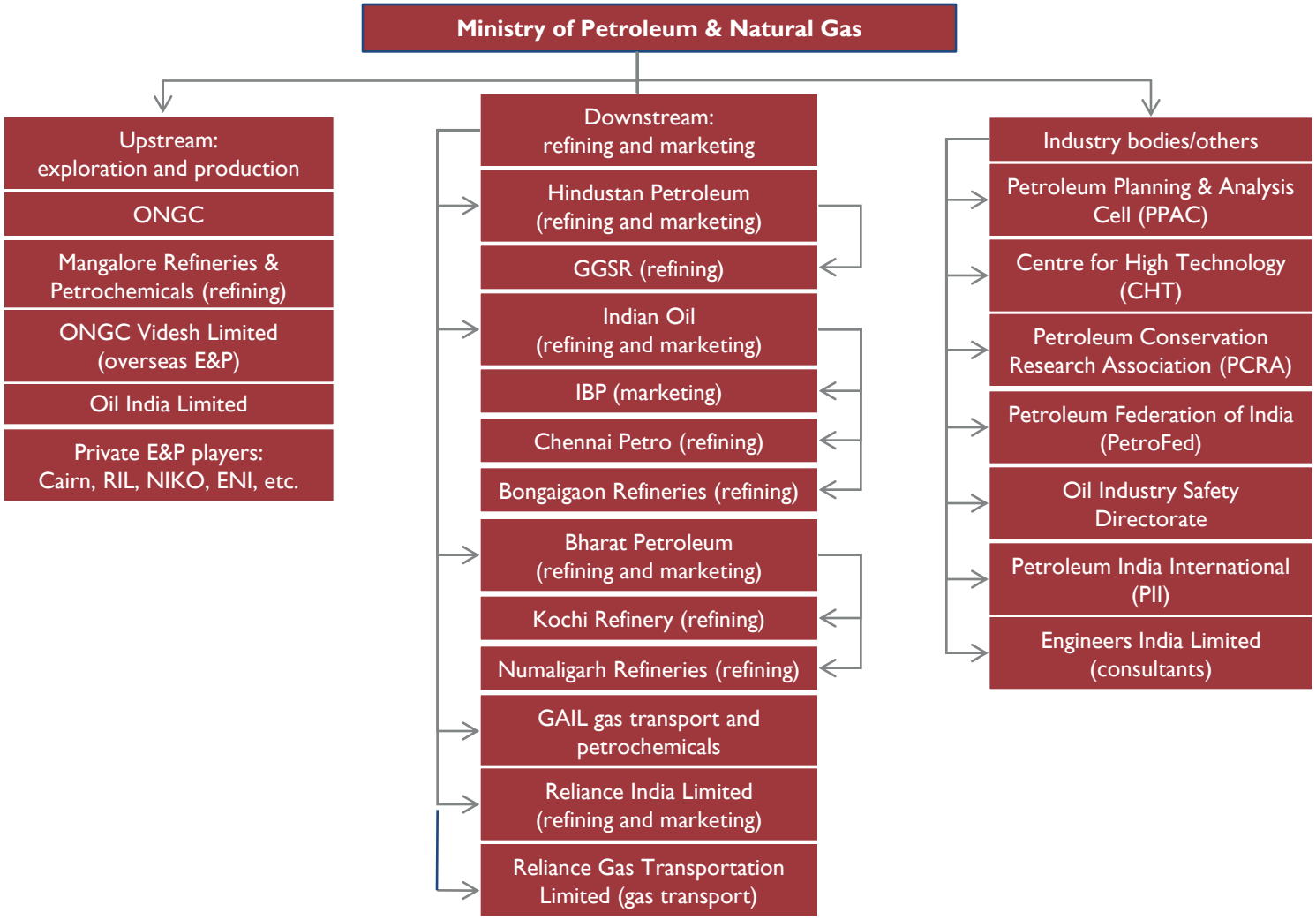
The oil and gas sector has a long history in India … (1/2)

- Oil struck at Makum near Margherita in Assam in 1867
- First commercial oil discovery in Digboi in 1889
- Systematic exploration and production (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 – Oil and Natural Gas Corporation Limited (ONGC) set up
- 1958 — First gas and oil pool discovered in Jwalamukhi (Himachal Pradesh) and Cambay; Oil India Limited (OIL) set up
- Discovery of Bombay High field in 1974 – Western Offshore highest producer
- 1991 — Liberalised petroleum exploitation and exploration policy

The oil and gas sector has a long history in India … (2/2)

- 1991–94 — 4th, 5th, 6th, 7th and 8th rounds of pre-NELP exploration bidding
- 1999 – New Exploration Licensing Policy (NELP)
- 2000 – NELP II
- 2002 – NELP III
- 2003 – NELP IV
- 2004 – NELP V
- 2006 – NELP VI
- 2007 – NELP VII
- 2009 – NELP VIII

The sector has a multi-tier institutional arrangement



India has significant oil and gas reserves

Sedimentary area

- 3.14 million sq km (approximately 4 per cent of the world's sedimentary area)

Sedimentary basins

- 26 (exploration initiated in 15)

