Ministry of Petroleum and Natural Gas
Government of India

ANNUAL REPORT
2017-18

FUELING ENERGY IN EVERY LIFE
MAKING OF NEW INDIA

CONTENTS

Chapter 1

Introduction

Introduction

1.1 The Ministry of Petroleum and Natural Gas is concerned with exploration and production of Oil and Natural Gas, refining, distribution and marketing, import and export, and conservation of petroleum products. The work allocated to the Ministry is given in **Appendix I**. The names of the Central Public Sector Enterprises and other organizations under the Ministry are listed in **Appendix II.**

1.2 Shri Dharmendra Pradhan earlier Minister of State (Independent Charge) for Petroleum & Natural Gas has assumed the charge of Minister for Petroleum & Natural Gas with effect from 3rd September, 2017.

1.3 Shri K.D. Tripathi, IAS (AM: 1980) continues to hold the charge of Secretary in the Ministry of Petroleum & Natural Gas with effect from 1st May, 2015.

1.4 Shri Rajiv Bansal, IAS (NL: 1988) has assume the charge of the post Additional Secretary & Financial Advisor in the Ministry of Petroleum & Natural Gas w.e.f. 24th July, 2017.

1.5 Ms. Urvashi Sadhwani, IES (1982) continues to hold the post of Senior Advisor in the Ministry of Petroleum & Natural Gas with effect from 9th November, 2015.

1.6 Shri Sandeep Poundrik, IAS (BH: 1993) continues to hold the post of Joint Secretary in the Ministry of Petroleum & Natural Gas with effect from 8th October, 2014.

1.7 Shri Sunjay Sudhir, IFS (1993) continues to hold the post of Joint Secretary in the Ministry of Petroleum & Natural Gas w.e.f. 12th January, 2016.

1.8 Shri Amar Nath, IAS (AGMUT: 1994) continues to hold the post of Joint Secretary in the Ministry of Petroleum & Natural Gas w.e.f. 1st June, 2016.

1.9 Shri Ashutosh Jindal, IAS (MT: 1995) continues to hold the post of Joint Secretary in the Ministry of Petroleum & Natural Gas w.e.f. 17th February, 2015.

1.10 Shri Ashish Chatterjee, IAS (TN: 1999) continues to hold the post of Joint Secretary in the Ministry of Petroleum & Natural Gas w.e.f. 2nd November, 2016.

1.11 Shri Diwakar Nath Misra IAS (AM: 2000) earlier Director in the Ministry of Petroleum & Natural Gas has assumed the charge of the post of Joint Secretary in the Ministry of Petroleum & Natural Gas with effect from 9th October, 2017.

1.12 Smt. Sushma Rath, CSS (DR -1988) continues to hold the post of Joint Secretary in the Ministry of Petroleum & Natural Gas with effect from 5th August, 2015.

1.13 Smt. Anuradha S. Chagti, CSS (DR-1991) earlier Director in the Ministry of Petroleum & Natural Gas has assumed the charge of the post of Joint Secretary in the Ministry of Petroleum & Natural Gas with effect from 10th August, 2017.

1.14 Ms. Indrani Kaushal, IES (1995) continues to hold the post of Economic Adviser in the Ministry of Petroleum & Natural Gas with effect from 1st June, 2016.

1.15 Shri Sukh Ram Meena, ISS (1993) has assumed the charge of the post of Deputy Director General in the Ministry of Petroleum & Natural Gas with effect from 6th March, 2017.

1.16 Performance of Petroleum & Natural Gas Sector-Some Key Macro Economic Trends

India continuous to remain one of the fastest growing economies in the world. As per a report of the United Nations titled: World Economic Situation and Prospects 2018, 'the outlook for India remains largely positive, underpinned by robust private consumption and public investment as well as ongoing structural reforms. Hence, GDP growth is projected to accelerate from 6.7% in 2017 to 7.2% in 2018 and 7.4% in 2019.' The growth rate projections for 2018-19 and 2019-20 as per the Global Economic Prospects: January 2018 Report of the World Bank are marginally higher at 7.3% and 7.5% respectively.

As a result of all-round and multi-sectoral reform initiatives, for the first time ever India has jumped up 30 notches into the top 100 rankings on 'Ease of Doing Business' index as per the World Bank group flagship report on Doing Business 2018: Reforming to Create Jobs.

GDP at constant (2011-12) prices in Q2 of 2017-18 is estimated at ₹ 31.66 lakh crore, as against ₹ 29.79 lakh crore in Q2 of 2016-17, showing a growth rate of 6.3 percent. GVA at Basic Price at constant (2011-12) prices for Q2 of 2017-18 is estimated at ₹ 29.18 lakh crore, as against ₹ 27.51 lakh crore in Q2 of 2016-17, showing a growth rate of 6.1 percent over the corresponding quarter of previous year. GVA at basic prices for Q2 of 2017-18 from 'mining and quarrying' sector grew by 5.5 percent as compared to decline of 1.3 percent in Q2 of 2016-17.

1.17 Ensuring Energy Security

The priorities of the Government, as outlined by Prime Minister are Energy Access, Energy Efficiency, Energy Sustainability and Energy security. Towards achieving this, several initiatives have been taken for increasing production and exploitation of all domestic petroleum resources.

The new Hydrocarbon Exploration Licensing Policy (HELP) for award of Hydrocarbon Acreages in the Upstream Sector of India was notified on March 30, 2016 and formally launched w.e.f July 1, 2017. Open Acreage Licensing Policy (OALP) is one of the key features of HELP which has been notified on 30.06.2017.

The Government launched the Bid Round-I under OALP for international competitive bidding on 18.01.2018. For the first time in India, 55 bidder selected blocks, each carved out by prospective bidders themselves in promising basins with an area of 59,282 Sq. KMs were announced for bidding. This is the largest offering of acreages, the Government has announced in the past 8 years.

National Data Repository (NDR) has been set up at DGH to make the entire Exploration and Production (E&P) data available for commercial exploration, research and development and academic purposes. This has been launched on 28.6.2017.

Discovered Small Field Policy (DSF) is aimed at monetizing hydrocarbon resources locked-in for years in a time bound manner to boost domestic production of Oil and Gas. 31 contracts areas have been awarded through international e-bidding in 1st bidding round of DSF. Based on the success of DSF Bid Round-I, DGH has further identified 60 un-monetised discoveries / fields of ONGC and OIL in nomination regime and relinquished blocks of PSC regime.

National Seismic Programme was launched to generate seismic data for initiating E&P activities, which envisages 2D seismic surveys of all sedimentary basins of India. The estimated cost of the project is ₹ 2932.99 Crore. Project will be completed by 2019-20. As on date (31.12.2017), 2D seismic survey of 14,077.4 LKM has been carried out. Out of this, ONGC and OIL have conducted surveys of 13199.8 LKM and 877.6 LKM respectively.

ONGCians gearing up for Seismic Survey as a part of exploration activity for the Quest of Black gold

To have a gas based economy and enhance the share of gas in the energy basket, the Government has envisaged developing additional 15,000 km of gas pipeline network. At present, the natural gas grid in the country predominantly connects the western, northern and south-eastern gas markets with major gas sources. As a commitment to provide the clean energy in the Eastern part of the country, the Government has approved a capital grant of ₹ 5,176 Crore (40 per cent of the estimated capital cost of ₹ 12,940 Crore) under Pradhan Mantri Urja Ganga.

Further, the same pipeline has been approved for extension upto Guwahati to form the National Gas Grid. Efforts are also underway to create a North East region Gas Grid by Oil PSUs to provide pipeline connectivity to all states in the North-Eastern region.

The Government is promoting the usages of environment friendly transportation fuel, i.e. CNG by expanding the coverage of City Gas Distribution (CGD) network in the country. In order to promote the CNG services in the country, the Government has issued guidelines for making available domestic gas to the CGD entities for meeting the entire requirement of CNG for transport segments. At present, 31 CGD companies are developing CGD networks in 81 Geographical Areas (Gas) in 21 State(s)/UTs, which are supplying clean cooking fuel in the form of PNG to about 40 Lakhs in the country. Further Govt. has envisaged to expand the coverage of CGD networks across the country in synchronisation with the gas availability and pipeline connectivity.

India's total refining capacity increased from 233.97 MMTPA (as of 1.4.2017) to 247.57 MMTPA at present with the capacity additions in BPCL-Kochi, HMEL-Bhatinda and RIL (SEZ) Jamnagar refineries.

The Government has implemented supply of BS-IV auto fuels in the entire country in phases by 1.4.2017. Further, Government has also decided to leapfrog from BS-IV to BS-VI directly and a notification has been issued for implementation of BS-VI w.e.f. 01.04.2020 in the entire country. However, considering the recent rise in environmental pollution in Delhi and NCR, Government has preponed the implementation of supply of BS-VI w.e.f. 01.04.2018 in NCT-Delhi.

Pradhan Mantri Ujjwala Yojana (PMUY) has been launched with an aim to provide LPG connections to 5 crore women belonging to the Below Poverty Line (BPL) families, over a period of 3 years starting from FY 2016-17. As on 08.02.2018, more than 3.38 crore new LPG connections have been released.

As on 31.12.2017, more than 19.43 crore LPG consumers have joined the PAHAL Scheme. So far, more than ₹ 62630 crore have been transferred into the bank accounts of consumers. PAHAL has helped in identifying 'ghost' accounts, multiple accounts and inactive accounts. Estimated savings to the Government exchequer in subsidy due to implementation of PAHAL for FY 2014-15, 2015-16, 2016-17 and 2017-18 (upto 31.12.2017) is nearly ₹ 37241 crores.

Direct Benefit Transfer in PDS Kerosene (DBTK) Scheme has been launched to bring reforms in allocation and distribution of PDS SKO distribution system, for better subsidy management, and also for reducing subsidy outgo by means of curbing diversion of subsidized kerosene. DBTK has been implemented in all districts of Jharkhand. Other States have been requested to join the Scheme. Further, States/ UTs are encouraged to become `Kerosene Free' by bringing all households under LPG. So far, UTs of Delhi, Chandigarh, Daman & Diu, Dadar and Nagar Haveli & Puducherry and the States of Haryana, Andhra Pradesh & Punjab have become `Kerosene Free'.

During 2016-17, more than 3.31 crore new LPG connections have been released and during 2017-18 (upto 31.12.2017), more than 2.26 crore new LPG connections have been released. As on 31.12.2017, National LPG coverage has reached 79.2%. To increase number of LPG distributors, advertisement for selection of 6149 new LPG distributorships has been released in various states across the country and selection process is underway. As on 06.01.2018, draw for 3555 locations have been conducted.

To enhance customer confidence through Q&Q (Quality and Quantity) of fuel and minimize chances of fraudulent transactions, OMCs have undertaken action for automation of all ROs selling more than 100KL/Month. As on 31.12.2017, out of 30956 ROs currently selling 100KL/Month, 21722 ROs have been automated.

There has been a significant expansion of digital payment infrastructure at retail outlets. As on 31.12.2017, 83790 POS terminals and 81561 e-wallet facility have been provided at 49428 (92%) petrol pumps across the country; these outlets cover more than 95% of sales.

In line with government's 'Act East' policy, there have been series of engagement in the hydrocarbon sector with the neighboring countries, various pipelines are being constructed to connect gas grids in India with neighboring countries like Bangladesh and Nepal. There has been robust hydrocarbon trade with Nepal, Bhutan and Mauritius. First test cargo of petroleum products has been sent to Myanmar. Plans are underway for setting up LNG terminal in Sri Lanka through an international JV company.

The oil and gas CPSEs have set up a Start-Up fund aggregating to ₹ 320 crore for 3 years. They have also launched their Start-Up websites as well as Innovation Challenges. 29 start-up firms have been selected in Phase-I.

Under the Skill India initiative Hydrocarbon Sector Skill Council (HSSC) has been set up with a projected training plan for certification based skill development programmes and has identified a target of training approximately 7.3 lakh persons by 2022.

A Policy to provide Purchase Preference (linked with Local Content (PP-LC)) in all oil and gas CPSEs has been approved by Government on 12.04.2017, to incentivize growth of local content in goods and services by implementing oil and gas projects in India by providing purchase preference to the manufacturers/ service providers, thereby giving a boost to Make-in-India initiative.

To ensure transparency and fairness, the Oil and Gas CPSEs were directed to consider incorporation of relaxation of Past Track Record (PTR) norm, subject to meeting the quality and technical specifications (except procurement of items related to public safety, health, critical security operations and equipments etc.), to all Startups (whether MSEs or otherwise) in their procurement manuals.

1.18 Crude Oil and Natural Gas Production

The crude oil production for the year 2016-17 is at 36.01 Million Metric Tonnes (MMT) as against production of 36.94 MMT in 2015-16, showing a decrease of about 2.53%. 70.8% of crude oil production is by ONGC and OIL from nomination regime and remaining 29.2% of crude production is by Private/JVs companies from PSC regime. The projected crude oil production in 2017-18 is 37.37 MMT. Crude oil production during April-November, 2017 was at 23.94 MMT which was lower by 0.2% against 23.99 MMT during April-November, 2016. Shortfall in production by ONGC was mainly due to delay in deployment of MOPU-Sagar Samrat, delay in implementation of development of Western Periphery of MHS (ZC) project and natural decline in matured fields of Western Offshore. Production by OIL is mainly from matured fields where decline rate encountered was more than expected, contribution from work-over and new well drilling was not commensurate with fall in production as well as bandhs, blockades, miscreant activities contributed to direct loss of production. Shortfall in production under PSC Regime was mainly due to shutdown at Mangala Processing Terminal (MPT), Panna platform and poor reservoir performance of Bhagyam field. Underperformance of CY-ONN-2002/2 & CB-ONN-2004/2, natural decline in CB-OS/2 and closure of 1 well in MA field in KG-DWN-98/3 also affected the production.

Natural Gas production during the year 2016-17 is at 31.90 Billion Cubic Meters (BCM) which is 1.09% lower than production of 32.25 BCM in 2015-16. 78.5% of natural gas production is by ONGC and OIL from nomination regime and remaining 21.5% of natural gas production is by Private/JVs companies from PSC regime. The projected natural gas production in 2017-18 is 35.24 BCM. The actual production of natural gas during April-November, 2017 was at 21.94 which was higher by 3.72% against 21.15 during April-November, 2016. Shortfall in production by ONGC was mainly attributed to less than planned production from Daman & C-26 Cluster due to evacuation constraint (export lines to TCPP platform are not completed) and natural decline from Bassein field. Shortfall in production under PSC Regime was mainly due to underperformance of KG-OSN-2001/3, Sohagpur West fields, closure of 2 wells in D1D3 field in KG-DWN-98/3 and also due to delay in grant of Petroleum Mining Lease (PML) in AAP-ON-94/1.

