Indian Minerals Yearbook 2015

(Part- III : Mineral Reviews)

54th Edition

PETROLEUM AND NATURAL GAS

(FINAL RELEASE)

GOVERNMENT OF INDIA
MINISTRY OF MINES
INDIAN BUREAU OF MINES

Indira Bhavan, Civil Lines,
NAGPUR – 440 001

PHONE/FAX NO. (0712) 2565471
PBX : (0712) 2562649, 2560544, 2560648
E-MAIL : cme@ibm.gov.in
Website: www.ibm.gov.in

July, 2017

39 Petroleum and Natural Gas

The domestic production of crude oil which stood at 37.5 million tonnes in 2014-15 decreased by 0.87% when compared to the output in the corresponding period of last year. Whereas, the net production of natural gas (utilised) decreased to 33,656 million cu metres in 2014-15 which is about 5% less as against the production in 2013-14. As on 01.04.2015, the refining capacity in the country was up by 2.0 million tonnes year-over-year (YoY) basis and touched 215.066 million tonnes. With this jump, India's share in total refinery capacity in the world increased to 4.56 percent.

RESOURCES

As on 1.4.2015, the total balance recoverable reserves of crude oil were estimated at 763.48 million tonnes (373.62 million tonnes in onshore and 389.86 million tonnes in offshore areas). Those of natural gas are placed at 1,488.47 billion cu m (499.59 billion cu m in onshore and 988.89 billion cu m in offshore areas) (Table - 1).

Table – 1 : Reserves of Crude Oil and Natural Gas in India as on 1.4.2015 (P)

(Crude oil in million tonnes; natural gas in billion cu m)

Area	Crude oil	Natural gas
India	**763.48**	**1488.47**
Onshore@@	**373.62**	**499.59**
Andhra Pradesh	13.19	48.44
Assam*	173.81	194.05
Gujarat	138.49	72.20
Rajasthan**	37.33	36.95
Tamil Nadu	10.80	47.59
Offshore	**389.86**	**988.89**
Western offshore @	333.44	436.65
Eastern offshore#	56.42	552.24

Source: *Indian Petroleum and Natural Gas Statistics, 2014-15, Ministry of Petroleum and Natural Gas, Govt. of India.*

* *Includes reserve in Arunachal Pradesh, Nagaland and Tripura.*

** *Rajasthan condensate reserves has been added in oil resources in Financial Year, 2013-14.*

@ *Includes Bombay High offshore, Rajasthan and JVC for crude oil.*

@@ *Includes Madhya Pradesh , Jharkhand & West Bengal (Coal-bed Methane) in case of natural gas.*

\# *Includes JVC/Private parties in case of crude oil and West Bengal (Coal-bed Methane) in case of natural gas.*

EXPLORATION & DEVELOPMENT

The Oil and Natural Gas Corporation (ONGC) and Oil India Limited (OIL), the two National Oil Companies (NOC) and a few private and joint venture companies were engaged in exploration and production activities of oil and natural gas, including Coal-bed Methane in the country. As on 31.3.2015, there were in all 463 oil/gas fields under these companies including offshore areas.

In Public Sector, ONGC's jurisdiction extended to 384 fields – Cambay basin (Gujarat) – 94 oil/gas fields; Upper Assam – 34 fields and Assam & Assam Arakan – 9 fields; Jodhpur (Rajasthan) – 8 fields; Krishna-Godavari basin (Andhra Pradesh) – 63 fields; Cauvery basin (Tamil Nadu) – 32 fields; Assam & Assam Arakan in Tripura - 11 fields and Assam & Assam Arakan in Nagaland –2 fields; Mizoram - 1 field; besides, 77 offshore fields in the Mumbai offshore; 10 in Kachchh, two in Cambay basin in West Coast and 40 offshore fields in Cauvery; Mahanadi and Krishna-Godavari basins (shallow and deep) in East Coast. OIL, a Public Sector Company was engaged in 19 fields – Upper Assam basin in Assam (14 fields) and Arunachal Pradesh (1 field); Jaisalmer basin (Rajasthan) (3 fields) and Bikaner-Nagaur basin (Rajasthan) - 1 field. Private/ Joint venture companies were engaged in 60 oil/gas fields - Cambay basin (Gujarat) at 34 fields; Kharsang basin (Arunachal Pradesh) at 1 field; Amguri basin (Assam) at 1 field; Jharia & Bokaro (Jharkhand) at 1 field (CBM) each; Sohagpur (Madhya Pradesh) at 2 fields (CBM); Rajasthan at 7 fields and Raniganj East basin (West Bengal) at 2 fields in onshore areas. In offshore areas, these companies covered 2 fields in Cauvery basin and 4 fields in Krishna-Godavari basin on the East Coast and 3 fields in Mumbai basin and 2 fields in Cambay basin on the West Coast.

Highlights of exploration carried out by ONGC and OIL during 2014-15 are furnished below:

During 2014-15, ONGC carried out seismic surveys and acquired 463.98 GLKM of 2D and 859.33 SKM of 3D seismic data in the inland area. A total of 206 exploratory wells with a meterage of 5,40,000 and 431 development wells with a meterage of 8,13,000 have been drilled.

Exploratory efforts of ONGC during 2014-15 resulted in 22 oil and gas discoveries (12 inland and 10 offshore areas) in domestic fields. Out of these, 10 discoveries were made in the new prospects, whereas 12 were new pool discoveries. A total of five discoveries were made in New Exploration Licencing Policy blocks and fifteen in the nomination blocks. The two discoveries during the year i.e. Rudrasagar 184 and Gandhar 699 in the nomination blocks have already started production and others are likely to start production in the near future.

The ultimate reserve accretion of oil and oil equivalent gas (O+OEG) in 2014-15 in domestic assets of ONGC was 61.05 million tonnes. The total ultimate reserves of oil and oil equivalent gas (O+OEG) of ONGC as on 1.4.2015 was 2,790 million tonnes.

During 2014-15, OIL covered, under onshore seismic survey, 25,934 (GLKM) of 2D & 7,797 (SKM) of 3D in Assam and 4,084 (SKM) of 3D & 12,973 (GKKM) of 2D in Rajasthan. Also,300 (GLKM) of 2D & 402 (SKM) of 3D in Andhra Pradesh, 1,007 (SKM) of 3D in Western Offshore and 332 (SKM) of 3D in Saurashtra were covered. OIL carried out exploratory and development onshore drilling of 1,40,000 m in 37wells.