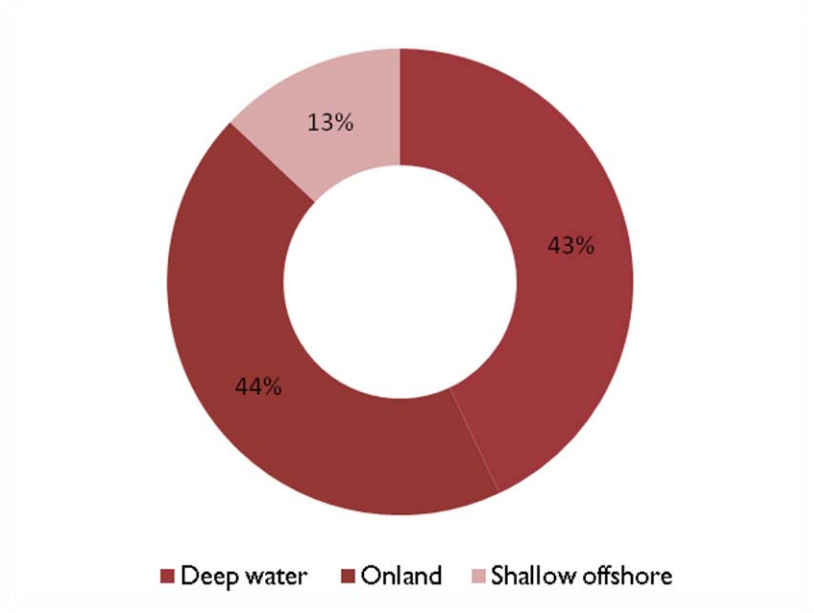
Prognosticated resources

- 205 billion barrel (for 18 basins only)

Established reserves

- 70 billion barrel (as of April 1, 2009)

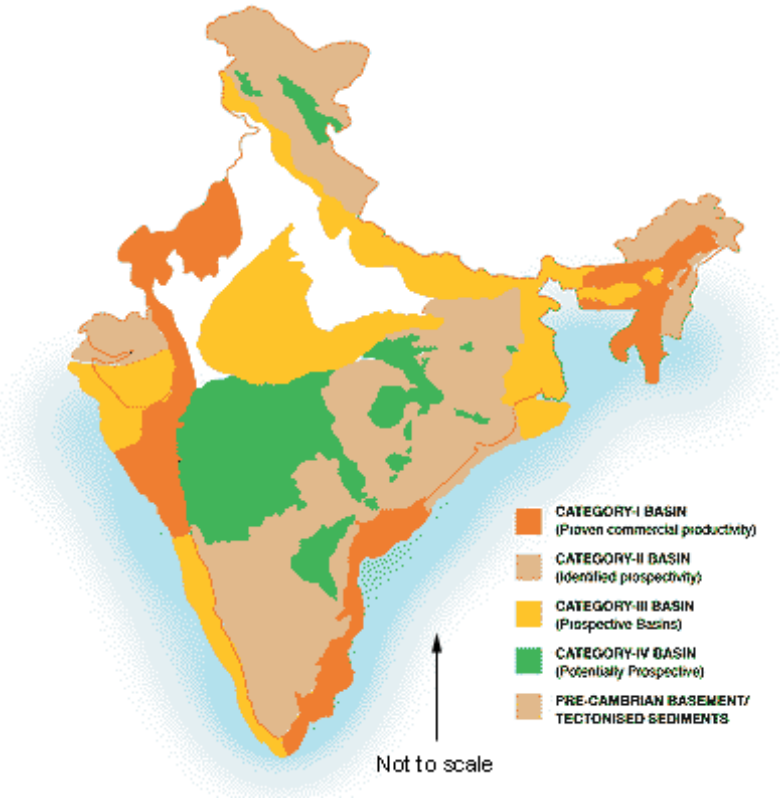
India's oil and gas reserves



Source: Directorate General of Hydrocarbons (DGH)

Sedimentary basin distribution

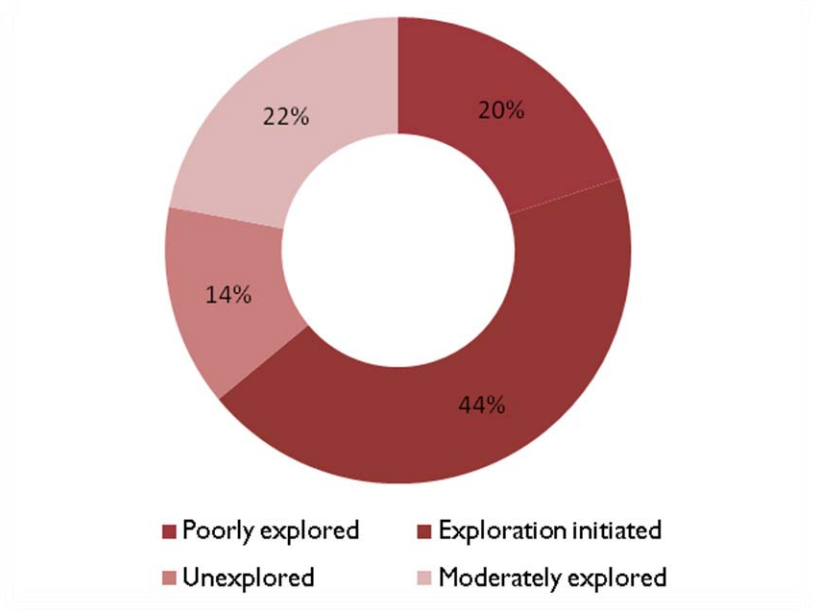
As of April 2009, the sedimentary basins of India, onland and offshore up to the 200 m isobaths, had an areal extent of about 1.79 million sq. km. So far, 26 basins have been recognised and they have been divided into four categories based on their degree of prospectibility as presently known. In the deep waters beyond the 200 m 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.