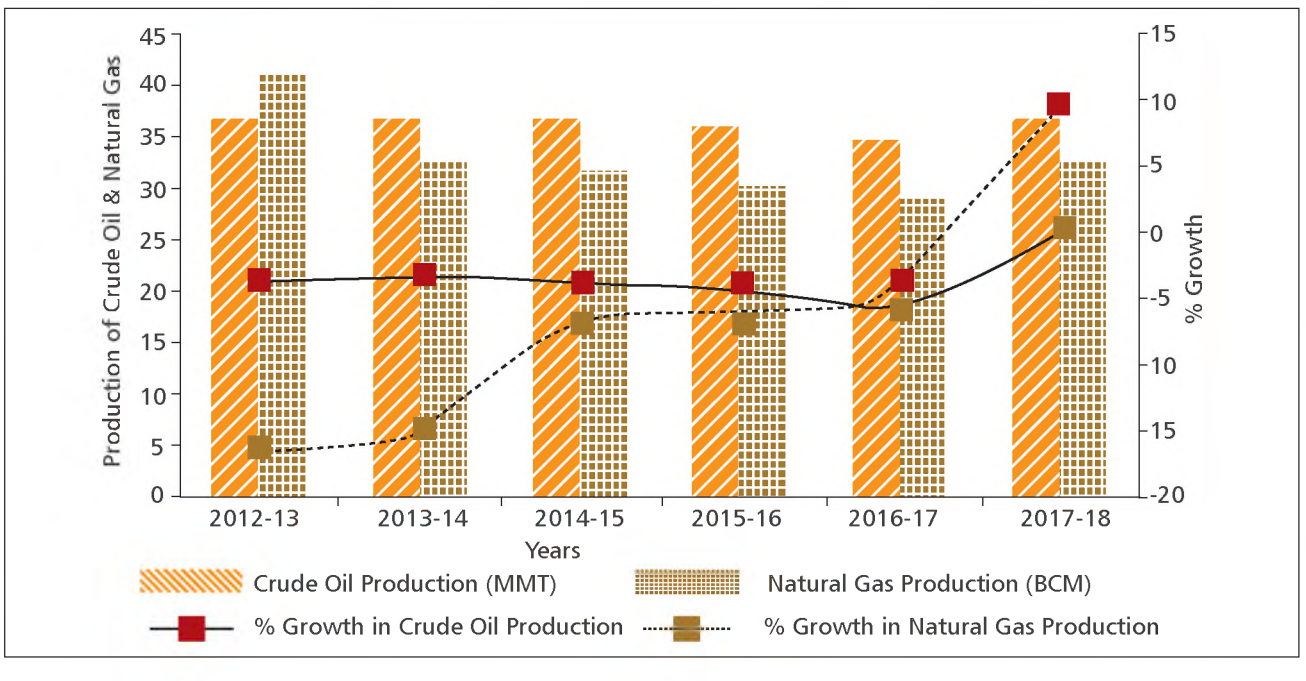
The trends in the production of crude oil and natural gas for the year 2012-13 to 2017-18 have been depicted below **(details in Appendix-III):**

Table-1.1: Crude Oil and Natural Gas Production

Year	Crude Oil Production (MMT)	% Growth in Crude Oil Production	Natural Gas Production (BCM)	% Growth in Natural Gas Production
2012-13	37.86	-0.60	40.68	-14.47
2013-14	37.79	-0.19	35.41	-12.96
2014-15	37.46	-0.87	33.66	-4.94
2015-16	36.94	-1.39	32.25	-4.18
2016-17	36.01	-2.53	31.90	-1.09
2017-18 *	37.37	3.77	35.24	10.49
2016-17 (Apr-Nov)	23.99	-	21.15	-
2017-18 (Apr-Nov) (P)	23.94	-0.21	21.94	3.73

P: Provisional *: Target

Graph-1: Crude Oil & Natural Gas Production



1.19 Refining Capacity & Refinery Crude Throughput

Indian refinery industry has done well in establishing itself as a major player globally. India, which is second largest refiner in Asia after China, is emerging as a refinery hub with refining capacity exceeding demand. The country's refinery capacity has increased to 247.57 MMTPA at present. Capacity of BPCL-Kochi increased from 9.5 MMTPA to 15.5 MMTPA. Further, there was addition of 2.3 MMTPA and 8.2 MMTPA capacities in HMEL-Bhatinda, and RIL (SEZ) Jamnagar refineries respectively during the year. Refinery Crude Throughput (Crude Oil Processed) for the year 2016-17 is 245.36 MMT as against 232.87 MMT in 2015-16, showing an increase of about 5.37%. Targeted Crude Throughput (Crude Oil Processed) for the year 2017-18 is 246.00 MMT. Crude throughput during April-November, 2017 was at 165.83 MMT, higher by 2.08% against 162.45 MMT during April-November, 2016.

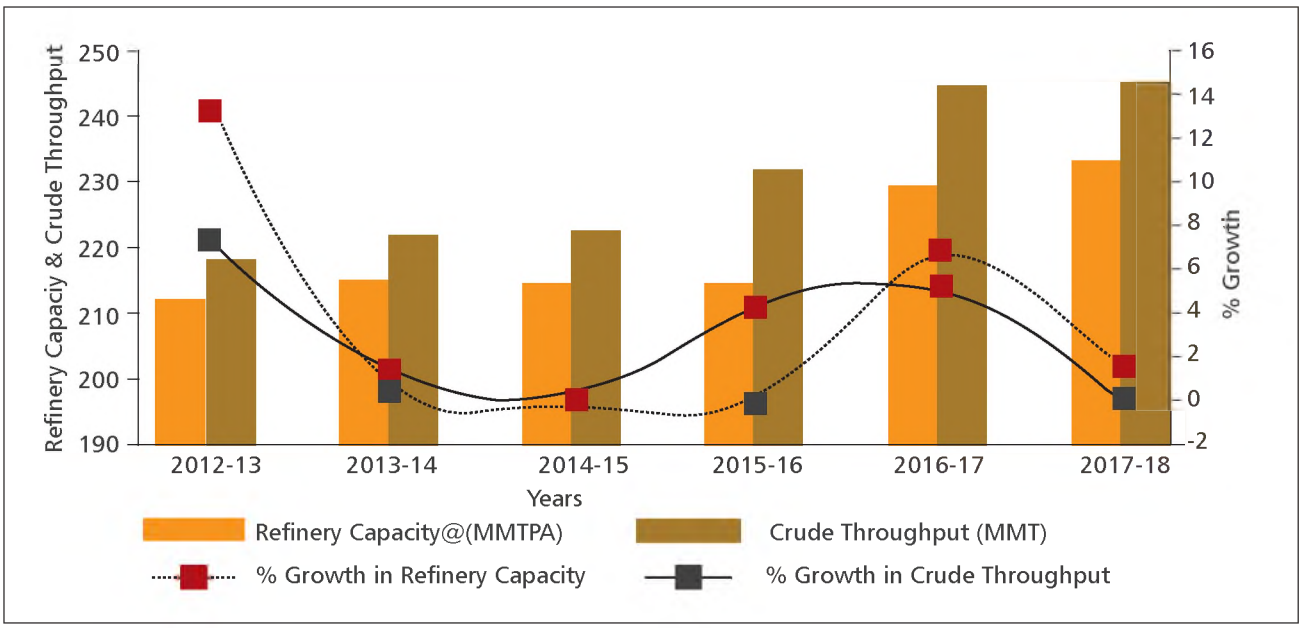
The trend in Refining Capacity and Crude throughput is depicted below **(details in Appendix-IV).**

Table -2 Refinery Capacity & Refinery Crude Throughput (in terms of Crude Oil Processed)

Year	Refining Capacity @ (MMTPA)	% Growth in Refining Capacity	Crude Throughput (MMT)	% Growth in Crude Throughput
2012-13	213.07	13.70	219.21	7.39
2013-14	215.07	0.94	222.50	1.50
2014-15	215.07	0.00	223.24	0.33
2015-16	215.07	0.00	232.86	4.31
2016-17	230.07	6.97	245.36	5.37
2017-18	233.97	1.70	246.00*	0.26
2016-17 (Apr-Nov)	-	-	162.45	-
2017-18 (Apr-Nov)	247.57^	5.81	165.83(P)	2.08

P: Provisional *: Target @: As on 1st April of initial year ^: As on 01.12.2017

Graph-2: Refinery Capacity and Refinery Crude Throughput



1.20 Production and Consumption of Petroleum Products

The production of petroleum products is at 243.55 MMT in year 2016-17 as against 231.92 MMT achieved in 2015-16, showing an increase of about 5.01%. The production of petroleum products is targeted at 243.58 MMT in year 2017-18. During April-November, 2017, production of petroleum products was at 166.40 MMT i.e. an increase of 3.43% over 160.88 MMT of production achieved during the corresponding period last year.

During the year 2016-17, the consumption of petroleum products in India was 194.60 MMT with a growth of 5.37% as compared to consumption of 184.67 MMT during 2015-16. The consumption of petroleum products during April-November, 2017 was at 134.60 MMT i.e. an increase of 3.40% over 130.17 MMT in April-November, 2016.

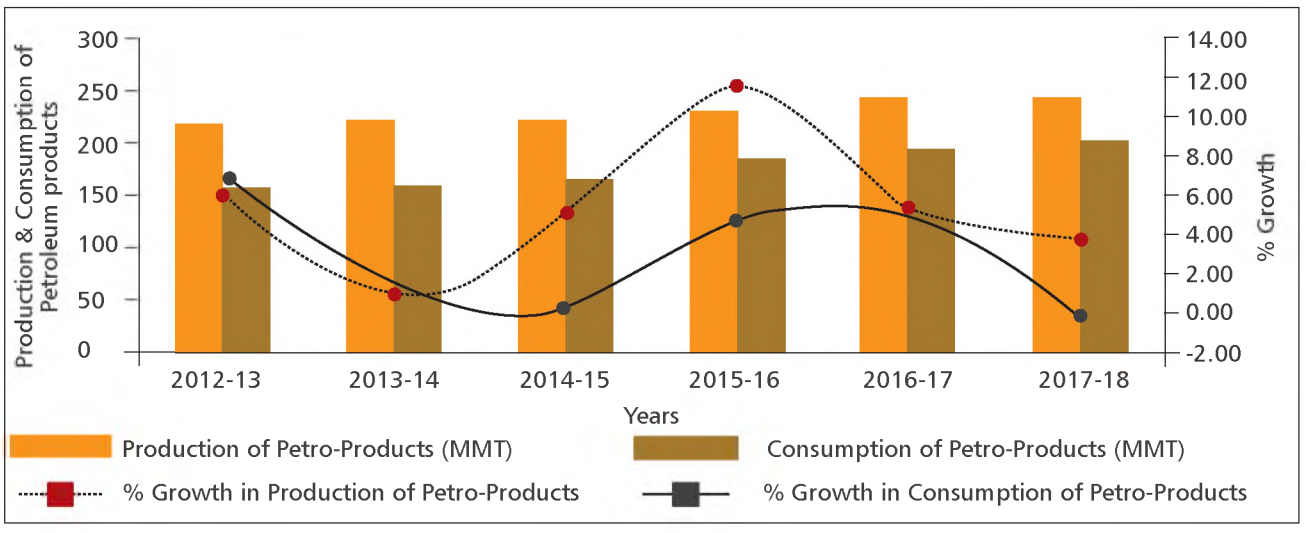
Year-wise production and consumption of petroleum products since 2012-13 to 2017-18 are depicted below **(details in Appendix V-VI).**

Table-3: Production and Consumption of Petroleum Products

Year	Production of Petro-Products (MMT)	% Growth in Production of Petro-Products	Consumption of Petro-Products (MMT)	% Growth in Consumption of Petro-Products
2012-13	217.74	7.15	157.06	6.02
2013-14	220.76	1.39	158.41	0.86
2014-15	221.14	0.17	165.52	4.49
2015-16	231.92	4.88	184.67	11.57
2016-17	243.55	5.01	194.60	5.37
2017-18	243.58*	0.01	201.90**	3.75
2016-17 (Apr-Nov)	160.88	-	130.17	-
2017-18 (Apr-Nov) (P)	166.40	3.43	134.60	3.40

P: Provisional *: Target **: Estimated (Prorated based on April- November 2017 figures)

Graph-3: Production and Consumption (indigenous sales) of Petroleum Products



1.21 Import of Crude Oil

Import of crude oil during 2016-17 was 213.93 MMT valued at ₹ 470159 crore as against import of 202.85 MMT valued at ₹ 416579 crore in 2015-16 which marked an increase of 5.46% in quantity terms and 12.86% in value terms as compared to the import of crude oil during 2015-16. Import of Crude Oil during April-November, 2017 was 144.72 MMT valued at ₹ 3,42,673 crore which marked an increase of 9.31% in quantity terms and 15.32% in value terms as against the imports of 143.81 MMT valued at ₹ 2,97,161 crore for the same period of last year.

The crude prices steadily increased and remained in the band of US$ 94.51-123.61 per barrel from 2011-12 to 2013-14. However, the prices of crude oil and petroleum products have shown a declining trend after July, 2014. The price of Indian basket crude oil which was around $110/bbl in June, 2014, decreased thereafter touching a low of $ 24.03/bbl on 20.01.2016.

The monthly average prices of Indian basket crude oil which remained at a level of $ 30-45/bbl during February-May 2016 started increasing and crossed the level of $50 /bbl to hover in the range of $50-54/bbl upto February 2017. Global average monthly crude oil prices have moved in a relatively wide range of US $ 46-55 per barrel over April-September 2017. There had been a softening of crude oil prices owing to various factors including, inter-alia, increased shale oil production, slowing energy demand in China and vast inventory buildup. Of late, however, crude oil prices have gained momentum since September 2017, on account of some firming up due to OPEC cuts, declining US crude inventories, adverse climatic conditions and geo political concerns.

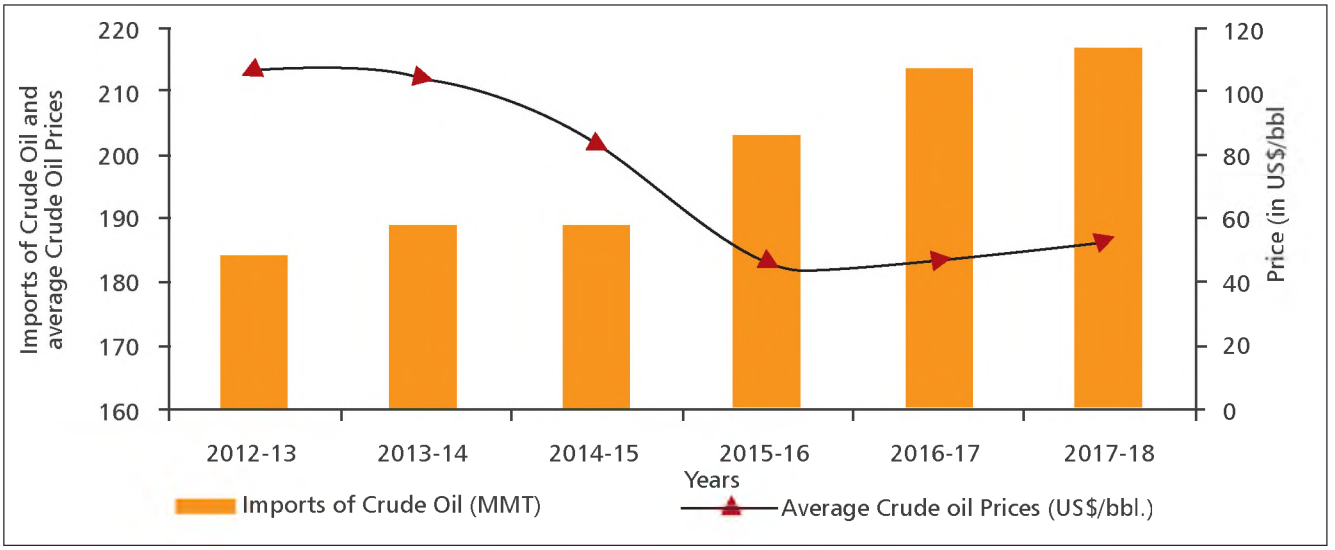
The trend in growth of crude oil imports and crude oil international (Indian Basket) prices is shown in Table-4 & Graph- 4A. The trend in prices of Indian basket crude oil during April, 2016 to December, 2017 is at Graph 4B.

Table-4: Import of Crude Oil and average Crude Oil Prices (Indian basket)

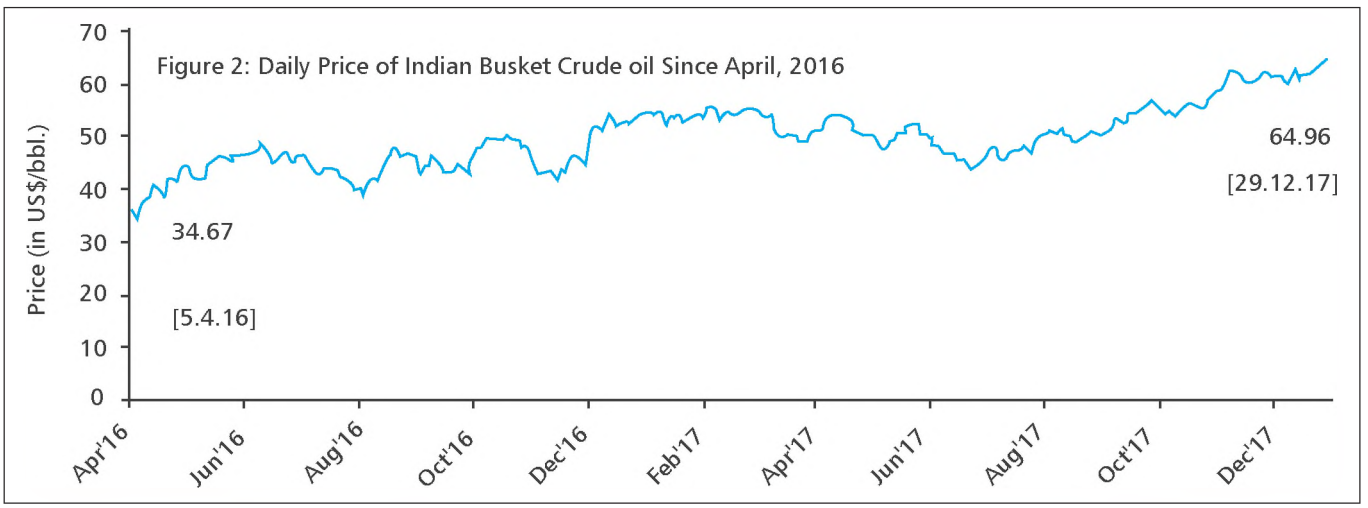
Year	Imports of Crude Oil (MMT)	% Growth in Imports of Crude Oil	Average Crude oil Prices (Indian basket US$/bbl.)	% Growth in Average Crude oil Prices
2012-13	184.80	7.61	107.97	-3.50
2013-14	189.24	2.40	105.52	-2.27
2014-15	189.43	0.10	84.16	-20.24
2015-16	202.85	7.08	46.17	-45.15
2016-17	213.93	5.46	47.56	3.02
2017-18	217.08*	1.47	53.59^	12.68
2016-17 (Apr-Nov)	143.81	-	45.62^	-
2017-18 (Apr-Nov)	144.72(P)	0.63	53.59^	17.47

P: Provisional *: Estimated (Prorated based on April- November 2017 figures) ^: Average April-December

Graph-4A: Quantity of Crude Oil Imports and Average International Crude Oil Prices (Indian basket)



Graph-4B



1.22 Imports & Exports of Petroleum Products

During April-November, 2017, imports of petroleum products were 23.76 MMT valued at ₹ 53,258 crore, which shows decrease of 4.91% in quantity terms but increase of 20.95% in value terms, against the imports of 24.99 MMT valued at ₹ 44033 crore for the corresponding period of previous year. The quantity of petroleum products imported during 2016-17 was 36.29 MMT valued at ₹ 71,566 crore.