The details of discoveries of oil/gas made by OIL during 2014-15 are highlighted below:

i) Nadua-1 (Loc. Ch) is located in Nadua Structure under Chabua PML and has been drilled down to 3,693 m to probe the hydrocarbon prospects within Paleocene-Eocene Formations. The Well has encountered a few prospective sand ranges within Paleocene-Eocene Formations and is presently producing oil from one of the tested sands. This discovery of oil has opened up new avenues for exploration and exploitation of hydrocarbon in Paleocene-Eocene Formations in Nadua and adjoining Area.

ii) Rangmala-1 (Loc. TAJ) is located in Balijan-II Structure under Tinsukia PML and has been drilled down to 3,930 m to probe the hydrocarbon prospects within the Paleocene-Eocene Formations. The Well has encountered a few prospective sand ranges within Paleocene-Eocene Formations and presently producing gas from one of the tested sands. The discovery of gas in this Well has opened up new avenue for exploration and exploitation of hydrocarbon within the Paleocene-Eocene Formations in Balijan-II and adjoining structures.

iii) Mechaki-3 (Loc. MKA) is located in the West Mechaki Structure under Mechaki Extension PML and has been drilled down to 5,636 m to probe the hydrocarbon prospects within Paleocene-Eocene Formations. The Well encountered a few prospective sand ranges within Paleocene-Eocene Formations and produced oil from one of the tested sand within Narpuh Formation. The discovery of oil in this Well has opened up new avenue for exploration and exploitation of hydrocarbon within the Paleocene-Eocene Formations in West Mechaki and adjoining area.

iv) NHK-616 (Loc. NLB) is located in Balagaon Structure within Nahorkatiya Extension PML and has been drilled down to 3,005 m to probe the hydrocarbon prospects within the Barail and Tipam Formations. The Well has encountered a few prospective sand ranges within Barail Formations and one of the tested sands produced oil intermittently during testing. However, commercial oil production could not be sustained and the Well is presently kept shut-in.

v) NHK-466 (Loc. HHW) is located in Langkasi area of Greater Jorajan Oilfield under Hugrijan PML and was drilled and completed during the year 1991. During 2014-15, oil has been discovered in new/unappraised Kopili sand through workover operations. The discovery of oil in this sand has opened up a new play for exploration and exploitation of oil in Kopili Formation of Langkasi and adjoining areas.

vi) Balimara-2 (Loc. BF), is located in Balimara Structure under Borhat PEL and was drilled and completed during the year 2012. During 2014-15, oil has been discovered in new/unappraised Barail sand through work-over operations. The discovery of oil in the Barail Formation has opened up a new reservoir for exploration and exploitation of oil in Balimara and adjoining areas.

vii) Barekuri-2 (Loc. TR) is located in the central part of Barekuri Structure under Tinsukia PML and was drilled and completed during the year 2005. During 2014-15, gas has been discovered in new/unappraised Narpuh sand through work-over operations. The discovery of gas in the Narpuh Formation has opened up a new reservoir for exploration and exploitation of oil in Barekuri and adjoining area.

viii) Hapjan-24 (Loc. HKC) is located in the North Hapjan Structure under Hugrijan PML and was drilled and completed during year 1993. During 2014-15, oil has been discovered in new/ unappraised Narpuh Barail-sand through work-over operations. The discovery of oil in the Barail Extra Sand has opened up a new reservoir for exploration and exploitation of oil in Hapjan and adjoining area.

ix) Hapjan-28 (Loc. HNP) is located in Hapjan area under Hugrijan PML and was drilled and completed during the year 1997. During 2014-15, gas/condensate has been discovered in one sand within Lakadong+Therria Formation through work-over operations. The discovery of gas/ condensate has opened up a new reservoir for exploration and exploitation of gas in Hapjan and adjoining area.

x) Baghjan-7 (Loc. BGE) is located in Baghjan Structure under Baghjan PML and was drilled and completed during year 2008. During 2014-15, gas/ condensate has been discovered from new/ unappraised sand within Narpuh Formation through work-over operations. The discovery of gas in Narpuh Formation has opened up a new reservoir for exploration and exploitation of gas in Baghjan and adjoining area.

xi) Moran-78 (Loc. MBT) is located in Moran area under Moran PML and was drilled and completed during the year 1981. During 2014-15, oil has been discovered in new/unappraised Barail sand through work-over operations. The discovery of gas in Barail Sand has opened up a new reservoir for exploration and exploitation of gas in Moran area.

xii) Dangeru-1 (NELP Block KG-ONN-2004/1) The Well is the first exploratory Well drilled in NELP Block KG-ONN-2004/1. The Well has been drilled down to 3,719 m and the Well encountered a few prospective sand ranges within Kummugudem Formation of Permian-Triassic Age. Four sand packages have been tested in the Well and all the four sands flowed gas. The discovery of gas in this Well opened up new exploration potential in this NELP Block. Appraisal programme is being worked out to ascertain commercial viability of the gas discovery. OIL operates in this NELP block and holds 90% Participating Interest (PI).

RIL's Performance

There are 4 blocks which are under development and production including the KG-D6 Block.

D1, D3 and D26: D 1-D3 field continues to produce from eight wells. To maximise the recovery from the field, well intervention jobs have been planned for execution in phases,various developmental works were planned to be undertaken during FY 2015-16. Meanwhile, of the three Onshore Terminal Booster Compressor (OTBC) projects, of which, two compressors have been successfully commissioned, the third compressor is expected to be commissioned during 2015-16. As an outcome of this effort, augmentation of production in terms of improved recovery from the field is expected to be achieved.

In D26 field, Well MA6H and MA5H side track have been completed successfully and put on production.

Panna-Mukta : The Panna-Mukta JV has successfully completed 20 years of operation and is entering into the last five years of its contract period. The field is still contributing significantly to the E&P revenue and profitability. During the year, the developmental activities were carried out viz., intermediate stage compressor piping modification to enhance gas processing capability; successful migration of Panna emergency shutdown system from pneumatic system to a more reliable electronic shutdown system; its is also in the process of expanding the existing gas lift pipeline network to enhance oil production; and mobilisation of rig for work-over of 15 wells (of which five wells have been completed) and for drilling of six development wells at Mukta-B.

Mukta-B development project is at an advanced stage of completion and was expected to be completed by 2015-16. Drilling of six development Wells was scheduled to commence during the first quarter of 2015-16 and first oil was expected in the subsequent quarter.

Tapti: The production level has steadily declined this year as it is nearing the end of its economic life. The field is currently producing around 1 MMSCMD of gas. The cessation of production is likely to happen during the second half of 2015-16.

It is also necessary to commence decommissioning and abandonment activities (the first of its kind in India's E&P Industry) in line with the obligated conditions in the agreement with the Government in the coming year. Further, in line with the production sharing contract, RIL along with its partners have issued an abandonment notice to the Government in December 2013 and started allocating funds for site restoration activity.

Domestic Exploration Blocks

During the year 2015-16, no significant development has taken place in NEC-25 Block.

After completition of exploration Phase II at CY-D5 Block, RIL along with its partner has opted not to enter the Phase-III exploration and will not submit the development plan for Discovery D35.