Source: Directorate General of Hydrocarbons (DGH)

Just over 60 per cent of the potential in oil sector has been explored so far

Status of exploration in India



Source: Directorate General of Hydrocarbons (DGH), April 2009

Extensive discoveries have been made in recent years

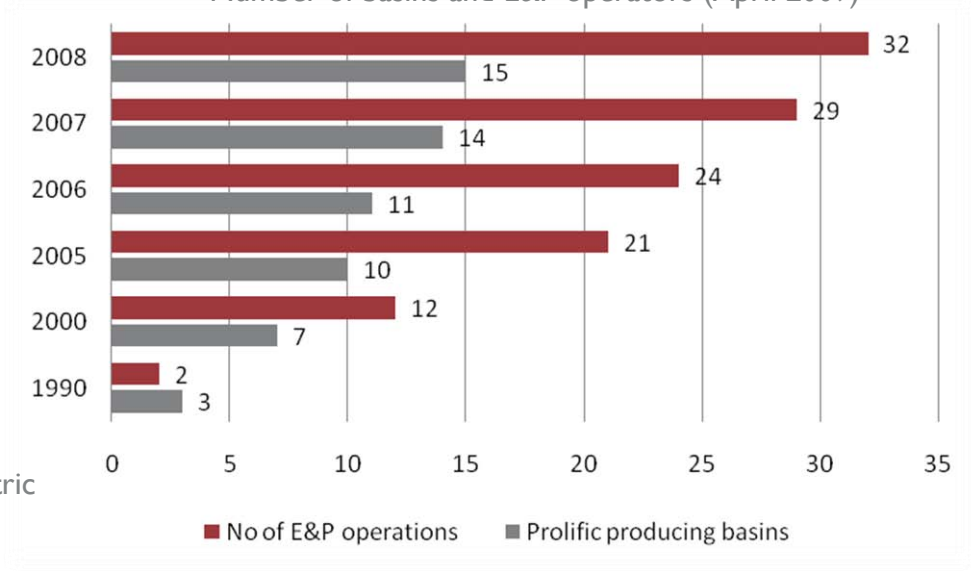
	Pre-NELP (1993–2006)	NELP-I, II & III, IV,V,VI,VII (2000–08)
2D seismic survey (LKM)	24,091	109,305
3D seismic survey (SKM)	5,304	67,773
Exploratory wells (no.)	167	199 (until NELP-V)
Development wells (no.)		313 (until NELP-IV)
PSC blocks	28	149
No. of discoveries (up to April 15, 2009)	25	180
Investment made in exploration (US$ million)	781.65	1,823.17

Source: Directorate General of Hydrocarbons (DGH), April 2009

Exploration status by basin and E&P operators

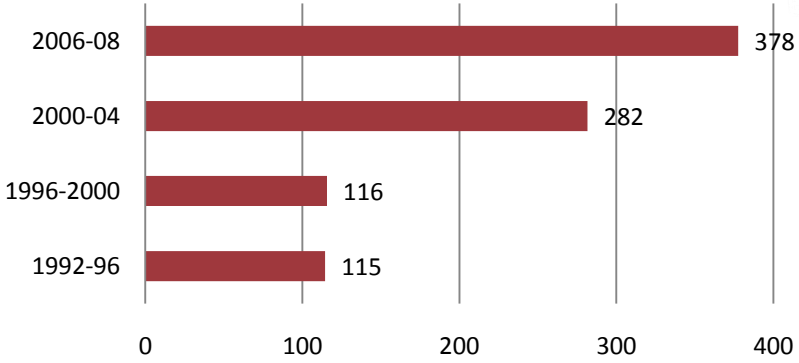
- The total number of significant discoveries made during the last eight years now stands at 118. The most noteworthy of these discoveries are located in the offshore east coast basins of Krishna-Godavari and Mahanadi-NEC basins; Western offshore and onland in the Rajasthan, Cambay and onland Assam-Arakan basins.

Number of basins and E&P operators (April 2009)



Source: Directorate General of Hydrocarbons (DGH)

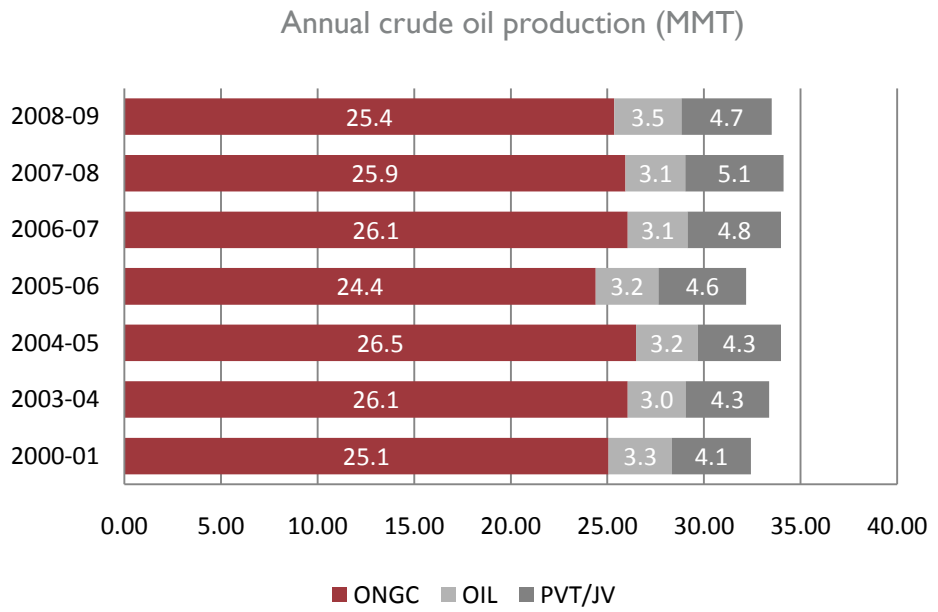
Average annual in-place reserves accretion in million metric tonnes (MMT) in April 2009



Source: Directorate General of Hydrocarbons (DGH)