During April-November, 2017, exports of petroleum products were 44.31 MMT valued at ₹ 1,40,503 crore, which shows an increase of 1.03% in quantity terms and 12.77% in value terms, as against the exports of 43.86 MMT valued at ₹ 1,24,591 crore for the same period of last year. During 2016-17, 65.51 MMT of petroleum products, valued at ₹ 1,94,893 crore were exported.

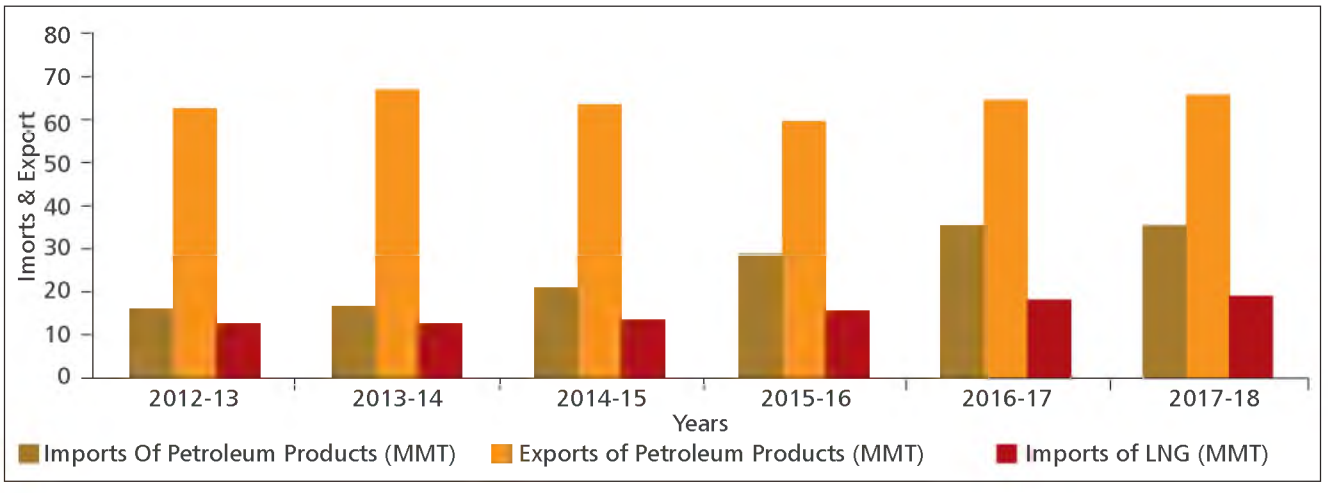
During April-November, 2017, import of LNG was 13.10 MMT valued at ₹ 29,828 crore which marked an increase of 3% in quantity terms and 17.56% in value terms, against imports of 12.72 MMT valued at ₹ 25,372 crore for the same period of previous year. During 2016-17, 18.63 MMT of LNG, valued at ₹ 40813 crore was imported. The trend in quantity of petroleum products and LNG imports & exports is depicted in Table-5 & Graph-5 **(details in Appendix-VII).**

Table-5: Imports & Exports of Petroleum Products

Year	Imports of Petroleum Products (MMT)	% Growth in Imports of Petroleum Products	Exports of Petroleum Products (MMT)	% Growth in Export of Petroleum Products	Imports of LNG (MMT)	% Growth in Imports of LNG
2012-13	16.35	3.18	63.41	4.23	13.14	-0.60
2013-14	16.70	2.10	67.86	7.03	12.99	-1.07
2014-15	21.30	27.57	63.93	-5.79	14.09	8.45
2015-16	29.46	38.28	60.54	-5.31	16.14	14.55
2016-17	36.29	23.19	65.51	8.22	18.63	15.42
2017-18*	35.64	-1.78	66.47	1.45	19.65	5.47
2016-17 (Apr-Nov)	24.99	-	43.86	-	12.72	-
2017-18 (Apr-Nov) (P)	23.76	-4.91	44.31	1.03	13.10	3.00

P: Provisional *: Estimated figures (Prorated based on April- November 2017 figures)

Graph-5: Trend in Imports & Exports of Petroleum Products and imports of LNG



1.23 Equity Oil and Gas from Abroad

In order to supplement domestic availability of crude oil & natural gas, the Government has been encouraging acquisition of assets abroad. Our oil and gas companies are present in 27 countries with investments of nearly US$ 33 billion.

ONGC Videsh Limited (OVL), which is wholly owned subsidiary and overseas arm of Oil and Natural Gas Corporation Limited (ONGC), was created with an objective of acquiring overseas assets, including exploration, development and production of oil and gas. Presently, it has participation in 39 E&P projects in 18 countries. OVL currently has oil and gas production from 14 assets, 4 assets where hydrocarbons have been discovered and are at various stages of development and 17 assets are under various stages of Exploration. There are 4 pipeline projects. During the financial year 2017-18, the share of equity oil & gas for OVL from its overseas investment is approximately 9.34 MMTOE till November, 2017.

Bharat Petro Resources Limited (BPRL), a 100% subsidiary of Bharat Petroleum Corporation Ltd. (BPCL), has Participating Interest (PI) in 10 overseas blocks in 5 countries along with Equity stakes in 2 companies in Russia that hold the license to 4 Producing assets.

As of November 2017, IndianOil Corporation Limited (IOCL) has participating interest in 8 overseas blocks located in 7 countries. IOCL holds non-operating participating interest ranging between 3.5% and 50% in these 8 overseas blocks.

Hindustan Petroleum Corporation Limited (HPCL), through its wholly owned subsidiary, Prize Petroleum International Pte Ltd (PPIPL), acquired minority stake in two assets in Australia in 2014. Currently, one of the assets produces gas, condensate and LPG from three wells.

Oil India Limited (OIL) has stakes in oil and gas assets in 11 countries, some of which are independent investments and others in partnership with other Indian CPSEs as part of consortium. OIL's share of production from overseas assets stood at 1.147 MMTOE during the period April to September 2017.

India Consortium comprising ONGC Videsh (OVL), Bharat PetroResource Ltd. (BPRL) and Indian Oil Corporation Ltd. (IOCL) acquired 10% Participating Interest in Lowe Zakhum offshore oil field in UAE on 10th February 2018. The Concession Agreement in this context was signed in the presence of Prime Minister of India and HRH Crown Prince of Abu Dhabi in Abu Dhabi. This is the first Indian upstream investment in a producing asset in the Gulf region and in the Middle East. Indian share of 10% oil will be about 1.75 MMTPA for next 40 years and total cumulative share of the Indian consortium will be 70 MMT over the next 40 years. The Concession Agreement will directly boost India's energy security. Further, the stake will also provide a valuable platform to Indian upstream companies to work alongside the international majors and thus expose them to the latest state-of-the-art technology and management practices.

1.24 Foreign Direct Investment Inflows

In order to attract Foreign Direct Investment (FDI) in the sector, the FDI policy has been further liberalized. FDI for petroleum refining by CPSEs has been allowed with 49% foreign equity under the automatic route instead of approval through Foreign Investment Promotion Board. Year-wise FDI inflows under Petroleum & Gas sector is given in Table-6. It may be observed that inflow of FDI in petroleum and natural gas has varied considerably over the years that could at least be partly due to the bulkiness of investment in the sector. During the year 2016-17, FDI inflow received was ₹ 11971 crore contributing 0.41% of total FDI inflow in the economy.

Table -6: Year wise FDI inflows under Petroleum & Gas Sector

Years	FDI inflows				Annual Growth (%)			
	All Sectors		P&NG Sector		All Sectors		P&NG Sector	
	₹ Million	US$ Million	₹ Million	US$ Million	₹ Million	US$ Million	₹ Million	US$ Million
2012-13	1219067	22424	11926	215	-26.18	-36.15	-88.02	-89.42
2013-14	1475178	24299	6784	112	21.01	8.37	-43.12	-47.75
2014-15	1891071	30931	64957	1079	28.19	27.29	857.51	861.44
2015-16	2623216	40001	6770	103	38.72	29.33	-89.58	-90.45
2016-17	2916963	43478	11971	180	11.20	8.69	76.81	75.11
2017-18	1804818	28036	449	7	-	-	-	-
(Apr-Oct)								

*: Provisional

1.25 Plan Outlay for Ministry of Petroleum & Natural Gas

The actual expenditure of Internal & Extra Budgetary Resources (IEBR) of oil and gas CPSEs in 2016-17 was ₹ 104426.04 crore against Budget Estimate (BE) of ₹ 87214.56 crore. Budget Estimates (BE) of IEBR of oil and gas CPSEs under Ministry of Petroleum & Natural Gas in 2017-18 is ₹ 86027.29 crore. Against this, ₹ 62232.32 crore has been utilized during April-December, 2017 by the oil & gas CPSEs. Detailed Budget Estimates of the Ministry of Petroleum & Natural Gas in 2017-18 are given in **Appendix VIII.**

1.26 Strategic Crude Oil Storage

In order to provide energy security and as a buffer from supply side disruption of crude oil, Government of India (GoI) has established Strategic Petroleum Reserve (SPR) facalities at three locations viz. Visakhapatnam (Andhra Pradesh), Mangalore and Padur in Karnataka. These facilities, which have total capacity of 5.33 MMT, are being managed by Indian Strategic Petroleum Reserve Limited (ISPRL). GoI has filled the Vishakhapatnam Strategic Petroleum Reserve (SPR) facility. For

ISPRL strategic crude oil storage

ONGC Wind Mill

filling up Manglore SPR facility, ISPRL and ADNOC (of UAE) signed a restated Definitive Agreement on Oil Storage and Management on 10th February 2018. Under the Agreement, ADNOC will fill 5.86 million barrels of crude oil in the Manglore SPR facility at it's own cost. The total reserve is currently estimated to supply approximately 10 days of India's crude requirement. To further augment energy security of India, GoI announced construction of additional SPR facilities at two more locations. The Ministry is working towards identifying suitable locations for the SPRs after taking into account the technical, geological, security aspects and for better commercial utilization.

1.27 Non-Conventional Energy

Ethanol Blended Petrol Programme: The Government through Oil Marketing Companies (OMCs), is implementing Ethanol Blended Petrol (EBP) Programme under which, OMCs sell ethanol blended petrol with percentage of ethanol up to 10%. In order to augment the supply of ethanol, the Government in December, 2014 introduced the administered price mechanism. For the sugar season 2017-18, Government has fixed the administered price of ethanol during ethanol supply period from 1st December 2017 to 30th November 2018 at ₹ 40.85/ - per litre. Additionally, GST and transportation charges will also be payable.

2G Ethanol Programme: In December, 2014 ethanol produced from other non-food feedstocks besides molasses, like cellulosic and lingo cellulosic materials including petrochemical route was allowed to be procured. Oil PSUs are also working in the direction of setting up 12 Second Generation (2G) ethanol Biorefineries in 11 States with an objective to boost production of ethanol in the country. Some Oil PSUs have completed Detailed Feasibility Report (DFR) of their projects and are planning to commence the mechanical erection works at the earliest, subject to a few statutory approvals & clearances.

Biodiesel Programme: The Government, vide notification dated 29th June, 2017, has allowed for direct sale of Biodiesel (B-100) for blending with High Speed Diesel to all consumers, in accordance with the specified blending limits and the standards specified by the Bureau of Indian Standards. Pursuantly, OMCs and concerned Ministries have been requested on 9.8.2017 to take appropriate action for implementation of the said order.

1.28 New and Renewable Energy

As a part of initiative under New and Renewable Energy, OMCs have provided solar lighting in Retail Outlets (ROs). As of November, 2017, OMCs have undertaken solarisation of 9871 retail outlets with solar power plants. The expenditure incurred on solarisation of one retail outlet ranges from ₹ 6 lakh to ₹ 25 lakh. Besides, IndianOil Corporation Ltd. is exploring the feasibility of battery charging for EVs as well as swapping infrastructure in Retail Outlets.

Recently, the work related to bio-fuels has been transferred from Ministry of New & Renewable Energy to Ministry of Petroleum & Natural Gas. To spurt growth in Bio-fuel industry, this Ministry has initiated the process of formulating the National Policy on Bio-fuels – 2018 and is planning to come up with a scheme to incentivize setting up of 2G Ethanol Bio-refineries based on crop residues and Municipal Solid Waste (MSW).

1.29 Fuel Conservation Initiative: SAKSHAM

Petroleum Conservation Research Association (PCRA) is at the forefront of promoting conservation of petroleum products & energy efficiency in various sectors of economy. In order to provide

sustained impetus on fuel conservation efforts PCRA undertakes nationwide people centric mass awareness campaign, called "SAKSHAM (Sanrakshan Kshamta Mahotsav) starting 16th January in association with CPSE Oil & Gas companies. During this one month drive, various sections of society viz., students, youth, farmers, housewives, drivers, industrial workers etc are being engaged to profess and propogate the need to conserve by judicious utilization of one & all in underlining, and appreciating the individual's effort in reducing consumption of energy and lessening GHG emissions through multiple activities.

1.30 Goods & Services Tax (GST)

The Goods and Services Tax (GST) has been implemented w.e.f 1.7.2017. Five petroleum sector items viz., Crude Oil, Natural Gas, Petrol, Diesel and Aviation Turbine Fuel, although included under the GST Constitutional Amendment Act, are presently, outside the scope of levy of GST, till such time they are notified, based on the recommendation of the GST Council. The sector is, thus, faced with a hybrid tax regime on account of being subject to levy of existing taxes i.e. excise duty and State sales tax for non-GST items and GST for the remaining petroleum products. The matter for bringing 5 excluded products under GST has been flagged by Ministry of Petroleum & Natural Gas to the Ministry of Finance. As a result of in-depth deliberation with the Group and follow up at various levels, GST rates have been recently rationalized by the GST Council for select items.

1.31 Swachh Bharat Mission

Ministry of Petroleum and Natural Gas (MoPNG) has been proactively involved in mainstreaming Swachhta in its regular activities and carrying out various initiatives to make Swachhta a Jan

ONGCians taking Swachh Bharat to Mount Everest

Andolan. In recognition with the efforts undertaken towards Swachh Bharat Mission in the past 3 years, MoPNG has been conferred with the Swachh Bharat Inter-Ministerial Award on October 2, 2017.

The focus of MoPNG has been not only to garner people's involvement but also to bring about behavioural and attitudinal change through unique/special contribution to the cause of Swachh Bharat Mission, through innovative and unconventional practices/approaches. Some of the innovative activities undertaken by Oil & Gas CPSEs, under the administrative control of MoPNG, inter-alia include, launch of Project Saraswati to tap the ground water resources along the course of Paleo-channel of river Saraswati in Haryana to tide over severe water crisis in summer; construction of unique zero energy based vegetable cellars in Nang village near Leh for helping potato farmers by preventing rotting of farm produce due to extreme temperatures; construction of bio-toilets in Leh (J&K) and Mahanandpur (Bihar), making ODF localities such as Bharatnagar (Maharashtra), Gandhigaon (Assam) etc., cleaning Himalayas in collaboration with Indian Mountaineering Foundation and organizing competitions on Swachhta Apps.