CB-10: After the completion of Phase-1 of the exploration, 8 discoveries out of 18 wells drilled in the block were reported and the Government has accorded approval for Phase-II of exploration. RIL has extensive plans towards drilling to explore and augment additional resources. RIL is preparing the development plan for submission.

Coal-bed Methane (CBM)

Development activities are in progress in RIL's two CBM Blocks (Sohagpur East and West) with all requisite approvals required for the development stage in place.

RIL has plans to drill more than 200 wells and also has plans to set up two gas gathering stations and eight water gathering stations under Phase-I operations. RIL has drilled 168 surface holes, 153 production holes and completed hydro-facturing jobs for 120 wells. Installation and erection of most of the equipment is nearing completion and installation of well site facilities has been completed for two trunk lines. Laying of gas & water gathering network is under progress. The first gas production is expected by the end of this year.

PRODUCTION

Petroleum (Crude)

Production of petroleum (crude) in the country which stood at 37.5 million tonnes in 2014-15 registered a nominal decrease of 0.9% as compared to that in the previous year. Bulk of the total production (68.5%) was shared by the Public Sector companies while Private Sector companies accounted for the remaining 31.5 percent (Table-2).

Offshore areas continued to be the largest producer of petroleum (crude) in 2014-15 with a share of 50.5% of the country's output. Next in order were Rajasthan with a contribution of 23.6%, Gujarat with 12.4% and Assam with 11.9%. The remaining 1.6% production was reported by Andhra Pradesh, Tamil Nadu and Arunachal Pradesh.

During 2014-15,barring Tamil Nadu and Offshore areas where the productioon of petroleum (crude) registered an increase of 6.2% and 4% respectively, the other States that reported production showed moderate to sharp decline. The production levels dropped in Arunachal Pardesh by 31.5%, Andhra Pradesh by 14%, Gujarat by 7.5%, Assam by 5% and Rajasthan by 4% from that of the previous year.

Natural Gas (Utilised)

The production of natural gas (utilised) at 33,656 m cum registered a decrease of 5% in 2014-15 as compared to that in the previous year.

Offshore areas continued to be the largest producers of natural gas (utilised) with a share of 73.9%. Next in the order were Assam with a share of 8.8%, Gujarat with 4.5%, Tamil Nadu & Rajasthan with 3.5% each, Tripura with 3.4% and Andhra Pradesh with 1.6%. West Bengal and Arunachal Pradesh accounted for the remaining 0.8% of the total production.

Statewise analysis revealed that Tripura, Rajasthan, Assam and West Bengal recorded an increase in natural gas production, whereas, offshore areas, Andhra Pradesh, Gujarat, Tamil Nadu and Arunachal Pradesh recorded decrease in production of natural gas in 2014-15 as compared to the previous year.

The production of natural gas increased in Tripura by 38.7%,West Bengal by 37.3%, Rajasthan by 20%, and Assam by 3.18 percent. The decline in production was recorded in Arunachal Pradesh by 17.1%, Tamil Nadu 9%, Gujarat by 7.9% and Offshore areas by 5.8 percent.

As much as 73.5% of the total production resulted from the Public Sector Companies, whereas, the remaining 26.5% was accounted to the Private Sector Companies during the year 2014-15 (Table - 3).

Domestic prices of petroleum (crude) in 2012-13 to 2014-15 are furnished in Table-4.

Table – 2 : Production of Petroleum (Crude), 2012-13 to 2014-15 (By States)

(Quantity in '000 tonnes; Value in ₹'000)

State	2012-13		2013-14		2014-15 (P)	
	Quantity	Value	Quantity	Value	Quantity	Value
India	**37862**	**688171117**	**37788**	**686826110**	**37461**	**680882633**
Public Sector	26222	476605119	25711	467317300	25676	466681148
Private Sector	11640	211565998	12077	219508810	11785	214201485
Andhra Pradesh	295	5361853	297	5398204	254	4616646
Arunachal Pradesh	121	2199269	111	2017511	76	1381359
Assam	4863	88388784	4710	85607891	4466	81173002
Gujarat	5331	96895046	5061	91987587	4653	84571872
Rajasthan	8593	156184417	9180	166853596	8848	160819240
Tamil Nadu	238	4325834	226	4107725	240	4362186
Offshore	18421	334815914	18203	330853596	18924	343958328

Table – 3 : Production of Natural Gas (Utilised), 2012-13 to 2014-15 (By States)

(Quantity in million cu metres; Value in ₹'000)

State	2012-13		2013-14		2014-15 (P)	
	Quantity	Value	Quantity	Value	Quantity	Value
India	**40679**	**336420537**	**35407**	**292820422**	**33656**	**278339428**
Public Sector	26188	216578112	25910	214279016	24744	204636047
Private Sector	14491	119842425	9497	78541406	8912	73703381
Andhra Pradesh	1249	10329390	1171	9684320	541	4474139
Arunachal Pradesh	41	339075	41	339075	34	281184
Assam	2910	24066072	2868	23718727	2958	24463039
Gujarat	2032	16804900	1657	13703602	1526	12620215
Rajasthan	685	5665038	982	8121266	1178	9742211
Tamil Nadu	1206	9973774	1304	10784247	1191	9849723
Tripura	647	5350773	822	6798045	1140	9427946
West Bengal (CBM)#	107	884904	166	1372841	228	1885589
Offshore	31802	263006611	26396	218298299	24860	205595382

 # Includes Jharkhand and Madhya Pradesh *CBM: Coal-bed Methane*

Source: *Ministry of Petroleum & Natural Gas*

Table – 4 : Prices of Petroleum (Crude), 2012-13 to 2014-15

(In ₹ per tonne)

Grade	Market	2012-13	2013-14	2014-15 (P)
Indigenous*	Onshore	43656	45600	37089
Indigenous*	Offshore	46134	49911	40129
Indigenous*	Offshore & Onshore	45295	48504	39215
Imported	c.i.f. Indian Port (average)	42389**		

Source: *Indian Petroleum & Natural Gas Statistics, 2014-15 for indigenous crude prices and DGCI&S,Kolkata for average imported crude prices.*

**Relates to basic prices of petroleum crude which is all inclusive of Gross (pre-discount) price and linked to international crude prices.*

***M&MS Division, IBM.*

INDUSTRY

The total refining capacity of 22 units in operation in the country was about 215.066 million tpy in 2014-15, with a share of about 4.56% in the estimated world refinery capacity of 4,712.3 million tpy during year 2014. In 2014-15, refinery crude throughput increased to 223.24 million tonnes from 222.50 million tonnes in 2013-14 (Table-5).