Annual crude oil production

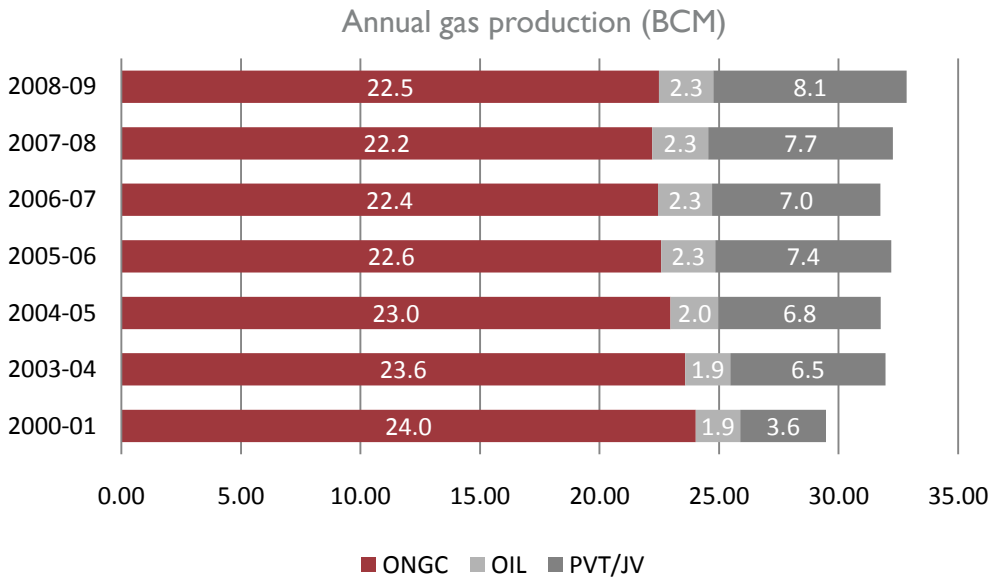
- Total production of crude oil during 2008–09 was 33.50 MMT.
- Contribution from private/joint venture (JV) small, medium and discovered fields during the year was 4.67 MMT of oil, which accounted for about 14 per cent of the national oil production.



Source: Ministry of Petroleum and Natural Gas

Steady annual gas production

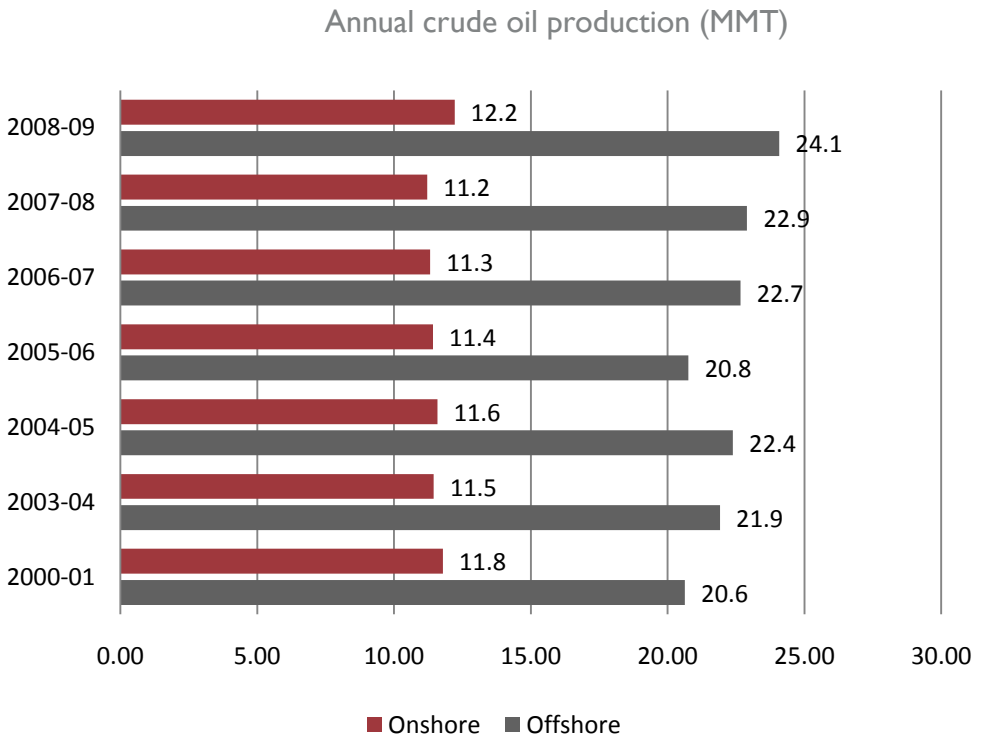
- The total production of natural gas in 2008–09 was 32.85 billion cubic metres (BCM).
- Contribution from private/JV small, medium and discovered fields during the year was 8.09 BCM of gas, which accounted for about 25 per cent of the national gas production.