Under the Swachh Vidyalaya Abhiyan, to reduce the drop-out rate among girl students due to non-availability of separate toilet facilities, Oil CPSEs/JVs have constructed more than 20,187 school toilets. These toilets are used by more than 5 lakh girl students. More than 95% of the toilets have been constructed in rural areas. Under waste to fuel projects, Oil & Gas CPSEs have taken initiatives for implementation of waste to fuel projects on a pilot basis across 7 States.

Tourist/religious iconic places have been earmarked for Oil and Gas CPSEs with focus on special clean up initiative focusing on maintenance and upkeep of tourist/religious places. The best iconic place award was given to Golden Temple, Amritsar and Special awards were given to Mata Vaishno Devi temple, J&K and Meenakshi temple, Tamil Nadu, adopted by HPCL, IOCL and BPCL respectively.

1.32 Achievements at a glance

1.32.1 Exploration & Production

HELP: The new Hydrocarbon Exploration Licensing Policy (HELP) for award of Hydrocarbon Acreages in the Upstream Sector of India was notified on 30th March, 2016 and formally launched w.e.f 1st July, 2017. Open Acreage Licensing Policy ("OALP"). One of the main components of HELP, has been launched on 30.6.2017 to call for Expression of Interest (EOI) for the open acreages. International Competitive Bidding for 55 blocks has been launched on the basis of blocks identified after receiving Expression of Interest (EOI).

Discovered Small Field Policy: The Union Cabinet approved 69 marginal fields for offer under Discovered Small Fields Policy. Out of these, 67 Discovered Small Fields were clubbed into 46 contract areas and put on offer. Based on the success of DSF Bid Round-I, DGH has further identified 60 un-monetised discoveries / fields of ONGC and OIL in nomination regime and relinquished blocks of PSC regime. DSF - II is now approved by Cabinet.

Survey of un-appraised areas of Sedimentary Basins of India: To generate seismic data for initiating Exploration and Production (E&P) activities, Government prepared a Project to conduct 2D seismic surveys of all sedimentary basins of India. The estimated cost of the project is ₹ 2932.99 Crore. Project will be completed by 2019-20. As on date 31.10.2017, 2D seismic survey of 10,200.54 LKM has been carried out. Out of this ONGC has conducted survey of 1902.68 LKM and OIL has conducted survey of 697.86 LKM.

Hon'ble President of India and Minister P&NG with PMUY beneficiaries

National Data Repository (NDR) : NDR has been set up at DGH to make the entire E&P data available for commercial exploration, research and development and academic purposes. This has been launched on 28.6.2017.

1.32.2 Natural Gas

National Gas Grid (Pradhan Mantri Urja Ganga): To have a gas based economy and enhance the share of gas in the energy basket to 15%, the Government has envisaged developing additional 15,000 km of gas pipeline network. At present, the natural gas grid in the country predominantly connects the western, northern and south-eastern gas markets with major gas sources. As a commitment to provide the clean energy in the Eastern part of the country, the Government has approved a capital grant of ₹ 5,176 Crore (40 per cent of the estimated capital cost of ₹ 12,940 Crore).

City Gas Distribution Network: Hon'ble Prime Minister in Urja Sangam 2015 on 27.03.2015 at Vigyan Bhawan, New Delhi mentioned as under "In the next four years, to increase Piped Line Gas Connection from 28 lakh connections to 1 crore connections to reduce pollution in the cities." At

present, 31 CGD companies are developing CGD networks in 81 GAs in 21 State(s)/UTs which are supplying clean cooking fuel in the form of PNG to about 40 Lakhs in the country. Further Govt. has envisaged to expand the coverage of CGD networks across the country in synchronisation with the Gas availability and pipeline connectivity.

In the eastern part of the country, the Piped Natural Gas (PNG) supply to household and Compressed Natural Gas (CNG) supply to transport sector in the city of Bhubneshwar (Odisha) was commenced

in year 2017. Further, development of CGD network in the city of Cuttack (Odisha) is also underway to provide the PNG & CNG in near future.

Promotion of CNG/LNG in Transportation Sector: The Government is promoting the usages of environment friendly transportation fuel, i.e. CNG by expanding the coverage of City Gas Distribution (CGD) network in the country. In order to promote the CNG services in the country, the Government has issued guidelines for making available domestic gas to the CGD entities for meeting the entire requirement of CNG for transport segments.

1.32.3 Refinery

Augmentation of refinery sector: Out of the 23 refineries operation in the country, 18 are in public sector, 3 are in private sector and two as a joint venture with a total refining capacity of 247.566 MMTPA. Out of the total refining capacity of 247.566 MMT, 142.066 MMT is in the public sector, 17.3 MMT in joint venture and the balance 88.2 MMT is in the private sector. The country is not only self-sufficient in the refining capacity for its domestic consumption but also exports a sufficient quantity of petroleum products.

1.32.4 Marketing

Pradhan Mantri Ujjwala Yojana (PMUY): This scheme has been launched with an aim to provide LPG connections to 5 crore women belonging to the Below Poverty Line(BPL) families, over a period of 3 years starting from FY 2016-17. As on 4.12.2017, more than 3.2 crore new LPG connections have been given to them. Out of this, 30.5% and 13.3% connections have been issued to SC and ST categories respectively.

PAHAL: As on 13.11.2017, more than 19.12 crore LPG consumers have joined the PAHAL Scheme. PAHAL has entered into Guinness book of World record being largest Direct Benefit Transfer scheme. So far, more than ₹ 58243 crore have been transferred into the bank accounts of consumers. PAHAL has helped in identifying 'ghost' accounts, multiple accounts and inactive accounts. Estimated savings in subsidy due to implementation of PAHAL for FY 2014-15, 2015-16 and 2016-17 is nearly ₹ 29446 crore.

Direct Benefit Transfer in PDS Kerosene (DBTK) Scheme: To bring reforms in Allocation and Distribution of PDS SKO distribution system, for better subsidy management, and also for reducing subsidy outgo by means of curbing diversion of subsidized kerosene, this scheme was launched. DBTK has been implemented in all districts of Jharkhand and 4 districts of Chattisgarh. Other States have been requested to join the Scheme. Further, States/ UTs are encouraged to become `Kerosene Free' by brining all households under LPG. So far, UTs of Delhi, Chandigarh, Daman & Diu, Dadar and Nagar Haveli & Puducherry and the States of Haryana, Andhra Pradesh & Punjab have become `Kerosene Free'.

LPG Coverage: During 2016-17, more than 3.31 crore new LPG connections have been released and during 2017-18 (upto 18.12.2017), more than 2.26 crore new LPG connections have been released. As on 1.11.2017, National LPG coverage has reached to 78.3% from 60.6% as on 11.1.2015.To increase the LPG coverage further, advertisement for selection of 6149 new LPG distributorships has been released in various states across the country and selection process is underway. As on 19.12.2017, draw for 2468 locations have been conducted.

Subsidy on Kerosene and LPG: As on 1st December, 2017, the Oil Marketing Companies are currently incurring under recovery of ₹ 12.44 per litre on PDS Kerosene and Government is providing cash compensation of ₹ 252 per cylinder under DBTL.

Automation at OMC ROs: To enhance customer confidence through Q&Q (Quality and Quantity) of fuel and minimizes chances of fraudulent transactions, this Ministry has given the target to

OMCs to Automate all ROs selling more than 100KL/Month. As on 15.11.2017, out of 31155 ROs currently selling 100KL/Month, 21152 ROs have been automated.

Promotion of Digital Payments Undertaken by MOP&NG: There has been a significant expansion of digital payment infrastructure at retail outlets. As on 28.11.2017, 82132 POS terminals and 81070 e-wallet facility have been provided at 49204 (90%) petrol pumps across the country, these Outlets cover more than 95% of sales.

1.32.5 Auto Fuel Vision

Auto Fuel Vision and Policy – Introduction of BS-IV & BS-VI fuels in the Country : The Government has implemented supply of BS-IV auto fuels in the entire country in phases by 01.04.2017. Further, Government has also decided to leapfrog from BS-IV to BS-VI directly and a notification has been issued for implementation of BS-VI w.e.f. 01.04.2020 in the entire country. However, considering the recent rise in environmental pollution in Delhi and NCR Government has preponed the implementation of supply of BS-VI w.e.f. 01.04.2018 in NCT-Delhi.

EBP Programme: In order to improve the availability of ethanol, the Government revised the ex-mill price of ethanol for the ethanol supply year 2017-18 at ₹ 40.85/per litre. During 2015-16, OMCs procured 111 crore litres of ethanol (till 30.11.2016) which is an all time record in the history of EBP. For 2016-17, OMCs have floated tender for the quantity of 278 crore litres of enthanol out of which 62.32 crore litres has been received till 14.11.2017.

Biodiesel Programme: The Government, vide notification dated 29th June, 2017, has paved the way for direct sale of Biodiesel (B-100) for blending with High Speed Diesel to all consumers, in accordance with the specified blending limits and the standards specified by the Bureau of Indian Standards.

2nd Generation Ethanol through Lignocelluloses Route: Oil PSUs are establishing twelve 2G Ethanol plants in 11 States of the country. Six MoUs have been signed between Oil Marketing Companies and Technology Providers (5 MoUs) / State Government (1 MoU) for setting of 2G ethanol plants in five locations. Foundation stone of the first Biofuel refinery set up by Hindustan Petroleum Corporation Limited in Bathinda, Punjab, has been laid.

Minister P&NG addressing the audience during the inauguration of Skill Development Institute at Ahmedabad

1.32.6 International Cooperation

In line with our 'Act East' policy, there has been series of engagement in the hydrocarbon sector with the neighbouring countries, various pipelines are being constructed to connect our gas grids with our neighbours like Bangadesh and Nepal. We have robust hydrocarbon trade with Nepal, Bhutan and Mauritious and have sent first test cargo of petroleum products to Myanmar. We are also working towards setting up an LNG terminal in Sri Lanka through an international JV company.

1.32.7 Flagship Programme

Start-Up India: The oil and gas CPSEs have set up a Start-Up fund aggregating to ₹ 320 Crore for 3 years. They have also launched their Start-Up websites and have launched Innovation Challenges. 29 start-up firms have been selected in Phase-I.

Skill Development: Under the Skill India initiative Hydrocarbon Sector Skill Council (HSSC) has been set up with a projected training plan for certification based skill development programmes and has identified a target of training approximately 7.3 lakh persons by 2022.

Make in India: A Policy to provide Purchase Preference (linked with Local Content (PP-LC) in all oil and gas PSUs has been approved by the Government on 12.04.2017 to incentivize growth of local content in goods and services by implementing Oil and gas projects in India by providing purchase preference to the manufacturers / service providers.

Ease of Doing Business: To ensure transparency and fairness the Oil and Gas PSUs were directed to consider incorporation of relaxation of Past Track Record (PTR) norm subject to meeting the quality and technical specifications (except procurement of items related to public safety, health, critical security operations and equipments etc.) to all Startups (whether MSEs or otherwise) in their procurement manuals.

Engagement of Apprentices: PSUs have also been directed to prepare their action plans for increasing engagement of apprentices upto the level of 10% of the total workforce by December 2017.

Chapter 2

Exploration & Production

2.1 Preamble

2.1.1 The energy demand will rise with social and economic development in the country. Current hydrocarbon demand is much more than the domestic crude oil and natural gas production. India is the 3rd largest consumer of energy after China and USA. The country is dependent on imports for about 82.1% of its crude oil requirement and to the extent of about 44.4% in case of natural gas. A large amount of foreign exchange goes on import of crude oil and Liquefied Natural Gas (LNG) in order to meet the energy needs of people of India. In order to bridge the gap between energy supply and demand, it is imperative to accelerate the exploration and production activities in the country.

2.1.2 Exploration and Production sector was opened up after implementation of New Exploration Licensing Policy (NELP) and Coal Bed Methane (CBM) Policy in 1997-99. These policies provide a level playing field to the private investors by giving the same fiscal and contract terms as applicable to National Oil Companies (NOCs) for the offered exploration acreage.

2.1.3 In a major Policy drive to give a boost to petroleum and hydrocarbon sector, the Government has unveiled a series of initiatives. The reforms in hydrocarbon sector are based on the guiding principles to enhancing domestic oil and gas production, increasing investment, generating sizable employment, enhancing transparency and reducing administrative discretion. Government has formulated path breaking policies to revolutionize the E&P sector which inter-alia includes –

- Gas Pricing Reforms
- Policy Framework for Early Monetization of CBM
- Discovered Small Field (DSF) Policy
- Reform Initiatives to Enhance Domestic Production
- Hydrocarbon Exploration and Licensing Policy (HELP) coupled with operationalization of Open Acreage Licensing Policy (OALP)
- Monetization of the Ratna offshore field
- Permission of Extraction of CBM to Coal India Limited (CIL) & its subsidiaries in coal Mining area.
- Policy for the Grant of extensions to Pre-NELP Exploration Blocks
- Hydrocarbon Vision 2030 for North East
- National Seismic Programme of Un-appraised areas
- National Data Repository (NDR)

2.1.4 In the upstream sector, the two Upstream National Oil Companies (NOCs) viz., Oil and Natural Gas Corporation Limited and Oil India Limited play a dominant role with a total share of about 76% in oil and gas production in the country. Presently, ONGC produces nearly 62.5% of indigenous crude oil and 71.5% of country's gas production, while OIL's share is 9.5% of indigenous crude oil and 8.9% of gas production. The share of Private/JV companies in oil and gas production is 28% and 19.6% respectively.

2.1.5 The Directorate General of Hydrocarbons (DGH) was established under the administrative control of Ministry of Petroleum and Natural Gas by Government of India Resolution in 1993. The objective of setting up of DGH was - to promote sound management of the IndianOil and natural gas resources having a balanced regard for environment, safety, technological and economic aspects of petroleum activity.

Source: PPAC Ready Reckoner, Oil Industry at a glance, November, 2017

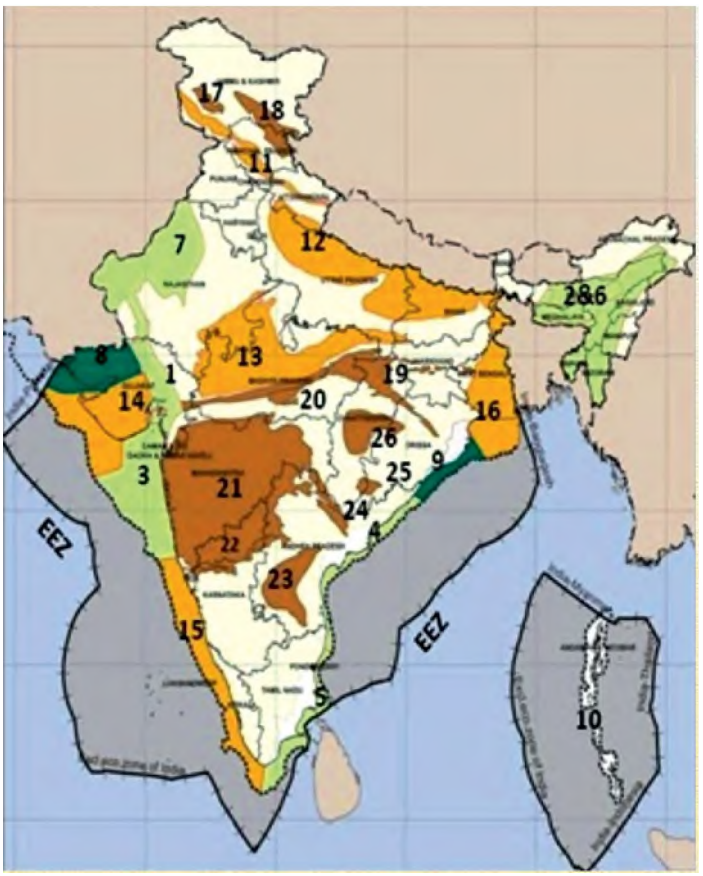
2.2 Sedimentary Basins in India

2.2.1 India has 26 sedimentary basins covering an area of 3.14 million square kilometres. The sedimentary basins of India, onland and offshore up to the 400m isobath, have an aerial extent of about 1.84 million sq. km. In the deepwater beyond the 400m isobath, the sedimentary area has been estimated to be about 1.30 million sq. km.