In the next few years, about 30.0 million tonnes of additional refining capacities in both brownfield and greenfield expansion are reportedly expected to come on stream. The new refineries that are under implementation and coming up in the near future are Indian Oil Corporation Ltd, Paradeep, Odisha (15.0 million tonnes), Nagarjuna Oil Corporation Ltd, Cuddalore, Tamil Nadu (6.0 million tonnes) and Hindustan Petro Chemical Ltd, Barmer, Rajasthan (9.0 million tonnes).

During the 12th five year plan period, capacity augmentation to the tune of 53.1 million tonnes are planned as per annual report of Ministry of Petroleum & Natural Gas. Out of these, 32.1 million tonnes of capacity expansion are planned by PSU refineries. The capacity expansions by JV and private refineries during the same period are planned for three million tonnes and 18 million tonnes, respectively. The capacity of Essar refinery, Vadinar, Gujarat is expected to rise by 18 million tpy after brownfield expansion. The capacity augmentation plans of Bharat Oman Refinery Ltd, Bina, M.P. have target of achieving 9.0 million tpy in the near future.

Production of various petrochemicals from these refineries during 2012-13 to 2014-15 is provided in Table-6.

CONSUMPTION

Total consumption of petroleum products (excluding Refinery Boiler Fuel) increased to 165 million tonnes in 2014-15 from 158 million tonnes in 2013-14.

Increase in consumption was reported in the case of Petroleum Coke (23.83%), LPG (10.47%), Motor spirit (11.37%) and ATF (3.96%) during 2014-15 as compared to that of the year 2013-14, whereas the consumption showed a decline in LSHS (16.03%), Furnace oil (3.5%) and Naptha(1.97%), during the same period.

The consumption of various petroleum products from 2012-13 to 2014-15 is furnished in Table-7.

ALTERNATIVE SOURCES

With the ever-increasing dependence on petroleum imports due to stagnant domestic production and spiralling growth in demand, the Government is encouraging the development of alternative sources of hydrocarbons. The Government as a measure to offer a fillip for tapping alternate sources has vigorously initiated exploration & development of coal-bed methane, gas hydrates, hydrogen, bio-diesel and ethanol.

Coal-bed Methane

Coal-bed Methane (CBM), an eco-friendly natural gas stored in coal seams, is generated during the process of the coalification. The coal and lignite seams contain varying amounts of methane depending on the rank of the carbonaceous matter, the depth of burial and the geotectonic setting of basins. CBM exploration and exploitation has an important bearing on reducing the greenhouse effect, and extraction of the CBM through degassing of the coal seams prior to mining of coal is a cost-effective means of boosting coal production and maintaining safe methane level in working mines.

India has the fourth largest proven coal reserves in the world and therefore, holds significant prospects for exploration and exploitation of CBM. In order to harness CBM potential in the country, the Government of India formulated CBM policy in 1997 to provide level playing platform for exploration and commercial exploitation of CBM by national and international entrepreneurs.

CBM blocks were offered through international competitive bidding for exploration and production of CBM in the country for the first time in May 2001. So far, under CBM policy, the Government has awarded 30 CBM blocks in four rounds of bidding to National, Private & Joint Venture Companies. In addition, 2 CBM blocks were awarded on nomination basis and one block through Foreign Investment Promotion Board (FIPB) route. These CBM blocks are in the states of Andhra Pradesh, Assam, Chhattisgarh, Gujarat, Jharkhand, Madhya Pradesh, Maharashtra, Odisha, Rajasthan, Tamil Nadu and West Bengal.

Table – 5 : Installed Capacity and Crude Throughput in Refineries

(In '000 tonnes)

Refinery	Annual installed capacity (as on 1.4.2015)	Refinery Crude throughput		
		2012-13	2013-14	2014-15 (P)
Total	**215066**	**219211**	**222498**	**223241**
Public/Private Sector & JV's	**120066**	**120301**	**119548**	**121182**
IOCL, Guwahati, Assam	1000	956	1019	1006
IOCL, Barauni, Bihar	6000	6344	6478	5944
IOCL, Koyali, Gujarat	13700	13155	12960	13285
IOCL, Haldia, West Bengal	7500	7490	7952	7650
IOCL, Mathura, Uttar Pradesh	8000	8561	6641	8515
IOCL, Bongaigaon, Assam	2350	2356	2328	2403
IOCL, Digboi, Assam	650	660	651	591
IOCL, Panipat, Haryana	15000	15126	15098	14191
BPCL, Mumbai, Maharashtra	12000	13077	12684	12821
BPCL (formerly KRL), Kochi, Kerala	9500	10105	10285	10356
HPCL, Mumbai, Maharashtra	6500	7748	7785	7408
HPCL, Visakh, Andhra Pradesh	8300	8028	7776	8770
CPCL, Manali, Tamil Nadu	10500	9105	10065	10251
CPCL, Narimanam, Tamil Nadu	1000	640	559	531
MRPL, Mangaluru, Karnataka	15000	14415	14589	14632
NRL, Numaligarh, Assam	3000	2478	2613	2777
ONGC, Tatipaka, Andhra Pradesh	66	57	65	51
Joint Venture	**15000**	**10636**	**14721**	**13527**
Bharat Oman Refineries Ltd, Bina[@]	6000	5732	5450	6209
HPCL, Bathinda[#]	9000	4904	9271	7318
Private Sector	**80000**	**88274**	**88229**	**88532**
RIL, Jamnagar, Gujarat	33000	32613	30307	30867
RIL (SEZ), Jamnagar, Gujarat	27000	35892	37720	37174
Essar Oil Ltd,Vadinar, Gujarat	20000	19769	20202	20491

Figures rounded off.

Source: *Indian Petroleum and Natural Gas Statistics, 2014-15, Ministry of Petroleum & Natural Gas, Government of India.*

@ BORL is a joint venture company promoted by BPCL and Oman Oil Company Ltd (OOCL), Commissioned in May 2011.

 # HPCL & Mittal Energy Investment Pvt. Ltd, a Joint venture, Bathinda commissioned in April 2012.

Note: *1. CPCL and BRPL are subsidiaries of IOCL; NRL of BPCL and MRPL of ONGC.*

2. Excludes other inputs from RIL refineries crude throughput during 2012-13, 2013-14 & 2014-15 .

Table – 6: Production of Petroleum Products from Refineries, 2012-13 to 2014-15

(In '000 tonnes)

Product	Production		
	2012-13	2013-14 (R)	2014-15 (P)
A) FROM CRUDE OIL	**213219**	**216456**	**217141**
(a) LPG	9825	10030	9840
(b) Mogas	30118	30275	32325
(c) Naphtha	19018	18505	17391
(d) Kerosene	7971	7418	7559
(e) ATF	10088	11220	11103
(f) HSD	91103	93759	94428
(g) LDO	400	423	358
(h) Furnace oil	13690	12920	11248
(i) LSHS/HHS/RFO	1364	485	671
(j) Fuel Oils*	15054	13405	11919
(k) Lube oils	896	941	946
(l) Bitumen	4670	4785	4632
(m) Petroleum coke	10943	12068	12448
(n) Total Waxes	57	56	53
(o) Others	17598	17871	18137
B) FROM NATURAL GAS			
LPG	2214	2130	2140

Source: *Indian Petroleum & Natural Gas Statistics, 2014-15, Ministry of Petroleum & Natural Gas, Government of India.*
Note: *Include production of RIL SEZ in the year 2012-13, 2013-14 & 2014-15 which includes other inputs.*
** Fuel Oil figures not included in total.*

The estimated CBM resources are of the order of 2,600 billion cubic metres (BCM) or 91.8 trillion cubic feet spread across 12 states in the country. Out of these, about 112.6 BCM (3.98 TCF) of CBM recoverable reserves have been established as on 31.03.2015.