Source: Ministry of Petroleum and Natural Gas

Annual crude production by offshore and onshore operations

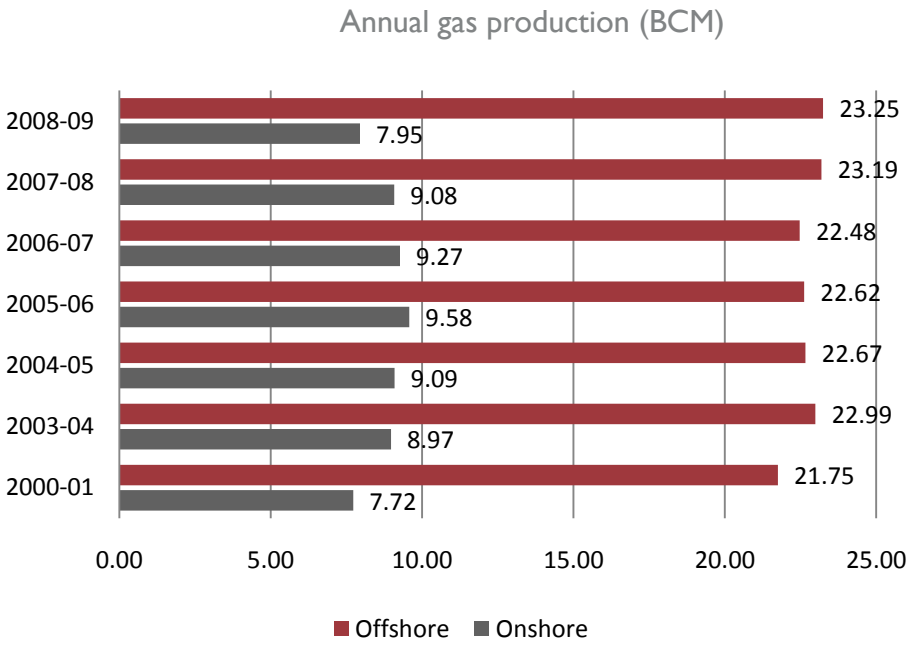
- The annual crude oil production ratio of offshore to onshore operations has largely remained static.



Source: Ministry of Petroleum and Natural Gas

Annual gas production by offshore and onshore operations

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



Source: Ministry of Petroleum and Natural Gas

Refining activity has been growing steadily

- 19 refineries: 17 in public sector, two in private sector
- Capacity has grown from 62 MMT in April 1998 to 149 MMT in January 2008
- Refining capacity expected to reach 235 MMT by April 2012
- Surplus refining capacity of 86 MMT projected in 2011–12
- Large export potential of refined crude oil products

India's refining capacity

Year	Refining capacity in 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 2008	149.0
April 2012 (forecast)	235.0

Source: Ministry of Petroleum and Natural Gas

Most of it is in the public sector; Reliance Petroleum is the major player in the private sector

- In the liberalised scenario, the Government of India (GoI) has opened the refining sector to the private sector for achieving faster growth.
- About 53.49 million tonnes per annum (MTPA) additional capacity is planned to come up under public sector units (PSUs) between 2008–2012.
- Under joint ventures, 24 MTPA capacity will be added between 2008 and 2012 by private players.

Player-wise details (as of April 2009)

	Installed capacity (thousand tonnes)	Capacity utilisation (per cent)
Public sector		
IOCL	49,700	103.92
BPCL	19,500	102.57
HPCL	13,000	121.59
CPCL	10,500	96.53
NRL	3,000	75.03
ONGC	78	107.69
MRPL	9,690	129.79
BRPL	2,350	92.04
Private sector		
RIL	62,000	107.99
Essar	10,500	122.98

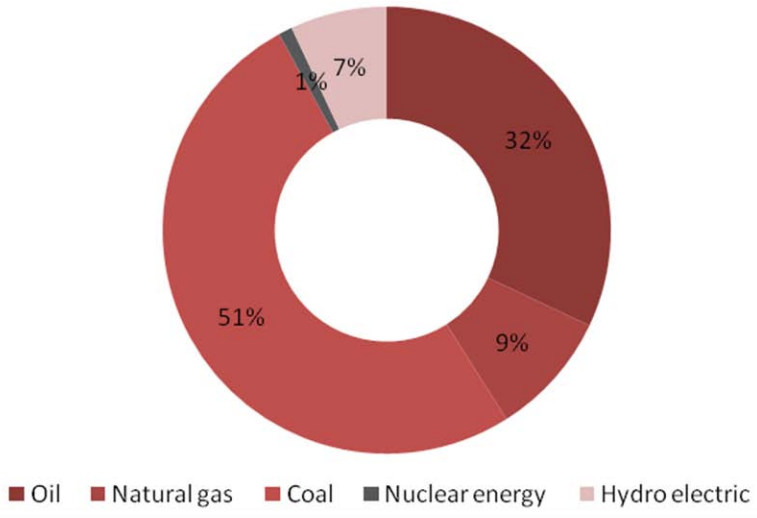
Source: Ministry of Petroleum and Natural Gas

Energy consumption mix in India

- India is still largely dependant upon coal and oil for its energy needs.

- The 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 (April 2009)



Source: Ministry of Petroleum and Natural Gas

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 (LNG).

- According to estimates of 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 an 8 per cent GDP growth rate through 2032.

Year	Consumption (MTPA)
1991–92	56.37
1992–93	58.90
1993–94	61.54
1994–95	67.45
1995–96	74.67
1996–97	79.17
1997–98	84.29
1998–99	90.56
1999–2000	97.09
2000–01	100.08
2001–02	100.43
2002–03	104.13
2003–04	107.75
2004–05	111.63
2005–06	113.21
2006–07	120.75
2007–08	128.95
2008–09 (P)	133.40

Source: PPAC, Ministry of Petroleum and Natural Gas
P = Projected

The demand-supply gap has been increasing

- Oil comprises about 33 per cent of India's primary energy consumption at present.
- As per estimations of the integrated energy policy, 2006 growth in demand is projected to catapult overall demand to 196 MMT in 2011–12 and 250 MMT in 2024–25.
- Likewise, demand for natural gas (NG), at more than 120 million metric standard cubic metres per day (MMSCMD) in the country has far outstripped supply (about 75 MMSCMD), and there is an increasing trend towards emergence of new natural gas demand, as well as conversion from existing fuels to natural gas.