2.2.2 The Indian sedimentary basins have been broadly divided into four categories based on their degree of prospectivity as presently known which is as under:

Table 2.1: Categories of Indian sedimentary basins

Type of basins	Area (Sq. KM)	Hydrocarbons Prospectivity	Basins/ Region
Category I (7 Basins)	532500	Established commercial production	Cambay, Assam Shelf, Mumbai offshore, Krishna Godavari, Cauvery, Assam Arakan Fold Belt and Rajasthan
Category II (3 Basins)	182000	Known accumulation of hydrocarbons but no commercial production as yet	Kutch, Mahanadi-NEC & Andaman-Nicobar
Category III (6 Basins)	660000	Indicated hydrocarbon shows that are considered geologically prospectivity.	Himalayan Foreland, Ganga, Vindhyan, Saurashtra, Kerala-Konkan-Lakshadweep & Bengal
Category IV (10 basins)	461200	Uncertain potential which may be prospective by analogy with similar basins in the world.	Karewa, Spiti-Zanskar, Satpura-South Rewa-Damodar, Narmada, DecanSyneclise, Bhima-Kaladgi, Cuddapah, Pranhita-Godavari, Bastar, Chhattisgarh
Deepwater	1299000		East & west cost from 400 m water depth to EEZ
Total	3134700		

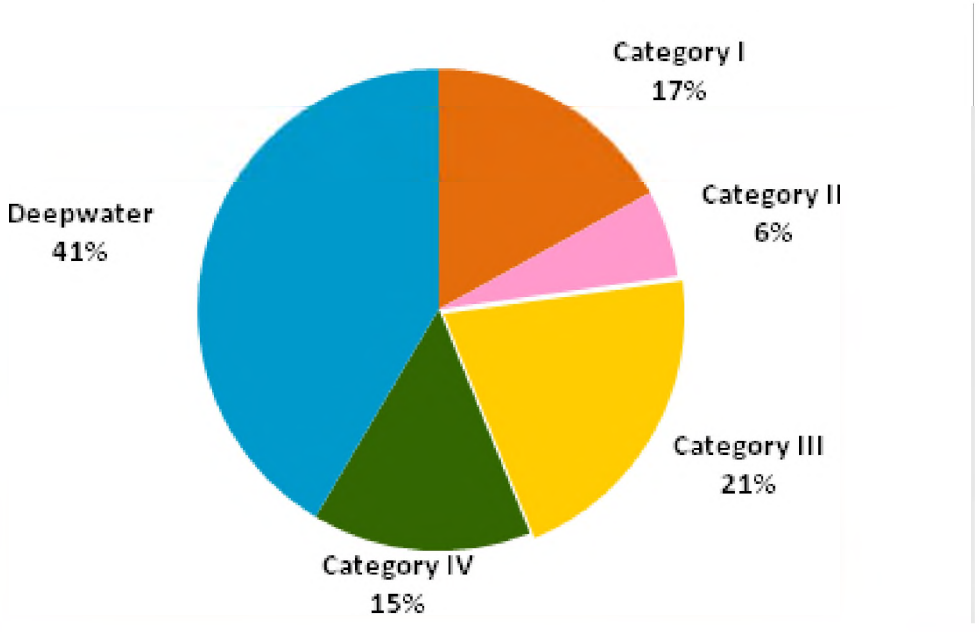


Indian Sedimentary Map of India

- Category I
- Category II
- Category III
- Category IV
- Deep Water

3.14 million Sq. Km

2.2.3 Crude oil & natural gas production in the country is from 7 basins under category-I and deepwater areas. In category-II basins, hydrocarbon discoveries have been made but commercial production is yet to commence. The distribution of total Indian sedimentary area of 3.14 million square kilometre under different categories and deepwater is presented as under:



2.3 Estimated Resources of Crude oil & Natural Gas

2.3.1 Conventional Hydrocarbon Resources

The prognosticated conventional hydrocarbon resources in 26 sedimentary basins of the country are of the order of 41.87 billion tonnes (oil and oil equivalent of gas), which is about 49% increase as compared to earlier estimates of 28.08 billion tonnes. The basin-wise details are as under:

Table 2.2: Estimated Hydrocarbon Resources in India

Category	Basin	Prognosticated Resource as per Re-assessment Study in 2017-18 **(MMTOE)***
Category I	Assam Arakan Fold Belt	1632.8
	Assam Shelf	6001.2
	Cambay	2585.6
	Cauvery	1964.4
	Krishna Godavari	9554.5
	Mumbai Offshore	9646
	Rajasthan	4126
Category I Total		**35510.5**
Category II	Andaman	371.4
	Kutch	898.4
	Mahanadi	650.6
Category II Total		**1920.4**
Category III	Bengal	828.3
	Ganga	128.4
	Himalayan Foreland	44.4
	Kerala Konakan	1244.6
	Saurashtra	1325.2
	Vindhyan	632.5
Category III Total		**4203.4**

Category	Basin	Prognosticated Resource as per Re-assessment Study in 2017-18 **(MMTOE)***
Category IV	Bastar	1.3
	Bhima-Kaladgi	3.2
	Chhattisgarh	25
	Cuddapah	5.1
	Deccan	11
	Karewa	4
	Narmada	18
	Pranhita Godavari	95.4
	Satpura-S.Rewa-Damodar	63
	Spiti-Zanskar	11.1
Category IV Total		237.1
Total		**41871.4**

Source : DGH; *MMTOE : Million Metric Tonne of oil and oil equivalent of gas

2.3.2 As on 1.4.2017, In-place hydrocarbon volume of 10454 million tonnes of oil and oil equivalent gas could be established through exploration by ONGC, OIL and Private/JV companies. So, about 75% of resources are under "yet to find" category. Out of 10454 MMT of oil and oil equivalent gas of In-place volumes, the ultimate reserves which can be produced are about 4017 MMT of oil and oil equivalent gas since inception. The balance recoverable reserves are of the order of 1787 MMT of oil and oil equivalent gas. The break-up of hydrocarbon reserves explored by ONGC, OIL and private/JV companies in the country as on 1.4.2017 are as under:

Table 2.3: Crude Oil and Natural Gas Reserve Position as on 1.4.2017

	Initial In-Place (MMT)			Ultimate Reserves (MMT)			Balance Recoverable Reserves (MMT)		
	Oil	Gas	O+OEG	Oil	Gas	O+OEG	Oil	Gas	O+OEG
ONGC	4939	2139	7078	1418	1199	2617	437	533	971
OIL	807	374	1181	249	213	462	79	124	202
Pvt/JV	1008	1187	2196	228	710	938	88	526	614
Total	6754	3700	10454	1895	2122	4017	604	1183	1787

Source: DGH; O+OEG: Oil and Oil Equivalent of Gas

2.3.3 Unconventional Hydrocarbon Resources

CBM Resources

The estimated Coal Bed Methane (CBM) resources are of the order of 2600 Billion Cubic Metres (BCM) or 91.8 Trillion cubic feet (TCF) spread over in 11 states in the country. The state-wise details of CBM resources are as under:

Table 2.4: Coal Bed Methane Resources in India

Sl. No.	STATE	Estimated CBM Resources (BCM)
1	JHARKHAND	722.08
2	RAJASTHAN	359.62
3	GUJARAT	351.13
4	ORISSA	243.52
5	CHATTISGARH	240.69
6	MADHYA PRADESH	218.04
7	WEST BENGAL	218.04
8	TAMILNADU	104.77
9	ANDHRA PRADESH	99.11
10	MAHARASHTRA	33.98
11	NORTH EAST	8.50
	Total CBM Resources	2599.48

2.3.4 **Recoverable CBM Reserves:** In order to harness CBM (Coal Bed Methane) potential in the country, 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, Government has awarded 30 CBM blocks under 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. CBM in-place reserves of about 280.3 BCM (9.9 TCF) have been established by different operators as on 01.04.2017. State-wise and block-wise CBM reserves position is given below:

Table 2.5: Recoverable Coal Bed Methane Reserves as on 1.4.2017

State	Block name	Operator	GIIP (BCM)	Recoverable Reserves (BCM)
Jharkhand	BK-CBM-2001/1	ONGC	30.182	3.68
	NK-CBM-2001/1	ONGC	9.529	1.46
	Jharia	ONGC	14.61	3.04
Madhya Pradesh	SP(E)-CBM-2001/1	RIL	47.855	16.7
	SP(W)-CBM-2001/1	RIL	55.501	15.44
West Bengal	RG(E)-CBM-2001/1	EOL	60.881	28.12
	Raniganj North	ONGC	7.43	1.86
	Raniganj South	GEECL	54.368	37.94
Total			280.357	108.24

2.3.5 Shale Gas/Oil Resource

It is estimated that a number of sedimentary basins (Gangetic plain, Gujarat, Rajasthan, Andhra Pradesh & other coastal areas) in India, including the hydrocarbon bearing ones – Cambay, Assam-Arakan, & Damodar – have large shale deposits. Various agencies have made different estimates of shale gas and oil in the Indian sedimentary basins.

i. M/s Schlumberger: 300 to 2100 TCF of shale gas resource for the country.

ii. Energy Information Administration (EIA), USA in 2011: 290 TCF of shale gas in 4 basins (Cambay Onland, Damodar, Krishna Godavari Onland & Cauvery Onland).

iii. Energy Information Administration (EIA), USA in 2013: 584 TCF of shale gas and 87 billion Barrels of shale oil in 4 basins (Cambay Onland, Damodar, Krishna Godavari Onland & Cauvery Onland).

iv. ONGC: 187.5 TCF of shale gas in 5 basins (Cambay Onland, Ganga Valley, Assam & Assam Arakan, Krishna Godavari Onland & Cauvery Onland.

v. Central Mine Planning and Design Institute (CMPDI): 45 TCF of shale gas in 6 sub-basins (Jharia, Bokaro, North Karanpura, South Karanpura, Raniganj & Sohagpur).

vi. United States Geological Survey (USGS) has also estimated technically recoverable shale gas resources of 6.1 TCF in 3 basins (Cambay Onland, Krishna Godavari Onland & Cauvery Onland). Further, USGS has indicated that these basins have also potential for shale oil.

2.3.6 Re-assessment of Hydrocarbon Resources

The last Hydrocarbon resources assessment exercise was carried out approximately two decades ago. During the course of implementation of pre-NELP (New Exploration Licensing Policy) and NELP rounds and other exploration and production activities, substantial geoscientific data have been generated. New oil and gas fields have also been discovered by utilizing improved geological understanding and new technology. With the increase in exploration spread and quantum jump in availability of geo-scientific data generated under NELP, there was a need to revisit the hydrocarbon resource assessment of all sedimentary basins of India. A Multi Organization Team (MOT) comprising of representatives of ONGC, OIL and DGH has carried out estimation of hydrocarbon resource potential in the country. The exercise of re-assessment of hydrocarbon resources for all the sedimentary basins in the country has been completed in 2017. The prognosticated conventional hydrocarbon resources in 26 sedimentary basins of the country are of the order of 41.87 billion tonnes (oil and oil equivalent of gas), which is about 49% increase as compared to earlier estimates of 28.08 billion tonnes

2.4 Crude Oil & Natural Gas Production

2.4.1 Crude oil production in 2017-18 upto December 2017 is about 26.933 Million Metric Tonne (MMT) by ONGC, OIL and Private/ JV Companies. About 72% of crude oil is by ONGC and OIL from nomination regime and remaining 28% of crude oil production is by Private/JV companies from PSC regime.

2.4.2 In 2017-18, the share of offshore crude oil production is about 51.1%. The remaining crude oil production was from 6 States viz., Andhra Pradesh (0.9%), Arunachal Pradesh (0.1%), Assam (12.2%), Gujarat (12.8%), Rajasthan (21.9%) and Tamil Nadu (1.0%). The details of crude oil production in 2017-18 upto December 2017 and last 5 years are as under:

Table 2.6: State-wise Crude Oil Production Trends (Thousand Metric Tonnes)

State/Source	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18 (upto Dec)
Onshore						
Andhra Pradesh	295	297	254	295	276	249
Arunachal Pradesh	120	111	68.88	57	55	39
Assam	4,863	4,709	4,473	4,185	4,203	3,278
Gujarat	5,332	5,061	4,653	4,461	4,605	3,446
Rajasthan	8,593	9,180	8,848	8,602	8,164	5,903
Tamil Nadu	238	226	241	261	284	260
Total Onshore	19,441	19,584	18,538	17,861	17,587	13,175
Share of PSUs	10,605	10,171	9,482	9,051	9,307	13,167
Share of Private/JV	8,836	9,413	9,056	8,810	8,280	7.537
Offshore						
Share of PSUs	15,617	15,541	16,194	16,543	16,284	12,324
Share of Private/JV	2,804	2,663	2,729	2,546	2,137	1,434
Total Offshore	18,421	18,204	18,923	19,089	18,421	13,758
Grand Total	37,862	37,788	37,461	36,950	36,008	26,933

Panoramic view of Eastern Offshore, Kakinada, ONGC

2.4.3 **Natural Gas Production:** Natural gas production in 2017-18 upto December 2017 is about 24.686 Billion Cubic Metre (BCM) or 89.8 MMSCMD by ONGC, OIL and Private/ JV Companies. About 80.4% of natural gas production was by ONGC and OIL from nomination regime and remaining 19.6% of natural gas production was by Private/JV companies from PSC regime.

2.4.4 The share of offshore natural gas production in 2016-17 is about 67.6%. The remaining natural gas production including CBM was from 10 States viz., Andhra Pradesh (2.8%), Arunachal Pradesh (0.1%), Assam (9.9%), Gujarat (5.0%), Rajasthan (4.4%), Tamil Nadu (3.7%), Tripura (4.4%), Jharkhand (0.01%), Madhya Pradesh (0.5%) and West Bengal (1.7%). The details of Natural gas production in 2017-18 upto December 2017 and last 5 years are as under:

Table 2.7: State-wise Natural Gas Production Trends (MMSCMD)

[illegible]	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18 (upto Dec)
Onshore						
Andhra Pradesh	3.4	3.2	1.5	1.7	2.4	2.5
Arunachal Pradesh	0.1	0.1	0.1	0.1	0.1	0.1
Assam	8	7.9	8.1	8.3	8.6	8.9
Gujarat	5.6	4.5	4.2	4.1	4.3	4.5
Rajasthan	1.9	2.7	3.2	3.7	3.5	3.9
Tamil Nadu	3.3	3.6	3.3	2.6	2.7	3.3
Tripura	1.8	2.3	3.1	3.6	3.9	3.9
CBM-WB, MP, Jharkhand	0.3	0.4	0.6	1.1	1.5	2.0
Total Onshore	24.3	24.7	24.1	25.2	27.0	29.1
Share of PSU	22.2	21.8	20.5	20.7	22.3	23.4
Share of Private/JV	2.2	2.9	3.6	4.5	4.7	5.7
Offshore						
Share of PSU	49.6	49.2	47.3	44.8	46.3	48.8
Share of Private/JV	37.5	23.1	20.8	18.1	14.1	11.9
Total Offshore	87.1	72.3	68.1	62.9	60.4	60.7
Total	111.4	97	92.2	88.1	87.4	89.8

2.4.5 **Coal Bed Methane (CBM) Production:** Commercial production of CBM in India has already commenced w.e.f. July 2007 in Raniganj (South) block in West Bengal operated by Great Eastern Energy Corporation Limited (GEECL). CBM production in the Raniganj (South) block is about 0.55 MMSCMD in December, 2017. Another two blocks, Raniganj (East) block operated by Essar Oil Limited is producing at the rate of 0.88 MMSCMD and Jharia operated by ONGC is producing at the rate of 0.01 MMSCMD. CBM production from Sohagpur (West) operated by RIL is about 0.84 MMSCMD. Thus, Current CBM production from 4 blocks in the country is about 2.28 MMSCMD in December, 2017.

2.5 Hydrocarbon Potential of Indian Sedimentary basins

2.5.1 Indian sedimentary basins need intensive exploration efforts for enhancing crude oil & natural gas supply in the country. The Hydrocarbon potential has been witnessed where exploratory inputs have been expended. The following facts are important to understand the potential of hydrocarbons in the country.