Within the next few years, CBM is expected to emerge as a new source of natural gas production in the country. India has emerged as the fourth country in the world capable of producing CBM on commercial scale. Current production in the five blocks is about 0.77 MMSCMD (million metric standard cubic metre per day). Seven CBM blocks are expected to start commercial production in near future. The total CBM production is expected to be around 4 MMSCMD by the end of the 12th plan.

Gas Hydrates

Gas hydrates are formed when gas and water mixtures are subjected to high pressure and low temperature conditions in the sea, usually in water depths of more than 800 m, within sediments just below the sea bottom. They are also formed in some permafrost region of the world. Gas hydrates may be an important source of hydrocarbon energy in the future. The gas hydrates also act as a cap under which natural gas can get accumulated.

World over gas hydrate production is in research & development stage. India is the third country after USA and Japan, where R&D work on gas hydrates has commenced. National Gas Hydrate Programme (NGHP), steered by the Ministry of Petroleum & Natural Gas and technically coordinated by Directorate General of Hydrocarbons (DGH), is in place and various R&D studies are in progress to develop vast resources of gas hydrates in western and eastern offshore and Andaman offshore areas. It is a consortium of National E & P Companies, namely, ONGC, GAIL, OIL and national research institutions NIO, NIOT and NGRI.

Table – 7 : Consumption of Petroleum Products 2012-13 to 2014-15*

(In'000 tonnes)

Product	2012-13	2013-14	2014-15 (P)
1. Light distillates of which	**46273**	**47578**	**50847**
(a) LPG	15601	16294	18019
(b) Motor Spirit	15744	17128	19075
(c) Naphtha+NGL	12289	11305	10939
(d) Others	2639	2851	2814
2. Middle distillates of which	**82702**	**81831**	**82775**
(a) SKO	7502	7165	7087
(b) ATF	5271	5505	5578
(c) HSDO	69080	68364	69404
(d) LDO	399	386	365
(e) Others	450	411	341
3. Heavy ends of which	**28083**	**29000**	**32366**
(a) Furnace oil(FO)	6290	5787	5640
(b) LSHS	1366	449	377
(c) Lubes Greases	3196	3305	2964
(d) Bitumen	4676	5007	4983
(e) Petroleum coke	10135	11756	14407
(f) Others	2420	2696	2995
Total (1+2+3)	**157058**	**158409**	**165988**

Source: *Indian Petroleum & Natural Gas Statistics,2015-16, Ministry of Petroleum & Natural Gas, Government of India.*

** Excludes data in respect of RIL SEZ Refinery as it is presumed that all products have been exported and not consumed domestically.*

Note: *Consumption data includes private sales & private imports too.*

There are numerous potential offshore areas of gas hydrates in KG, Mahanadi and Andaman deepwaters and these are under different stages of development. The NGHP-2 has completed drilling of 40 wells in the deepwaters of KG & Mahanadi basins. NGHP-3 aims at carrying out pilot production testing of at least one site in Indian deepwater environment. However, it depends on the sucess of NGHP-2.

Shale Oil/Shale Gas

Oil Shales are usually fine-grained sedimentary rocks containing relatively large amounts of organic matter from which significant quantities of shale oil and combustible gas can be extracted by destructive distillation. An oil shale, which has a very high proportion of organic matter in relation to mineral matter, is categorised as coal. Oil shales occur in many parts of the world ranging from small occurrences of little or no economic value to those of enormous size that occupy thousands of square miles and contain many billion barrels of potentially extractable shale oil.

With the continuing decline of petroleum supplies accompanied by increasing costs of petroleum, oil shale presents opportunities for supplying some of the fossil energy needs of the world in the years ahead. North-East India is endowed with rich deposits of coal, found in the Barail Formation of Tertiary Age. Carbonaceous shale occurs interbedded with the coal. Studies have indicated that these coals and carbonaceous shale constitute the principal source rocks that have generated the hydrocarbons produced from the region.

Shale Gas can emerge as an important new source of energy in the country. India has several Shale Formations which seem to hold shale gas. The Shale Gas Formations are spread over several sedimentary basins such as, Gangetic plain, Gujarat, Rajasthan,Andhra Pradesh and other coastal areas in the country including hydrocarbons-bearing ones-Cambay, Assam-Arkan & Damodar Basins have large shale deposits. Various developmental activities are going on in Gandhar area of Cambay Basin, KG Basin,Cauvery Basin and Assam & Assam Arkan Basin.

Hydrogen

Hydrogen for quite sometime has been receiving worldwide attention as a clean fuel and efficient energy storage medium for automobiles. Hydrogen can replace or supplement oil used in road transportation. Hydrogen production technologies can be both fossil fuel based and renewable resource based. However, substantial research and development is needed to establish use of hydrogen as an alternative fuel in a cost-effective manner. For development of hydrogen as a fuel, the Ministry of Petroleum & Natural Gas has set up a Hydrogen Corpus Fund with contribution from five major Oil Companies and Oil Industry Development Board (OIDB). A road map by Indian Oil Corp. (R&D), the nodal agency for the hydrogen research project, has been laid out for hydrogen production, dispensation, storage and application. The project on setting up of a Hydrogen Dispensing station at Dwarka, New Delhi by IOC (R&D) has been completed. Four projects, approved by the Steering Committee of HCF, are currently in progress.

Hydrogen up to 20% (by volume) can be blended with Compressed Natural Gas (CNG) for use as an automobile fuel.

Bio-diesel

Bio-diesel is a mixture of fatty acid easters having properties similar to diesel. It is derived a transesterification process which involve reaction of vegetable/animal fats and oils with alcohol preferably methanol. The properties of bio-diesel are such that it can be mixed with any diesel fuel. Experiments for extraction work of bio- fuel from various plant seeds have been carried out in the country. Of these, *Jatropha curcas* has been found most suitable for the purpose. The R&D studies indicated that it enhances the life of the engine and results in less pollution.