Crude oil (MMT)

Year	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 (F)*	199.60	33.47	166.13
2024–25 (F)*	376.50	61.40	315.10

Source: Ministry of Petroleum and Natural Gas; F=Forecasted

*As per projections in 2007-08

Natural gas (MMSCMD)

Year	Demand	Supply	Gap
2001–02	151.00	81.40	69.60
2005–06	231.00	94.84	136.16
2011–12 (F)*	313.00	158.05	154.95
2024–25 (F)*	391.00	170.00	221.00

Source: Ministry of Petroleum and Natural Gas; F=Forecasted

*As per projections in 2007-08

Alternative fuels scenario … (1/2)

Coal bed methane

- Methane trapped in coal seams is known as coal bed methane (CBM). The 26 blocks awarded in three rounds of bidding have a production potential of over 25 MMSCMD.

Underground coal gasification

- There is a huge potential in India to get natural gas through underground coal gasification (UCG). ONGC has signed an agreement with the Sckochinsky Institute of Mining, Russia, to harness world-class technology to tap this energy source.

Alternative fuels scenario … (2/2)

Gas hydrates

- National Gas Hydrate Program (NGHP) has been initiated and Steering Committee has been already formed.
- Agreements on collaborative research on drilling of experimental wells in India between Indian and US, Canadian and Japanese companies.
- Road map for gas hydrates is in place.

Ethanol-blended petrol

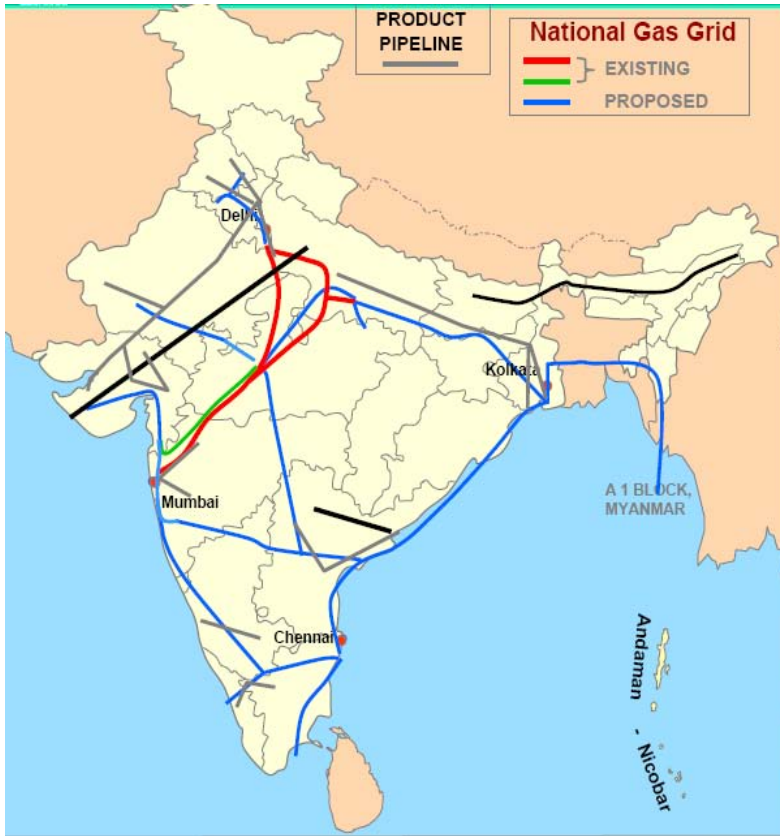
- The marketing of petrol with up to 5 per cent ethanol blending is being undertaken; the percentage of ethanol in petrol is proposed to be increased to 10 per cent.

Bio-diesel

- The government is in the process of introducing 5 per cent blended bio-diesel.

Extensive distribution and marketing networks

- The marketing of petroleum products is largely done by four PSUs: Indian Oil Corporation Limited (IOCL), Hindustan Petroleum Corporation Limited (HPCL), Bharat Petroleum Corporation Limited (BPCL) and IBP (a division of IOCL).
- The country's petroleum sector has an extensive retail network of over 16,000 outlets, 6,000 kerosene agencies and 5,000 LPG distributorships.
- The requirements of industrial units are met through direct supplies.
- A national gas grid is being constructed.
- In terms of distribution, the railways accounts for 40 per cent, pipelines for 30 per cent, coastal tankers for 12 per cent and the balance by road.



Source: Directorate General of Hydrocarbons (DGH)

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Policy regime favourable for investments

- The refinery sector was delicensed in 1998.
- NELP was announced by the government in 1999.
- The administered price mechanism (APM) was dismantled in April 2002.
- The marketing of transport fuels (petrol, diesel and aviation fuel) is now permitted, subject to meeting a minimum investment requirement of Rs 2,000 crore (about US$ 0.44 billion) in the oil and gas sector.
- 100 per cent foreign direct investment (FDI) is permitted in exploration, refining, pipelines (both petroleum products and gas) and marketing.
- Eight rounds of NELP (I to VIII) have been completed.
- Over 150 exploration blocks have been awarded under five rounds of NELP to domestic and foreign private companies.
- The sector has investment commitments of more than US$ 12 billion through NELP-I to V.

Long-term policy directions are favourable

- Planning Commission report on integrated energy policy in August 2006.
- Oil and gas are expected to be key drivers of energy consumption growth.
- Faster exploration of 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.
- Exploitation of alternative fuel sources such as CBM, gas hydrates, hydrogen fuel cell and blending of bio-fuels.
- Maintenance of strategic reserves in oil and petroleum products.
- Protection of environment.

New downstream regulatory regime introduced in 2006

- The Petroleum and Natural Gas Regulatory Board Act, 2006, was promulgated to regulate activities in the downstream oil and gas sector.