- About 48% of the sedimentary area has been apprised. This means, more than half of the Indian sedimentary basins have the undiscovered potential of hydrocarbons.
- Total prognosticated hydrocarbon resources are estimated at about 41,878 million tonnes in the sedimentary basins of the country, out of which 10,454 MMT in-place reserves have been established by ONGC, OIL and Private/JV companies as on 1.4.2017, which means about 75% hydrocarbon reserves are yet to be discovered. Thus, Indian sedimentary Basins have ample hydrocarbon potential for future exploration and production.

2.6 Appraisal status of Indian Sedimentary Basins

2.6.1 As per India Hydrocarbon Vision 2025, 100% Indian sedimentary area is to be appraised. As of now, only 48% of the basinal areas have been appraised. About 4% sedimentary basinal area has been declared as "NO GO area" by Ministry of Defence / Ministry of Environment & Forest which remains unapprised. This means, about half of the Indian sedimentary basins have the undiscovered potential of hydrocarbons.

Table 2.8: Appraised Area of Indian Sedimentary Basins

Area Type	Million SQ.KM.	% of Total Area	Appraised Area Million SQ.KM	Appraised Area % of Total Area
Onland	1.39	44.3%	0.48	15.3%
Offshore	1.745	55.7%	1.026	32.7%
Total	3.135	100%	1.506	48%

2.7 Blocks Awarded for Exploration & production

2.7.1 National Oil Companies, viz, ONGC and OIL are carrying out hydrocarbon exploration and production (E&P) activities in the country since inception. Consequent upon liberalization in petroleum sector in 1990s, the participation of foreign and Indian companies in the exploration and development activities to supplement the efforts of national oil companies was observed to narrow the gap between supply and demand.

2.7.2 Government of India signed production sharing contracts for 28 discovered blocks, 28 exploration blocks under pre-NELP regime and 254 blocks under NELP regime with National Oil Companies and private (both Indian and foreign)/ Joint Venture companies as licensee for blocks. Thus 310 production sharing contracts (PSCs) were signed. Out of which, 206 blocks have been relinquished or proposed for relinquishment by the operators and 104 PSCs are operational

2.7.3 In order to monetize the hydrocarbon discoveries, the first bidding round under the Discovered Small Field (DSF) Policy was launched on 25th May 2016 in New Delhi thereby offering 67 discovered small fields in 46 contract areas of ONGC and OIL for international bidding. Total 30 contracts

under DSF for 43 discovered small fields were signed with 20 companies. The Government is in the process of launching second bidding round under DSF with the proposal of enhancing scope of the Policy to include fields from the PSC regime as well.

2.7.4 **Petroleum Exploration Licenses (PEL) for domestic exploration & production of crude oil and natural gas were granted under the different regimes over a period of time:**

1. Nomination Basis: Petroleum Exploration License (PEL) was granted to National Oil Companies viz. Oil and Natural Gas Corporation Ltd (ONGC) and Oil India Ltd. (OIL) on Nomination basis prior to implementation of NELP.
2. Pre-NELP Discovered Field: Petroleum Mining Lease (PML) was granted under small / medium size discovered field Production Sharing Contract (PSCs) during 1991 to 1993 where operators of blocks were private companies and ONGC/OIL has the participating interest.
3. Pre-NELP Exploration Blocks: 28 Exploration Blocks were awarded to private companies between 1990 and prior to implementation of NELP where ONGC and OIL have the rights for participation in the block after hydrocarbon discoveries.
4. New Exploration Licensing Policy (NELP) -1999 onwards: Under NELP, exploration blocks were awarded to Indian Private and foreign companies through international competitive bidding process where National Oil Companies viz, ONGC and OIL are also competing on equal footing.
5. Discovered Small Field (DSF) Policy: Under Discovered Small Field Policy, Government has awarded 30 Contract area based on Revenue Sharing Model.
6. Hydrocarbon Exploration & Production Policy: Under Hydrocarbon Exploration & Production Policy (HELP), Government has obtained "Expression of Interest" for 57 blocks which are carved out by the bidders under Open Acreage Licensing Policy (OALP) in the first window from 1st July, 2017 to 15th July, 2017. Out of these blocks, 55 blocks are being offered in January, 2018 for international competitive bidding process. The bid closing date for these blocks is slated to be 3rd April, 2018.

2.7.5 Under PSC Regime as on 1.4.2017, an investment of about US$40.6 billion on exploration and production was made. Out of this, investment of US$6.3 billion on discovered fields, US$ 8.1 billion on Pre-NELP exploration Blocks and US$ 26.2 billion on NELP Blocks were made for exploration and production activities.

2.8 Petroleum Exploration Licence (PEL) and Petroleum Mining Lease (PML)

2.8.1 Under Nomination regime, ONGC is operating 9 PEL and 345 PML blocks covering an area of about 93880.6 sq. Km. In addition, OIL is operating 3 PEL and 25 PML under nomination regime covering an area of 5335.28. The basin-wise details of PEL/PML operated by ONGC and OIL are as under:

Table 2.9: Basin-wise PEL & PML under Nomination Regime as on 1.1.2018

Company / Operator	Basin		PEL		PML		Total	
			No.	Area (Km^2)	No.	Area (Km^2)	No.	Area (Km^2)
ONGC-Nomination	Assam-Arakan	Assam	1	87.50	45	2912.23	46	2999.73
		Nagaland	3	1590.00	1	12.00	4	1602.00
		Tripura	-	-	17	3075.29	17	3075.29
	Cambay		-	-	170	5719.27	170	5719.27
	Cauvery	Onland	-	-	29	3493.21	29	3492.98
		Offshore			1	96.83	1	96.83
	Himalayan Foreland		1	1848.00	-	-	1	1848.00
	Krishna Godavari	Onland	-	-	38	4893.03	38	4893.03
		Offshore	1	1193.00	11	1261.86	12	2454.86
	Kutch Offshore		1	16557			1	16557.00
	Mumbai Offshore		2	16488	28	32636.50	30	27109.50
	Jaisalmer-Rajasthan				4	882.01	4	882.01
	Vindhyan				1	1135.00	1	1135.00
	Total- ONGC		9	37763.50	345	56117.13	354	93880.63
OIL- Nomination	Rajasthan		-	-	2	460	2	460
	Assam - Arakan		3	331.75	20	4543.53	23	4875.28
	Total - OIL		3	331.75	22	5003.53	25	5335.28

2.8.2 Private/JV companies are operating 64 PEL and 60 PML blocks covering an area of 72027.1 Sq. Km. The basin-wise details of PEL/PML operated by private/JV companies are as under:

Table 2.10: Basin-Wise PEL & PML With Private/ Joint Venture Companies as on 01.01.2018

BASIN	PEL		PML	
	PEL (No.)	Area (Sq. Km.)	PML (No.)	Area (Sq. Km.)
Assam-Arakan Fold Belt	1	3213.0		
Assam-Arakan Shelf	8	7077.1	3	138.69
Bengal	3	11733.0		
Cambay	25	7756.5	42	1040.26
Cauvery	2	515.0	2	156
Krishna Godavari	9	14179.5	6	1516.88
Kutch	4	3519.0		
Mahanadi	1	4128.9		
Mumbai	3	4126.0	3	2678
Rajasthan	4	4559.2	4	3287.17
Satpura-South Rewa-Damodar	1	789.0		
Saurashtra	2	1152.0		
Vindhyan	1	462.0		
Total	64	63210.1	60	8817

2.9 Exploratory Efforts by ONGC and OIL under nomination regime

ONGC and OIL have carried out 9,16,210 line kilometre (LKM) of 2D seismic survey 1,34,134 Sq. Km. of 3D seismic survey and drilled 6344 exploratory wells since inception as on 01.01.2018. The details of exploratory efforts in terms of 2D, 3D seismic and exploratory wells made by ONGC and OIL are as under:

Table 2.11: Exploratory Inputs by ONGC and OIL as on 1.1. 2018

Sl. No.	Company	Cumulative exploratory efforts as on 1.1.2018		
		2D(LKM)	3D (Sq. KM)	Exploratory Wells (Nos.)
1.	ONGC Nomination	882074	122308	5975
2.	Oil India Ltd. - Nomination	34,136	11,826	369
	Total	9,16,210	1,34,134	6,344

2.10 Exploratory Efforts by Private/JV companies under PSC regime

2.10.1 The basin-wise exploratory inputs expended by Private/Joint venture companies in terms of 2D seismic, 3D seismic and exploratory wells as on 1.10.2017 are as under:

Table 2.12: Exploratory Inputs in PSC Regime as on 1.10. 2017

Basin	2D seismic (LKM)	3D seismic (Sq. KM)	Exploratory Well (No)
Andaman-Nicobar	27070	16562	6
Assam-Arakan Fold Belt	1352	613	2
Assam-Arakan Shelf	5435	1966	32
Bengal	8387	7638	8
Cambay	35683	9612	300
Cauvery	67851	45872	49
Deccan Syneclise	476	-	-
Ganga	6417	1683	8
Himalayan-Foreland	810	-	1
Kerela Konkan	52290	14035	7
Krishna Godavari	76629	70847	179
Kutch	2985	6984	16
Mahanadi	59542	64659	53
Mumbai	21349	24604	45

Pranhita Godavari	195	-	1
Rajasthan	14267	17547	304
Satpura-South Rewa-Damodar	2050	304	2
Saurashtra	16037	14690	15
Vindhyan	3346	369	5
Total	402171	297985	1033

2.10.2 Exploratory efforts carried out by PSUs, Indian Private and foreign companies under PSC regime as on 1.10.2017 are given below:

Table 2.13: Operator-wise Exploratory Work under PSC Regime

Operator	2D seismic (LKM)	3D seismic (Sq. KM)	Exploratory Well (No)
Foreign companies	65106	24682	287
Indian Private companies	126132	108933	324
PSUs	210533	164370	422
Total	401771	297985	1033

2.11 Hydrocarbon Discoveries in 2017-18

ONGC and OIL have made 14 hydrocarbon discoveries. ONGC has made 9 hydrocarbon discoveries comprising of 4 discoveries (1 in NELP and 3 in Nomination) in onshore acreages and 5 discoveries in offshore acreages (3 in Nomination Shallow water and 2 in Nomination deepwater). One discovery has been monetized by ONGC. OIL has made 4 hydrocarbon discoveries in the State of Assam. Gail (India) Limited has made one hydrocarbon discovery in the State of Gujarat. The details of hydrocarbon discoveries made in 2017-18 up to December, 2017 are as under:

Table 2.14: Hydrocarbon Discoveries in 2017-18 upto December 2017

Sl. No.	Company	Oil Discovery	Gas Discovery	Total Discoveries
1.	ONGC	4	5	9
2.	OIL	2	2	4
3.	GAIL	1	-	1
Total		7	7	14

2.12 National Data Repository (NDR)

2.12.1 The Government of India notified the Open Acreage Licensing Policy (OALP) as a part of the Hydrocarbon Exploration and Licensing Policy (HELP) on March 30, 2016. National Data Repository (NDR) is a pre-requisite and key component for making OALP operational to view the surface and sub-surface geological, geophysical and other technical data by the investors. NDR has been launched on 28th June, 2017.

2.12.2 National Data Repository (NDR) is managed by DGH. Entire country's E&P data will be uploaded in NDR so that any interested party from around the globe can have access to these data and show interest to invest in India. As on 31st December, 2017, 17.6 Lakh Line kilometre(LKM) of 2D Seismic data, 6.5 Lakh Sq. KM of 3D Seismic data and 13,981 well log data have been loaded in NDR system.

Shri Dharmendra Pradhan, Minister P&NG launching the National Data Repository and Open Acreage Licensing Programme at New Delhi

2.13 Shale Gas Exploration

2.13.1 In order to promote Shale Gas and Oil exploration in India, the Government of India on 14.10.2013 has notified the policy guidelines for exploration and exploitation of shale gas and oil by National Oil Companies (NOCs) in their onland Petroleum Exploration Lease (PEL) / Petroleum Mining Lease (PML) blocks awarded under the nomination regimes.

2.13.2 As per policy guidelines, ONGC Ltd. and Oil India Ltd have to carry out Shale Gas and Oil exploration in 50 and 5 blocks respectively for assessment under Phase-I. ONGC is carrying out Shale Gas and Oil exploration activities in Cambay, Cauvery, Krishna-Godavari and Assam and Arakan Basins. Oil India is carrying out Shale Gas and Oil exploration activities in Assam and Rajasthan basins. So far

ONGC has drilled 22 wells in 18 blocks in four basins against the target of 57 wells. Out of which 5 are exclusive shale gas wells. ONGC has drilled 14 wells in Cambay Basin, 3 wells in KG Basin, 3 wells in Cauvery Basin and 2 wells in A&AA Basin. OIL has drilled 2 wells in Upper Assam basin & 1 well in Jaisalmer Basin and further studies are underway.

2.14 Gas Hydrate

2.14.1 National Gas Hydrate Project -2 was conducted successfully in Eastern offshore from 9th March 2015 to 31st July 2015. NGHP-Expedition-02 carried out in 2015 drilled 42 wells at 25 sites in Krishna Godavari and Mahanadi area in sand reservoirs for gas hydrates. NGHP-02 has discovered significant gas-hydrate-bearing sand reservoir system in the Krishna Godavari area. Further studies are being carried out to assess the gas hydrate resource potential, reservoir characterization, reservoir delineation and geo-mechanical modelling for seafloor and wellbore stability and identification of sites for pilot production for testing.

2.15 Policy Initiatives Taken by the Government for enhancing crude oil and gas production

Night view of an ONGC's Onland Rig-Working 24x7

2.15.1 Government has formulated path breaking policies to revolutionize the E&P sector. The Policy-wise details have been enumerated as under:

Hydrocarbon Exploration and Licensing Policy (HELP)

- A new and path breaking model for attracting investment in the E&P sector in tune with the principle of ease of doing business for forthcoming biding rounds.
- **Single License** for exploration and production of conventional as well as non-conventional Hydrocarbon resources.
- **Open Acreage Licensing Policy**-option to select the exploration blocks without waiting for formal bid round.
- **Revenue Sharing Model**-simple, easy to administer- no cost recovery - no micro-management by the Government - operational freedom to the operator.
- **Pricing and Marketing Freedom**- a major incentive for investment.
- **Reduced rate of royalty** for offshore blocks.

Under Hydrocarbon Exploration & Production Policy (HELP), Government has obtained "Expression of Interest" for 57 blocks which are carved out by the bidders under Open Acreage Licensing Policy (OALP) in the first window from 1st July, 2017 to 15th November, 2017. Out of these blocks, 55 blocks are being offered in January, 2018 for international competitive bidding process.

The bid closing date for these blocks is slated to be 31st March, 2018. Under this Policy, bidders will have opportunity to carve out exploration blocks of their choice from the opened Indian sedimentary basinal areas and bid for the blocks twice in a calendar year.

Policy Framework for Early Monetization of CBM

The Government notified the marketing and pricing freedom for CBM to develop alternate sources of natural gas and promote gas economy. Measures to streamline operational issues were also notified. CBM may now be sold on arm's length basis while discovering the market price, subject to the stipulations brought out in the notification. This is with an objective that best possible price is realized to the benefit of all the parties to the Contract.

Discovered Small Fields (DSF) Policy

The DSF policy notified earlier by the government is further being strengthened for securing energy needs of the country. It will be helpful in achieving the target of reduction in energy import dependency by 10% by the year 2022.

The First bidding round under the Discovered Small Field Policy was launched on 25th May 2016 in New Delhi thereby offering 67 discovered small fields in 46 contract areas of ONGC and OIL for international bidding. The policy aimed at monetizing these discoveries in a time bound manner to boost domestic production of Oil and Gas. In tune with minimum government-maximum governance, the policy is packed with all possible reforms in the E&P sector such as uniform licensing, pricing and marketing freedom, easy to administer revenue sharing mechanism etc. The policy enables and provides attracting features for start-ups to invest in monetizing these fields. The response from the stakeholders has been very encouraging and would lead to monetization of reserves worth ₹70,000 Cr thereby increasing the domestic production and government revenue through royalty and revenue sharing mechanism. Total 30 contracts for 43 discovered small fields were signed with 20 companies. Out of these, 13 companies were new entrants to the E&P sector in India.

The Government is in the process of launching Second Bidding Round under DSF with the proposal of enhancing scope of the Policy to include fields from the PSC regime as well.

Policy for the Grant of extensions to Pre-NELP Exploration Blocks

Government has approved a policy for grant of extension to the Production Sharing Contracts (PSC) signed by Government of India awarding Pre-NELP Exploration Blocks to enable and facilitate investment to extract the remaining reserves. This policy will enable the contractors to extract the additional reserves by implementing new technologies through fresh investments. The recoverable reserve from these blocks is estimated to be more than 426 million barrel of oil equivalent. During the extension period, contractors are expected to make an additional investment of more than US$ 5.4 billion. The Government share of Profit Petroleum during the extended period of contract would be 10% higher for these fields.