To encourage production of bio-diesel in the country, the Ministry of Petroleum and Natural Gas announced a Bio-diesel Purchase Policy, in October 2005, which became effective from 01.01.2006. However, no bio-diesel could be procured till 2014. With renewed focus on bio-diesel, the Government on 16.01.2015 allowed direct sale of bio-diesel by dealers of OMCs. Under this scheme, Oil Marketing Companies (OMCs) are to purchase bio-diesel, meeting the fuel quality standard prescribed by BIS for blending with High Speed Diesel to the extent of 5% at identified purchase centres across the country. The Policy has identified 20 Purchase Centres of the Public Sector OMCs all over the country. The OMCs would purchase bio-diesel from those bio-diesel manufacturers who register with them after satisfying the technical specifications, at a specified delivered price.

Ethanol

To reduce dependence on imported oil and alternatively to encourage use of indigenous sources of energy, Ministry of Petroleum & Natural Gas (MoPNG) had notified on 20.9.2006, the scheme of 5% ethanol-blended petrol (EBP), in accordance with BIS specifications, to be sold in notified areas subject to condition.

The Cabinet Committee on Economic Affairs decided on 03.07.2013 that sugarcane or sugarcane juice may not be used for production of ethanol and it be produced only from molasses and that OMCs will procure ethanol only from domestic sources to achieve the mandatory requirement of blending 5% ethanol with Petrol.

In December 2014, the government took a decision to procure ethanol at a fixed delivered price. Ethanol from non-food feed stocks, other than molasses, has also been allowed to be procured, subject to meeting the relevant BIS standards.

Due to these efforts, for the year 2014-15, against Oil Industry's requirement of 128.17 crore litres of ethanol, a total of 86.52 crore litres has been finalised and 67.42 crore litres have been procured.

POLICIES AND CONTRACTS

One of the landmark outcome of the Liberalisation Policy vis-a-vis Petroleum Sector is the impetus for participation of foreign and other Indian Companies in exploration and development activities. The Government further sent signals of encouragement to the National Oil Companies to aggresively pursue oil and gas opportunities overseas.

Taking into account the oil security concerns of India, the Government has also decided to build a Strategic Crude Oil Reserve of 5.33 million tonnes at three locations in the country viz. Visakhapatnam, Andhra Pradesh (1.33 million tonnes), Mangaluru, Karnataka (1.5 million tonnes) and Padur, Karnataka (2.5 million tonnes) through a Special Purpose Vehicle (SPV) named Indian Strategic Petroleum Reserves Ltd (ISPRL), a subsidiary Company of OIDB.

The need for additional crude oil storage is being felt in the light of increasing requirement of crude oil in the country. ISPRL was entrusted with the responsibility of preparation of Detailed Feasibility Reports (DFRs) for 12.5 MMT of Strategic Storage of Crude oil in Phase-II in four States, namely, Rajasthan, Odisha, Gujarat and Karnataka. The DFR's have been prepared by EIL with capacities proposed as Chandikhol 3.75 MMT, Rajkot 2.5 MMT, Bikaner 3.75 MMT and Padur 2.5 MMT.

The New Exploration Licensing Policy (NELP) for exploration & production (E&P) of oil & natural gas (excluding Coal-bed Methane), and the Coal-bed Methane (CBM) Policy were formulated by the Government of India, with Directorate General of Hydrocarbons (DGH) as the nodal agency, during 1997-98 to provide a level playing field to both the Public and Private Sector Companies in exploration and production of hydrocarbons. NELP has steered steadily towards a healthy spirit of competition between National Oil Companies and private companies.

The Government had initiated bids under the New Exploration Licensing Policy in February 1999 to accelerate and expand exploration of oil and gas in the country. Under NELP, acreages are offered to the participating companies through the process of open international competitive bidding. The first round of offer of blocks was launched in 1999 and most of the ninth round awards were concluded in 2012. A total of 388 exploration blocks have been offered so far and 282 blocks have been awarded for which PSCs were signed under various rounds of NELP, spanning 1999-2012. As on 01.04.2014, a total of 152 blocks are active and 130 have already been relinquished.

The details of the exploration blocks awarded in NELP rounds are highlighted in Table -8.

In order to explore and produce new sources of natural gas from coal-bearing areas, the Government had formulated a CBM Policy in 1997 and implemented the same in 2000 providing attractive fiscal and contractual framewotk for exploration and production of CBM which is an environment-friendly clean gas fuel similar to conventional natural gas.

The energy demand is on rise with social and economic development in the country. Current hydrocarbon demand is much more than the domestic crude oil and natural gas production. In order to bridge the gap between energy supply and demand, it is imperative to accelerate the exploration and production (E&P) activities in the country. Therefore, GOI has adopted multi-pronged strategy for giving momentum to exploration and production in the country. The major steps taken in this regard include offering of exploration blocks in Indian sedimentary basins through NELP, development of alternate sources of hydrocarbon, such as, CBM and Shale Gas, Research & Development for new sources, such as, Gas Hydrate, and carrying out E&P operations in safe and environment-friendly manner.

The GOI has been reviewing the policies from time to time for encouraging exploration activity and investments. At present, oil & gas and CBM are under two different contract regimes. These two contractual regimes for allocation of acreages for E&P operations of hydrocarbons have different fiscal terms and conditions. The contracts under the New Exploration and Licenscing Policy (NELP) for oil and gas are based on production sharing contract (PSC) where Government stake depends on biddable sharing of profit petroleum after allowing for cost recovery, while the contracts under CBM Policy provide for biddable revenue sharing based on production linked payment (PLP).

Considering the constraints experienced in the present PSC format and differences in fiscal and contractual regime for oil & gas and CBM, it is now proposed that the award of acreages for hydrocarbon exploration & production in future will be under a uniform licencing policy covering all types of hydrocarbons, with new fiscal terms ensuring ease of operation for E&P companies.

Under the revised policy, a total of 46 blocks (17 inland, 15 shallow water and 14 deep water blocks) are being offered under tenth round of New Exploration Licenscing Policy (NELP-X) in 13 prospective sedimentary basins of India for exploration of oil and natural gas, covering an area of 1,66,053 sq km. These 46 blocks fall in the Basin of Gujarat-Kachchh, Gujarat-Saurashtra, Mumbai, Kerala-Konkan, Cauvery, Krishna-Godavari, Mahanadi-NEC, Andaman, Bengal, Punjab plain, Rajasthan, Cambay & Deccan Synclise.

The Government has issued "Policy Guidelines for Exploration and Exploitation of Shale Gas and Oil on 14th October, 2013. Under this Policy, the right to exploration and exploitation of Shale Gas & Oil will lie with the National Oil Companies (NOCs) holding Petroleum Exploration Licence (PEL)/Petroleum Mining Lease (PML) granted under the nomination regime.