- The board consists of a chairperson and four members.

- Its bench consists of member (legal) and another member of the board to decide on settlement of disputes between parties.

Key functions of the regulatory board

In the case of a 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
- 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, provide the regulatory framework for the domestic exploration and production of oil and gas.

- The Directorate General of Hydrocarbons (DGH) was set up in April 1993 under the administrative control of the Ministry of Petroleum and Natural Gas (MoPNG) to promote the sound management of domestic oil and gas resources, keeping in view environmental safety, and the technological and economic aspects of upstream activities.

- In September 2006, the government gave the DGH statutory powers under the 1948 Act to carry out its functions.

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Private and foreign investments are on the rise

Opportunities – macro perspective

- The Indian private sector has several players in the oil and gas sector, such as Reliance Industries Limited (RIL), PetroNet, Essar, etc.
- Under seven rounds of NELP, 212 blocks have been awarded, of which 56 blocks have been awarded to private companies and JVs.
- There are several international players too with significant investments in the Indian oil and gas sector, such as Cairn Energy Plc (over US$ 1 billion), British Gas (over US$ 800 million), Shell (US$ 650 million) and BP (US$ 444 million).
- Other global players with India operations include Total, Exxon Mobil, Gaz De France and Chevron.

Foreign institutional investor (FII) holdings in select Indian oil and gas companies (in %)

	March, 31, 2001	March, 31, 2002	March, 31, 2003	March, 31, 2004	March, 31, 2005	March, 31, 2006	March, 31, 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

Opportunities in NELP VIII

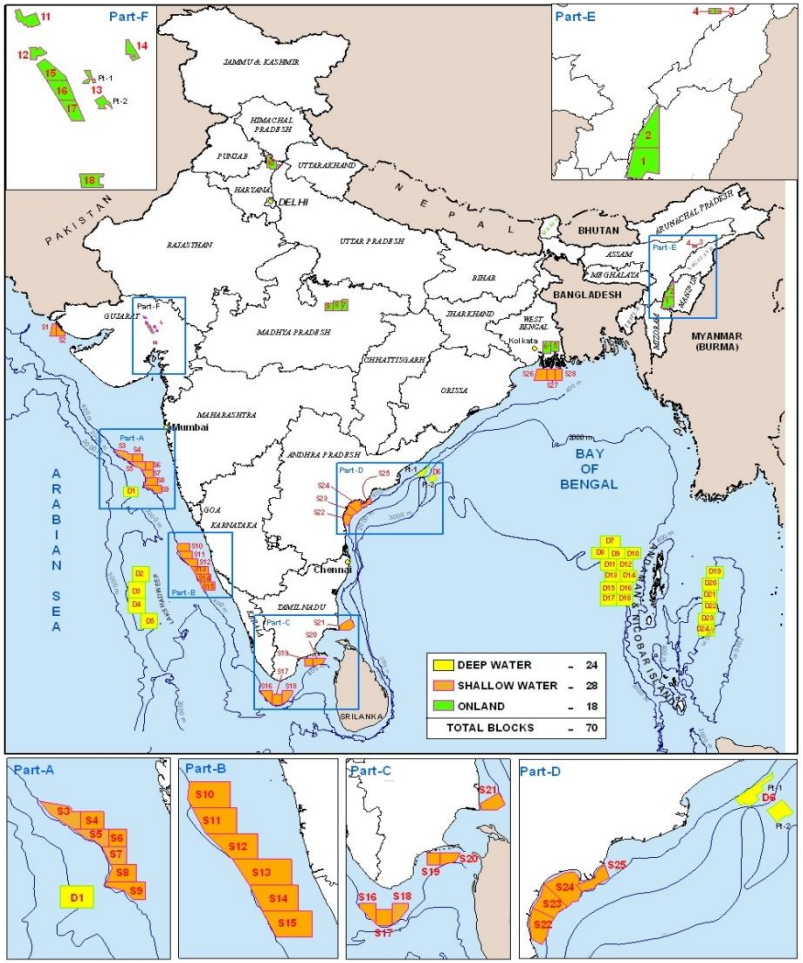
Opportunities – macro perspective

- NELP VIII concluded in October 2009 and offered the largest number of blocks ever under NELP at 70 blocks.