Monetization of Ratna Offshore Field

ONGC has initiated necessary action for development of the Field after cancellation of Letter of Award to Essar Oil Limited and Premier Oil Limited. Field Development Plan (FDP) for the fields under development has been approved by the ONGC Board. Sanctioned capital investment for development of the field is about ₹4,000 crore with estimated oil and gas production of about 7 MMT of oil and 0.88 BCM of gas by 2035-36. Government would realize the revenue through cess and royalty from the field.

Gas Pricing Reforms

Government approved the New Gas Pricing Formula in October, 2014 leading to resolution of this long pending issue. The new gas pricing guidelines has struck a fine balance between the requirements of both producing and consuming sectors. To incentivize gas production from difficult areas such as High Pressure High Temperature (HPHT) reservoirs and deepwater and ultra deepwater areas, government has given marketing and pricing freedom. The marketing freedom so granted would be capped by a ceiling price arrived at on the basis of landed price of alternative fuels.

Gearing up for Seismic Survey Operation

Reform Initiatives to Enhance Domestic Production

To ease out rigidities in the functioning of PSC regime Government approved Policy Framework for Relaxations Extensions and clarifications for early Monetization of Hydrocarbon Discoveries. These reforms have helped in moving ahead with discoveries with associated reserves of around ₹30,000 Cr and have also helped in resolving around 40 pending issues in different contracts. Government has approved a policy on Testing Requirement in NELP blocks to resolve existing dispute on this issue and provide clarity for future. This initiative has helped in monetization of resources of the order of ₹75,000 Crore. Government approved a policy for grant of extension to the Production Sharing Contracts for small and medium sized discovered fields. The policy provides clarity to investors for planning their investments and would help in monetization of resources of the order of ₹50,000 Cr in the extended period.

Permission of Extraction of CBM to Coal India Limited (CIL) & its Subsidiaries in Coal Mining area.

Government has permitted Coal India Limited (CIL) & its subsidiaries to undertake CBM operations in the coal mining lease areas held by them. This decision will not only help augmenting CBM gas production in the country but will also make the mines safe for operations.

Hydrocarbon Vision 2030 for North East

The Vision aims at doubling Oil & Gas production by 2030, making clean fuels accessible, fast tracking projects, generating employment opportunities and promoting cooperation with neighbouring countries and targets an investment of ₹1.30 lakh crore till 2030 in North East India.

National Seismic Programme (NSP) of Unapprised Areas

Almost half of India's sedimentary areas are yet to be apprised. The Government has taken up an ambitious programme of undertaking 2D seismic survey of entire un-apprised areas. National Seismic Programme was launched on 12th October, 2016. Under the programme, Government has approved the proposal for conducting 2D seismic survey for data Acquisition, Processing and Interpretation (API) of 48,243 Line Kilo Metres (LKM). The estimated cost of the project is ₹2932.99 crore and the project is proposed to be completed by 2019-20. As on 31st December, 2017, ONGC and OIL have acquired 14,077 LKM of 2D Seismic survey.

Chapter 3

Pipelines and Natural gas

3.1 Gas Grid

At present, about 16000 Km long gas pipeline network is under operation and it has formed a partial gas grid by inter-connecting western, northern and south-eastern gas markets in the country. In FY 2017-18, a 312 Km long gas pipeline has been commissioned from Shadol (Madhya Pradesh) to Phulpur (Uttar Pradesh) which has facilitated the flow of Coal Bed Methane (CBM) gas being produced from Sohagpur East and West CBM block into the gas gird. Further, work is in progress to develop an ecosystem of Gas Grid network in the country.

In order to develop a gas pipeline in the Eastern Part of the Country, Government has approved a partial capital grant of ₹ 5176 Crore (i.e. 40% of the estimated capital cost of ₹ 12,940 Crore) to GAIL to construct two gas pipeline projects i.e. Jagdishpur-Haldia and Bokaro-Dhamra Pipeline (JHBDPL) project.This project is popularly known as "Pradhan Mantri Urja Ganga (PMUG)" to Eastern India. These gas pipeline will pass through 50 districts in the State of Uttar Pradesh, Bihar, Jharkhand, Odisha & West Bengal. The construction work on the Phase-I of the project from Phulpur (Uttar Pradesh) to Dobhi (Bihar) with spurlines to Varanasi, Gorakhpur, Patna & Barauni is at advanced stage and is scheduled to be completed by December 2018. Further, the project activities on Phase-II of JHBDPL have also been commenced and it is scheduled to be completed by 2020.

In the advent of development of JHBDPL project, efforts are underway to encourage the socio-economic development in North Eastern region by connecting it with the National Gas Grid in coming years. A pipeline of about 750 Km long from Barauni (Bihar) to Guwahati (Assam) will be the gateway to connect North-eastern States with existing gas grid. This pipeline project will provide direct or indirect employment to the people of North-Eastern States and will promote industrial activities in the region. It will also facilitate in developing City Gas projects in the region which will ensure the uninterruptable availability of clean cooking fuel to the households and environment friendly fuel to the industrial, commercial and transport sectors in major cities of North Eastern States.

The construction work to develop Kochi-Kottanad-Managlore-Bangalore pipeline in the southern part of the country is in advanced stage. Efforts are underway for time bound development of this pipeline project and provide accessibility of natural gas sources (domestic and imported both) to southern cities by connecting KKMBPL project with the existing gas grid.

3.2 Regasification infrastructure in the country

Country commenced the first import of Liquefied Natural Gas (LNG) in year 2004 with the establishment of its first regasification LNG (RLNG) terminal located at Dahej (Gujarat). The import of LNG is being carried out as Open General License (OGL) item. The imported RLNG is being supplied at market determined prices as per contractual agreement between suppliers and buyers across the country. Establishment of LNG terminals is also permitted as an infrastructure project and eligible for 100% Foreign Direct Investment (FDI).

At present, import of LNG is being carried out at terminals located on western and south western coast viz. Dahej (GJ), Hazira (GJ), Dabhol (MH) and Kochi (KL). There is a continuous increase in volume of Re-gassified LNG (RLNG) in overall gas consumption due to limited availability of domestic gas. LNG is being procured on spot, short-term, medium-term and long-term basis. In FY 2016-17, imported LNG contributed about 50% of the total gas consumption in the country. The terminal wise details are given as under:

Sr. No.	Regas Terminal location	Regas Capacity (in Million Metric Tonne per Annum (MMTPA)
1)	Dahej	15.0
2)	Hazira	5.0
3)	Dabhol*	5.0
4)	Kochi	5.0
	Total	30.0 MMTPA

* In absence of break water, terminal is operational in non-monsoon months and is operating at ~1.5 MMTPA.

3.3 City Gas Distribution (CGD)

A City Gas Distribution (CGD) network is the interconnected network of pipelines to make supply of natural gas to domestic, industrial or commercial premises and CNG stations situated in a specified Geographical Area (GA). CGD networks are being developed based on the availability of trunk gas pipeline connectivity or gas sources and techno-commercial feasibility in a GA.

CGD network ensures the supply of environment friendly cooking fuel at the door step of domestic households in the form of Piped Natural Gas (PNG) as well as clean fuel to transport sector in the form of Compressed Natural Gas (CNG). The usage of CNG in transport sector helps in curbing the vehicle emissions in urban area and it improves the air quality. Details of CNG Stations in the country as on December 2017 is as under:

Sr. No.	State/UT	Name of City / Geographical Area (GA)	No. of CNG Stations as on Dec.2017
1	Delhi	NCT of Delhi(including Noida & Ghaziabad)	424
2	Maharashtra	Mumbai, Greater Mumbai, Thane & adjoining contiguous areas including Mira Bhayender, Navi Mumbai, Thane City, Ambernath, Bhiwandi, Kalyan, Dombivily, Badlapur, Ulhasnagar, Panvel, Kharghar&Taloja, Pune City including PimpriChinchwad and adjoining contiguous areas of Chakan, Hinjewadi, Talegaon GA & Thane Rural	254
3	Gujarat	Gandhinagar, Mehsana, Sabarkantha, Nadiad, Halol, Hazira, Rajkot, Khambhat, Karjan-Palej, Valsad, Navsari, Surendernagar, Vadodara, Ahmedabad, Surat, Ankleshwar, Bharuch & surrounding areas, Bhavnagar, Jamnagar, Vapi, Anand	409
4	Haryana	Faridabad, Gurugram, Sonepat	42

5	Uttar Pradesh	Agra, Allahabad, Bareilly, Divyapur, Firozabad, Kanpur, Khurja, Lucknow, Mathura, Meerut & Moradabad	66
6	Telangana	Hyderabad	32
7	Andhra Pradesh	Vijayawada, Kakinada	15
8	Rajasthan	Kota	3
9	Madhya Pradesh	Dewas, Vijaipur, Indore including Ujjain, Gwalior, Pithampura	26
10	Odisha	Bhubneshwar	2
11	Tripura	Agartala	6
12	West Bengal	Kolkata	7
13	Karnataka	Bengaluru	3
14	Chandigarh	Chandigarh	2
15	Daman and Diu	Daman and Diu	1
16	Dadar & Nagar Haveli	Dadar & Nagar Haveli	1
Total CNG Stations			1293

CGD networks also include the requisite grid infrastructure which reaches up to the premises of end customer, including small scale industries and commercial establishments to meet the gas requirement which is less than 50,000 Standard Cubic Meter per Day.

At present, 31 CGD companies are developing CGD networks in 81 GAs in 21 States/Union Territories. The clean cooking fuel i.e. PNG (Domestic) to households is being provided by these CGD networks and the progress of PNG (domestic) connections in last 5 years is as under:

Financial Year	Total PNG	Yearly increment in PNG (Domestic) connections
FY 2011-12	18.9 Lakh	-
FY 2012-13	22.22 Lakh	3.32 Lakh
FY 2013-14	25.42 Lakh	3.20 Lakh
FY 2014-15	28.69 Lakh	3.27 Lakh
FY 2015-16	31.69 Lakh	3.00 Lakh
FY 2016-17	36.08 Lakh	4.39 Lakh
April'17- Dec.'17	40.62 Lakh	4.54 Lakh

The CGD networks have also connected about 32,500 Industrial & Commercial Units to supply environment friendly fuel i.e. natural gas for energy purpose. Further, 1282 CNG stations have been established to cater the CNG demand of transport sector in the country.

In order to boost the growth of CGD sector, the major steps taken by the Government are as under:

IOCL's Paradip Raipur Rachi Pipeline Project

i. This Ministry has accorded priority to PNG (Domestic) and CNG (Transport) segments of CGD sector in domestic gas allocation. At present, domestic gas is being supplied to meet entire requirement of CNG (transport) and domestic PNG segments based on last six monthly consumption data by the respective CGD networks.

ii. State Governments have been advised-

   a. To standardize the Road Restoration/permission charges along with time bound permission for development of CGD networks.

   b. To earmark land plot for development of CNG Stations in their Master Plan.

   c. Relevant modification in building by-laws for providing gas pipeline infrastructure in residential & commercial buildings at architectural design stage.

iii. CGD networks have been provided the status of "Public Utility" under the Industrial Dispute Act, 1947.

iv. Guidelines have been issued for allowing the development of PNG network into defense establishments across the country.

v. Further, Public Sector Undertakings have been advised to have the provisions of PNG in their residential complexes.

vi. Efforts are underway to develop an online portal in consultation with State Government to streamline the process of permissions to develop CGD network.

Government has envisaged to connect One crore households with PNG supplies for cooking purpose by 2020. It has also been envisaged to expand the coverage of CGD networks in addition 146 GAs in coming years.

3.4 Creation of Competitive Gas Markets in the country

Natural gas is recognized as a cleaner and environment friendly energy source. Government is focused to promote the usage of natural gas as a fuel/feedstock across the country to move towards a gas based economy in the long run. Government is taking necessary policy and regulatory steps to attract investment in enhancing domestic gas production, gas infrastructure

Shri Dharmendra Pradhan, Minister P&NG inaugurating Odisha's First PNG Project

LNG Terminal at Nashik

including pipelines, City Gas Distribution (CGD) networks and Liquefied Natural Gas (LNG) import terminals. The Government is exploring means for establishing a gas market where natural gas can be traded freely and supplied. It is expected that free gas market will attract new investment in Exploration & Production (E&P) activities so as to increase gas availability and accessibility to all at market price.

Chapter 4

Refining

4.1 Refining Capacity

4.1.1 The Indian refining industry has established itself as a major player globally. India is emerging as a refinery hub and refining capacity exceeds the demand. The country's refining capacity has increased from a modest 62 Million Metric Tonnes Per Annum (MMTPA) in 1998 to 247.566 MMTPA at present, comprising of 23 refineries – 18 under Public Sector, 3 under private sector and 2 in Joint Venture (JV). The capacity wise details of the refineries are given below:

Sr. No.	Refinery Location	Name of the Company	Name Plate Capacity (MMTPA)*
PSU Refineries			
1	Digboi-1901#	IndianOil Corporation Limited	0.650
2	Guwahati-1962		1.000
3	Barauni-1964		6.000
4	Koyali-1965		13.700
5	Bongaigaon-1974		2.350
6	Haldia-1975		7.500
7	Mathura-1982		8.000
8	Panipat-1998		15.000
9	Paradip-2016		15.000
10	Mumbai-1954	Hindustan Petroleum Corporation Limited	7.500
11	Visakhapatnam-1957		8.300
12	Mumbai-1955	Bharat Petroleum Corporation Limited	12.000
13	Kochi-1963		15.500
14	Manali-1965	Chennai Petroleum Corporation Limited	10.500
15	Nagapattinam-1993		1.000
16	Numaligarh-2000	Numaligarh Refinery Limited	3.000
17	Mangalore-1996	Mangalore Refinery and Petrochemicals Limited	15.000
18	Tatipaka, AP-2001	Oil and Natural Gas Commission	0.066
Total			142.066
JV Refineries			
19	Bina-2011	Bharat Oman Refinery Ltd.	6.000
20	Bathinda-2012	HPCL Mittal Energy Ltd.	11.300
Total			17.300
Private Sector Refineries			
21	DTA-Jamnagar-1999	Reliance Industries Limited	33.000
22	SEZ, Jamnagar-2008		35.200
23	Vadinar-2006	Essar Oil Limited	20.000
Total			88.200
Grand Total			247.566

(# Refinery was set up at Digboi in 1901 by Assam Oil Company Ltd and later on IOCL took over the refinery on 14.10.1981)

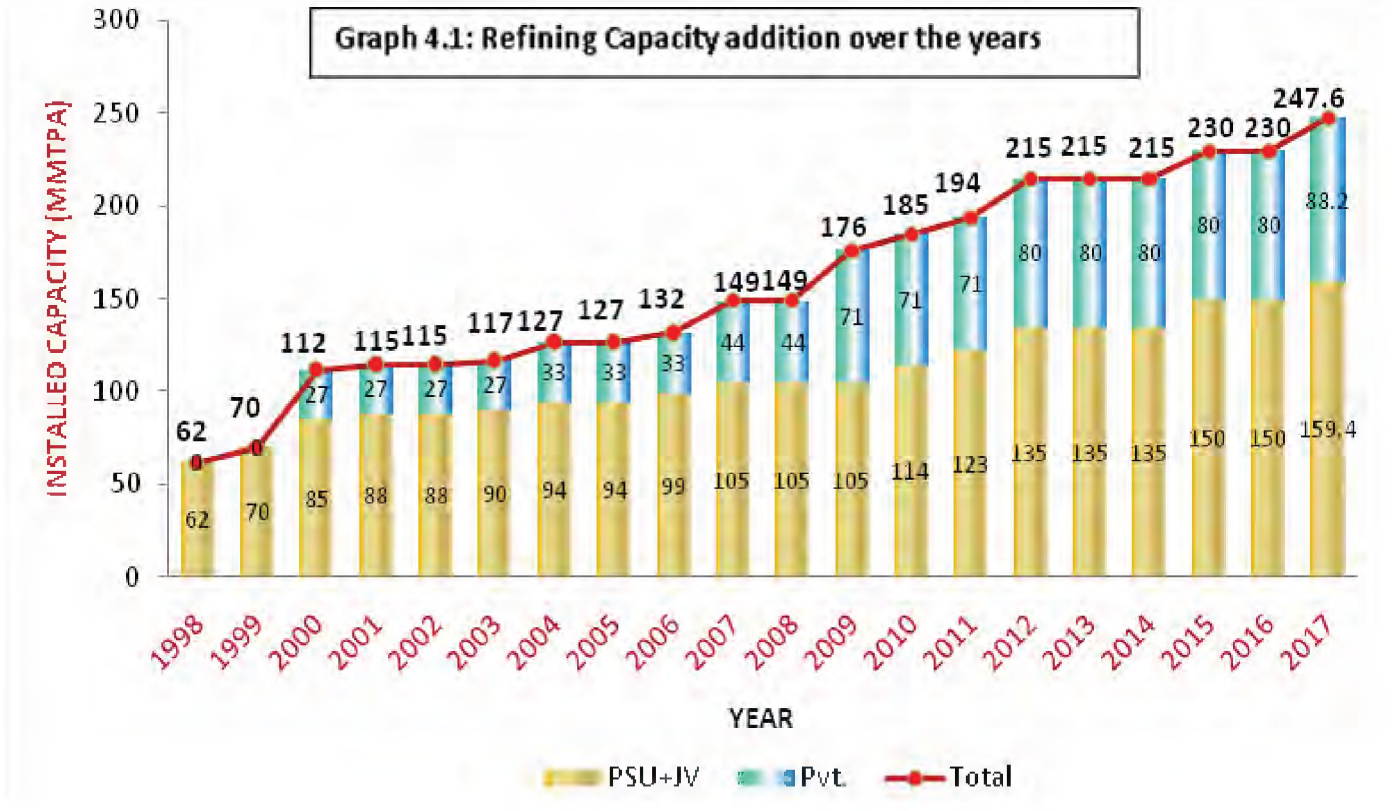
*MMTPA-Million Metric Tonne Per Annum

HPCL Visakh Refinery

4.1.2 The refining capacity is not only sufficient for domestic consumption but leaving a substantial surplus also for export of petroleum products. Since 2001-02, India is a net exporter of petroleum products. During 2017-18 (From April, 2017- November, 2017), the country has exported 44.3 Million Metric Tonnes (MMT) of Petroleum products worth US Dollars 21.7 Billion (provisional). India is the largest exporter of petroleum products in Asia since August 2009.