Table 8: Details of Exploration Block Awarded

Round	Month/year award of block or PSC signed	No. of blocks awarded	No. of blocks relinquished	No. of blocks operational
NELP-I	Apr. 2000	24	20	4
NELP-II	July, 2001	23	19	4
NELP-III	Feb. 2003	23	18	5
NELP-IV	Feb. 2004	20	15	5
NELP-V	Dec. 2005	20	14	5
NELP-VI	Mar. 2007	52	38	6
NELP-VII	Dec. 2008	41	23	14
NELP-VIII	June,2010	32	7	25
NELP-IX	Mar. 2012	19	2	27

***Source**:Directorate General of Hydrocarbons, Ministry of Petroleum & Natural Gas 2014-15.*

WORLD REVIEW

The world proved reserves of crude oil and natural gas at the end of 2015 were estimated at 239.6 billion tonnes and 186.9 trillion cu m, respectively (Tables - 9 and 10). The largest share of reserves of world crude oil is available in Middle East (45.40%) followed by South & Central America (21.30%), Europe & Eurasia (8.77%), Africa (7.14%), North America (14.99%) and Asia Pacific (2.17%).

Of the total world reserves of natural gas, Middle East possesses the largest share (42.83%) followed by Europe & Eurasia (30.38%), Asia Pacific (8.37%), Africa (7.53%), North America (6.82%) and South & Central America (4.06%).

The world crude petroleum production in 2014 increased to 4,197 million tonnes from 4,116 million tonnes in 2013. OPEC countries, namely, Algeria, Angola, Ecuador, Indonesia, Iran, Iraq, Kazakhstan, Kuwait, Libya, Nigeria, Saudi Arabia, UAE and Venezuela had a share of about 45.4% in the world crude oil production in 2014. Saudi Arabia, Russia & USA (13% each), China (5%), Canada, Iran, UAE & Iraq (4% each) and Mexico & Venezuela (3% each) were the principal producers of crude petroleum.

The world production of natural gas also marginally increased to 3.57 trillion cu m in 2014 from 3.53 trillion cu m in 2013. OPEC countries had a share of 15% in the world natural gas production in 2014. USA (20%), Russia (18%), Iran & Qatar (5% each), Canada & China (4% each) and Norway & Saudi Arabia (3% each) were the major producers of natural gas in 2014 (Tables - 11 & 12).

The world consumption of oil in 2015 was estimated as 4,331 million tonnes, while that of natural gas was 3,135 million tonnes oil equivalent. Consumption of oil and natural gas in India in the same period was 223.24 million tonnes (with 5.15% share) and 46.95 million tonnes oil equivalent (with 1.49% share), respectively.

Table – 9 : World Proved Reserves of Crude Oil* (By Principal Countries)

(In billion tonnes)

Country	Reserves
World: Total	**239.6**
Brazil	1.9
China	2.5
Canada	27.9
Iran	21.7
Iraq	19.3
Kazakhstan	3.9
Kuwait	14.0
Libya	6.3
Nigeria	5.0
Qatar	2.7
Russian Federation	14.0
Saudi Arabia	36.7
UAE	13.0
USA	6.6
Venezuela	47.0
Other countries	17.1

Source: *BP Statistical Review of World Energy, 2015.*
** At 2015 end.*

Table – 10 : World Proved Reserves of Natural Gas* (By Principal Countries)

(In trillion cu m)

Country	Reserves
World : Total	**186.9**
Algeria	4.5
Australia	3.5
Canada	2.0
China	3.8
Egypt	1.8
India	1.5
Indonesia	2.8
Iran	34.0
Iraq	3.7
Kazakhstan	0.5
Kuwait	1.8
Libya	1.5
Malaysia	0.5
Netherlands	0.7
Nigeria	5.1
Norway	1.9
Qatar	24.5
Russian Federation	32.3
Saudi Arabia	8.3
Turkmenistan	17.5
UAE	6.1
USA	10.4
Uzbekistan	1.1
Venezuela	5.6
Other countries	11.5

Source: *BP Statistical Review of World Energy, 2015.*
** At 2015 end.*

FOREIGN TRADE

Exports

Exports of natural gas drastically increased in 2014-15 to 1,38,168 tonnes against 4,922 tonnes in 2013-14. Exports of natural gas were mainly to Rep.of Korea (47%),Singapore (46%) and Nepal (6%) (Table -13).

Exports of petroleum products (total-including light distillates, middle distillates and heavy ends) decreased by 5.79% to 63.9 million tonnes in 2014-15 as compared to 67.8 million tonnes in the preceding year.

Imports

Imports of crude petroleum decreased marginally to 187.91 million tonnes in 2014-15 as compared to 189.18 million tonnes in 2013-14. Imports were mainly from Saudi Arabia (18%), Iraq (13%), Venezuela (12%),UAE (9%), Kuwait & Nigeria (10% each) and Iran (6%). Imports of natural gas increased marginally to 13.29 million tonnes in 2014-15 from 13.02 million tonnes in 2013-14. Main suppliers were Qatar (82%), Nigeria (7%) and Yemen Republic (5%) (Tables - 14 & 15).

Imports of petroleum products (total) at 20.30 million tonnes in 2014-15 increased by 27.41% as compared to 16.72 million tonnes in the preceding year. Besides, 15.47 million tonnes Liquefied Natural Gas (LNG) was imported in 2014-15 as against 13.03 million tonnes in 2013-14.

Table – 11 : World Production of Crude Petroleum (By Principal Countries)

(In million tonnes)

Country	20132	2013	2014
World : Total	**4095**	**4116**	**4197**
Algeria	67	69	66
Angola	87	87	83
Argentina	29	29	29
Azerbaijan	43	43	39
Brazil	111	109	121
Canada	161	173	186
China#	207	210	211
Colombia	47	50	49
Ecuador	26	27	30
Egypt	35	35	35
India*	38	38	37
Indonesia	43	41	40
Iran	177	166	169
Iraq	152	153	160
Kazakhstan	79	82	81
Kuwait@	154	151	151
Libya	71	46	23
Malaysia	28	27	28
Mexico	151	149	144
Nigeria	116	111	113
Norway	94	90	93
Oman	46	47	46
Qatar	83	84	83
Russia	517	523	525
Saudi Arabia@	547	542	543
UAE	155	166	167
UK	45	41	40
USA	409	464	536
Venezuela[e]	140	135	139
Other countries	237	228	230

Source: *World Mineral Production, 2010-2014.*
@ Including shares of production from the Neutral Zone.
 # Including oil from shale and coal.
** Year ended 31st March following that stated.*

Table – 12 : World Production of Natural Gas (By Principal Countries)

(In million cu m)

Country	2012	2013	2014
World: Total	**3505**	**3534**	**3571**
Algeria	81	81	83
Argentina	44	42	41
Australia	60	61	64
Canada	144	145	152
China	111	121	130
Egypt	61	56	49
India*	41	34	33
Indonesia	78	73	74
Iran	166	164	173
Kazakhstan	40	42	43
Malaysia	62	65	66
Mexico	57	58	58
Netherlands	76	81	66
Norway	115	109	109
Oman	38	35	29
Pakistan**	44	43	42
Qatar	171	177	177
Russia	653	668	639
Saudi Arabia***	99	100	108
Thailand	41[e]	42	42
Trininad & Tobago	43	43	42
Turkmenistan	62	62	69
UAE	54	56	58
UK	41	38	39
USA#	681	689	728
Uzbekistan	57	57	57
Other countries	385	392	400

Source: *World Mineral Production, 2010-2014.*
** Year ended 31st March following that stated.*
*** Year ended 30th June of that stated.*
**** Including one half of the output of the natural Zone.*
 # Dry gas.