Deepwater	24
Shallow water	28
Onshore	8
Type S	10
Total	70

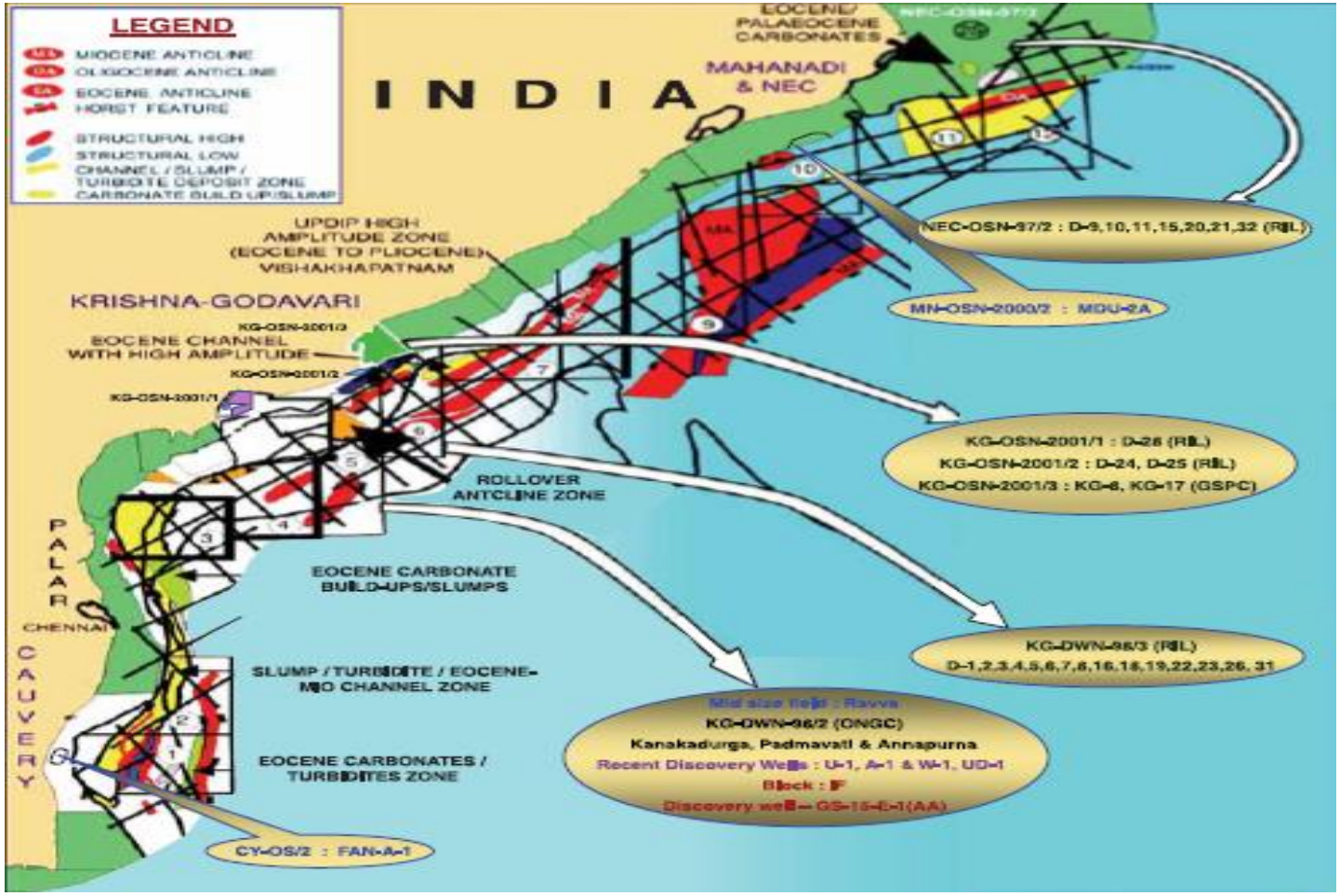
Source: Directorate General of Hydrocarbons (DGH)

Exploration blocks on offer under NELP-VIII



Deepwater and offshore prospects on east coast

Distribution of hydrocarbon prospects in deepwater and offshore, east cost

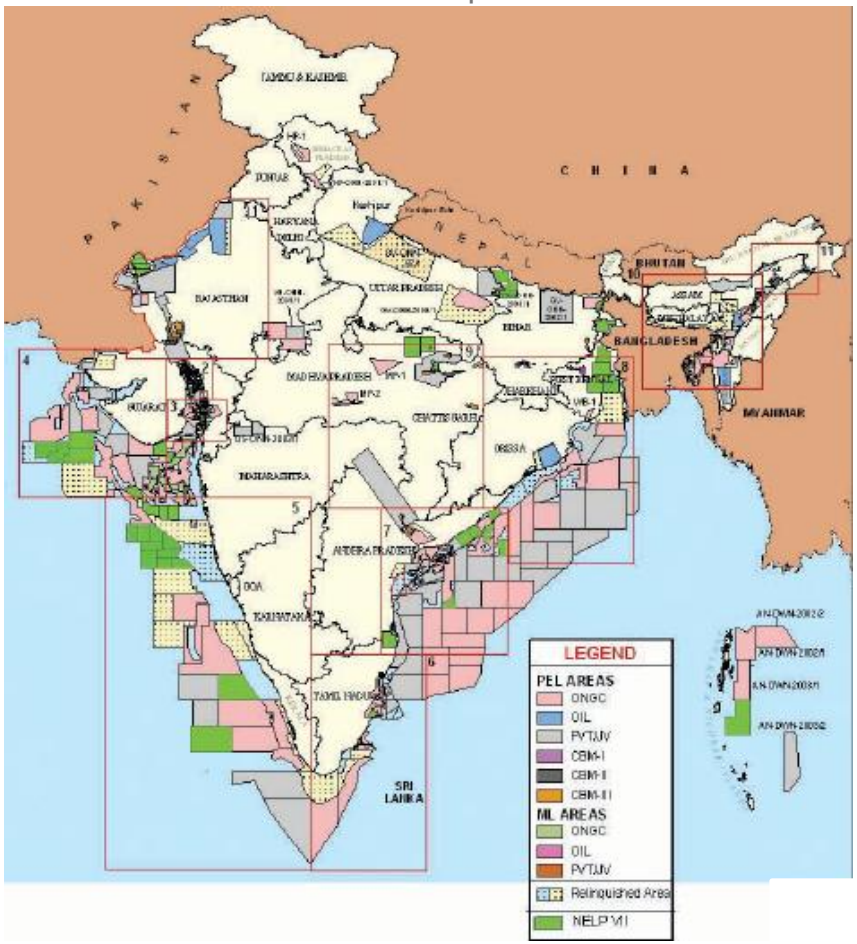


Source: Directorate General of Hydrocarbons (DGH)

Private/JV operations have been increasing

PEL and ML areas as on June 1, 1996

PEL and ML areas as on April 1, 2008



PEL: Petroleum Exploration License; ML: Mining Lease

Source: Directorate General of Hydrocarbons

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