Table – 13 : Export of Natural Gas (By Countries)

Country	2013-14		2014-15 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**4922**	**282767**	**138168**	**4901801**
Nepal	3100	243290	8961	528223
UAE	1682	35709	15	3333
Bhutan	140	3716	179	10614
Saudi Arabia	-	-	13	1392
Pakistan	-	-	++	146
Germany	-	-	++	7
Korea, Rep. of	-	-	65000	2945008
Singapore	-	-	64000	1413078
Other countries	++	52	-	-

Table – 14 : Import of Petroleum (Crude) (By Countries)

Country	2013-14		2014-15 (P)	
	Qty ('000 t)	Value (₹'000)	Qty ('000 t)	Value (₹'000)
All Countries	**189176**	**8696574352**	**187911**	**7093749532**
Saudi Arabia	39319	1874435805	34753	1335567507
Iraq	24576	1106233380	24017	863280100
Kuwait	20063	911842585	18817	699124533
Venezuela	21304	843626344	23198	723062823
Nigeria	15877	822163112	17929	788791574
UAE	13649	667491845	15999	665812269
Iran	11267	515039278	11200	428585363
Angola	7539	363087424	6796	269044598
Colombia	7102	288567787	3107	106755499
Qatar	5116	258938918	3440	140152407
Other countries	23364	1045147874	28655	1073572859

Table – 15 : Import of Natural Gas (By Countries)

Country	2013-14		2014-15 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**13020689**	**516992878**	**13289155**	**563400559**
Qatar	11579139	453903919	10896163	467221775
Nigeria	609893	27226945	886800	36373110
Yemen Republic	513062	22061925	634024	23135186
Spain	-	-	209485	9821999
Algeria	-	-	137209	6105555
Trininad	-	-	115216	4115063
Oman	-	-	74362	3448601
Malaysia	-	-	68141	2868178
Korea Rep. of	-	-	52950	2717843
UAE	-	-	79059	2602363
Other countries	318595	13800089	135746	4990886

FUTURE OUTLOOK

Several measures are being taken by the Government to intensify exploration and enhance hydrocarbon reserves. These include development of new as well as existing fields, implementation of Enhanced Oil Recovery Schemes, recourse to specialised technology, enlisting the services of international experts and encouraging participation of Private and Joint-Venture Companies in the exploration programme.

Some of the recommendations of the Working Group on Petroleum & Natural Gas Sector for the 12th Five Year Plan (2012-17) are as follows:

Exploration & Production Sector

i. ONGC is to develop marginal fields located in west coast and other gas discoveries in east coast area during 12th Plan period. This will result in increase in natural gas production of ONGC by about 28 MMSCMD in 2016-17.

ii. A National Data Repository (NDR) will comprise reliable exploration and production data for India, with provisions for seamless access. Online data management would be drawn up which would be an essential part of an Open Acreage Licensing Policy (OALP).

iii. Crude oil production in the 12th Five Year Plan period is expected to increase by about 22% over the average production in 11th Five Year Plan period. Natural gas production is expected to increase by about 57% during 12th Five Year Plan period from that of the previous Plan period.

iv. OALP is expected to give further momentum to oil and gas exploration activities in the Indian sedimentary basins. An estimated area of about 3.96 lakh sq km is to be offered under NELP/OALP during 12th Five Year Plan period.

Acquisitions of Assets Abroad

i. During the 12th Plan period, four oil PSUs together have a target to produce about 67 million tonnes of oil equivalent of oil & gas from overseas projects with an anticipated investment to the tune of ₹ 1,14,760 crore.

Natural Gas

i. With a targeted GDP growth rate of over 9%, India's energy demand is expected to grow at 5.2%.

ii. GOI has adopted a multi-pronged strategy to enhance availability of natural gas in the country through (a) intensification of domestic E&P activities through NELP, (b) Coal-bed Methane Exploration & Production activities, (c) Developing underground Coal Gasification and (d) Target Unconventional sources like Shale Gas, Gas Hydrates, etc.

iii. Price sensitivity is a major issue which is limiting LNG imports, and hence, it is imperative to launch progressive reforms across the gas value chain. LNG imports into the country and development of downstream markets to ensure offtake will remain at the core of the Natural Gas Sector in the days to come.

Refining

i. Transformations in the Indian Refining Sector would continue. Refinery capacity is expected to increase from 232.3 million tpy in 2011-12 to 310.9 million tpy by the end of 12th Five Year Plan Period.

ii. Refinery configurations too one likely to undergo further change. Hydrogen production & management, sulphur removal & recovery, changing hydrocarbon species in product pool are the parameter that will continue to drive these changes. The emphasis on green technologies will add to these changes.

iii. Refinery-Petrochemicals integration is an essential driver to economic growth as well as corporate profitability. Significant opportunity exists for refinery-petrochemical integration.

iv. Dependence on crude oil imports is likely to go up from around 80% in 2011-12 to 86.7% in 2016-17.

v. Existing port-infrastructure needs to be strengthened to handle additional Crude and POL imports/exports.

vi. In order to ensure energy security in case of any emergency, strategic storage facilities are under construction at Visakhapatnam, Mangaluru and Padur. A scheme for filling crude oil in the caverns has been proposed.

The country is deficient in oil resources and most of the domestic requirements are met through imports and this trend is likely to continue in the future as well.

Apart from above, as Oil India Ltd, has significant presence in NE part of India, it will concentrate its efforts in this area to achieve continued reserve accretion.

Various technologies will be adopted by the company to enhance recovery and to increase the production capacity of crude over the next 10 to 12 years.

It will also look towards acquisitiion of non-conventional assets like, oil sand, shale gas, gas hyderate, etc. along with addition to acquisition of conventional assets.

Company will also continue to pursue acquisition of prospective overseas E & P opportunities to ensure energy security for the country.

It will also diversify its activities in selective downstream and renewable energy segments, refineries,wind/solar energy, energy distribution/ marketing, etc. in the years to come.