4.2 Refining Capacity Addition Over The Years

4.2.1 The graphical representation of the refining capacity addition over the years shown in Graph 4.1.



4.3 Expansion of Existing Refineries

The Capacity expansion planned by 2022 is as under:-

S.No.	Name of the Company	Location of the Refinery	Increase in Capacity, MMTPA
1	IndianOil Corporation Limited (IOCL)	Barauni	3.000
2	IndianOil Corporation Limited (IOCL)	Guwahati	0.200
3	IndianOil Corporation Limited (IOCL)	Bongaigaon	0.350
4	IndianOil Corporation Limited (IOCL)	Mathura	1.200
5	IndianOil Corporation Limited (IOCL)	Haldia	0.500
6	Hindustan Petroleum Corporation Limited (HPCL)	Visakhapatnam, Andhra Pradesh	6.700
7	Hindustan Petroleum Corporation Limited (HPCL)	Mumbai, Maharashtra	2.000
8	Chennai Petroleum Corporation Limited(CPCL)	Nagapattinam	8.000
9	Bharat Oman Refinery Limited (Bharat Petroleum Corporation Limited & Oman Oil Company, Joint Venture), Bina	Bina, Madhya Pradesh	1.800

4.3.1 Green Field Refinery

S.No.	Name of the Company	Location of the Refinery	Capacity, MMTPA
1	HPCL Rajasthan Refinery Limited (HRRL)	Barmer, Rajasthan	9.0

C&MD HPCL explaining Hon'ble Prime Minister the 3D Model of Rajasthan Refinery

4.4 Refinery Performance Improvement

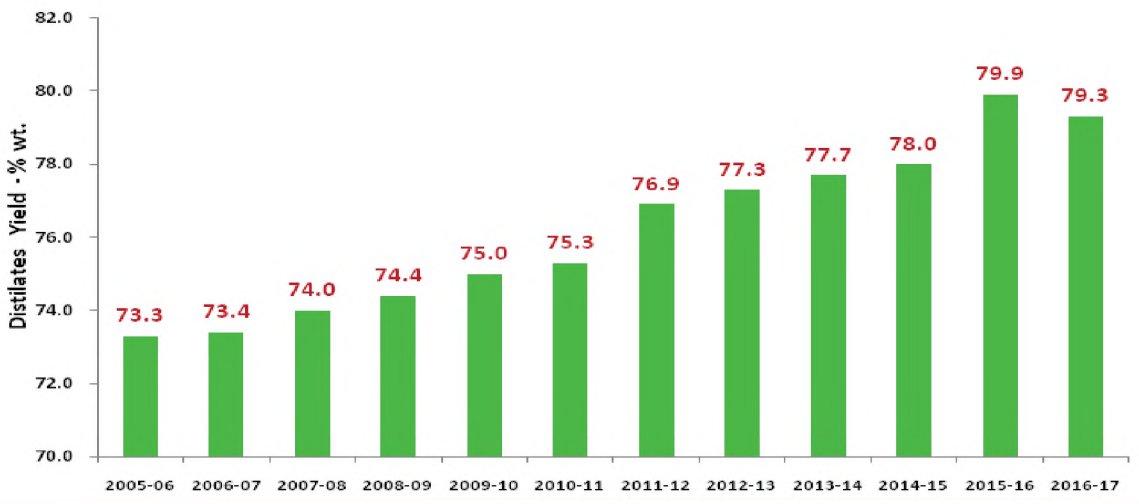
4.4.1 Indian public refineries are equipped with modern technologies and continuously upgrade the technologies in line with the International trend and as per the requirement. Indian refineries have accorded top priority to reduce the energy consumption through various energy conservation measures.

4.4.2 The Centre for High technology (CHT) carried out a Performance Benchmarking Study of 15 public sector Refineries through M/s Solomon Associates for consecutive cycles 2010, 2012, 2014 and the study for 2016 is in progress. The study reports involved comparison of various Key Performance Areas (KPAs) and parameters like Energy Efficiency Index, Volume Expansion Index, Operational Availability, Process Utilization, Maintenance & Personnel Index, Operational Costs, Margins, Transportation Fuel, Production cost etc. with Indian as well as regional peers. The result of these studies has shown wide performance gaps between Indian CPSE refineries and the best performing Asian and Global Refineries. CPSE refineries are working to improve performance in respect of key parameters.

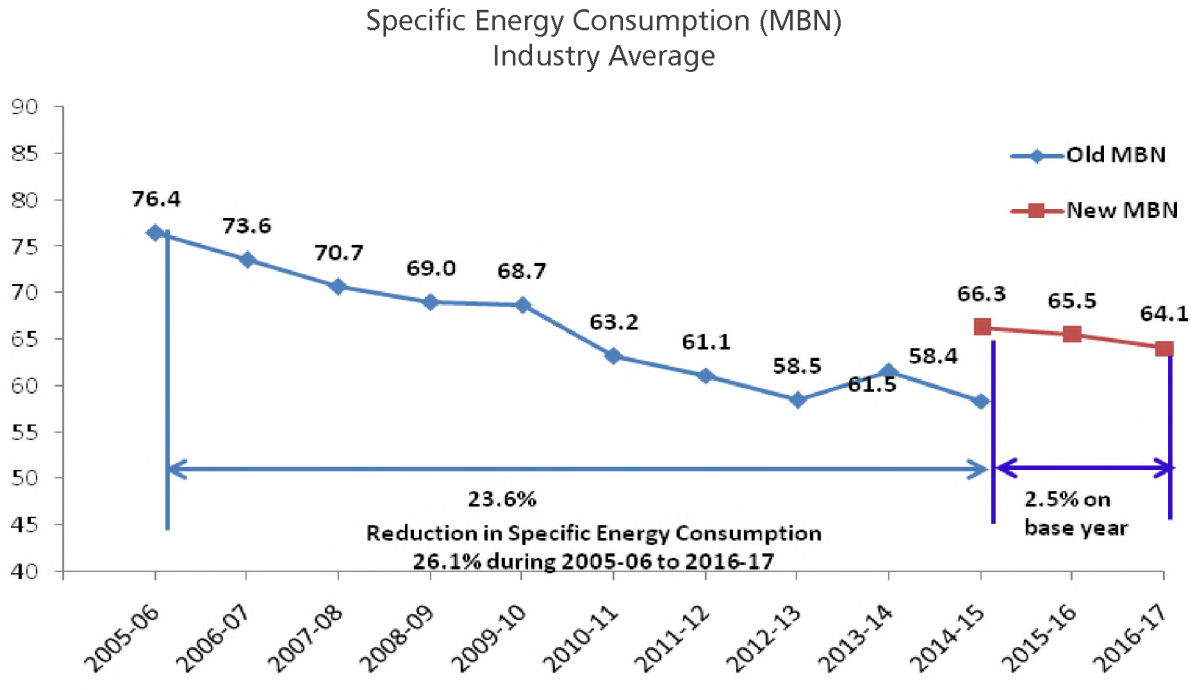
4.4.3 Further, adoption of modern technologies by Indian refineries and energy conservation measures has helped in increasing the distillate yield, quality upgradation of petrol/diesel and reduction in Specific energy consumption (MBTU/Bbl/NRGF-MBN). The PSU refineries average distillate yield (wt% on crude) has improved from 73.3% in 2005-06 to 79.3% in 2016-17 as depicted in Graph 4.3A. Similarly, the industry average MBN has come down from 76.4 (Old) in 2005-06 to 64.1 (New) in 2016-17 as depicted in Graph 4.3B. The MBN methodology and reporting has been changed to New MBN from 2015-16.

Graph-4.3A

Distillate Yield (%wt.)
PSU Average



Graph-4.3B



4.5 Auto Fuel Vision and Policy 2025

As per roadmap laid in Auto Fuel Vision & Policy -2025, Ministry of Petroleum & Natural Gas vide order dated 19.01.2015 has notified for implementation of BS-IV auto fuels in the entire country w.e.f 01.04.2017 in a phased manner. In accordance with the decision, the supply of BS-IV has been commenced in the entire country w.e.f 01.04.2017.

Further, It has also been decided that the country will leap frog directly from BS-IV to BS-VI fuel standards and BS-VI standards will be implemented in the country w.e.f 01.04.2020. Ministry of Road Transport & Highways vide Notification No. GSR 889(E) dated 16.09.2016 has notified emission standards for BS VI fuels.

However, considering recent rise in pollution level in Delhi, Government has decided to pre-pone the implementation of BS-VI in NCT Delhi w.e.f 01.04.2018.

4.6 Brief Description of the Refineries

Public Sector Refineries

IOCL Refineries

4.6.1 Digboi Refinery (Assam)- IndianOil Corporation Limited (IOCL)

Digboi Refinery was commissioned in 1901 by Burmah Oil Company Ltd. (later Assam Oil Company Ltd.). IndianOil Corporation Ltd. took over the Refinery and marketing management of Assam Oil Company Ltd. with effect from 14.10.1981 and created a separate division. This division had both Refinery and Marketing operations.

The present capacity of the Refinery is 0.650 MMTPA. The crude refining capacity utilisation of the refinery was 76.9% in 2016-17.

Digboi refinery is the oldest operating refinery in the world and produces premium grade Paraffin

wax and micro-crystalline wax.

4.6.2 Guwahati Refinery(Assam)-IndianOil Corporation Limited (IOCL)

Guwahati Refinery was commissioned in January, 1962 with design capacity of 0.75 MMTPA. The refinery was set up in collaboration with Romania.

The present capacity of the Refinery is 1.00 Million Metric Tonnes Per Annum (MMTPA). The crude refining capacity utilisation of the refinery was 90.0% in 2016-17.

Guwahati refinery was first refinery in the Public Sector. It was the first refinery to install "Indmax Unit", a novel technology developed by IOCL R&D Centre for upgrading heavy ends to LPG, motor spirit and diesel oil in 2003.

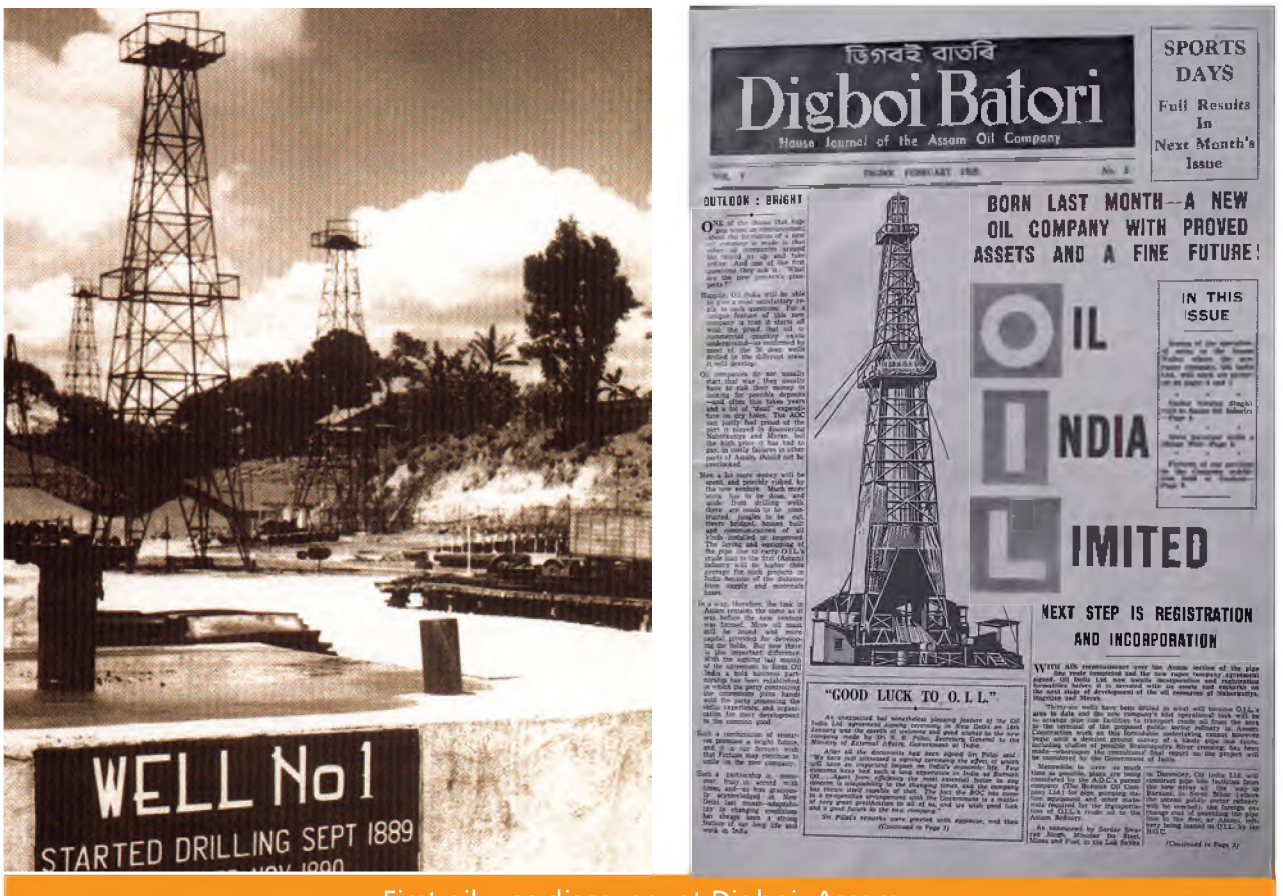
4.6.3 Barauni Refinery (Bihar)-IndianOil Corporation Limited (IOCL)

Barauni Refinery was commissioned in July, 1964. The refinery was set up in collaboration with the then Soviet Union.

The present capacity of the Refinery is 6.00 MMTPA. The crude refining capacity utilisation of the refinery was 108.3% in 2016-17.

The refinery, which was originally designed for processing indigenous Assam crudes, was subsequently revamped and expanded and is now capable of processing imported crudes.

4.6.4 Koyali Refinery (Gujarat)- IndianOil Corporation Limited (IOCL)



First oil was discovery at Digboi, Assam

Koyali Refinery was commissioned in October, 1965. The refinery was set up in collaboration with former Soviet Union.

The present capacity of the Refinery is 13.700 MMTPA. The crude refining capacity utilisation of the refinery was 102.2% in 2016-17.

Koyali refinery commissioned the country's first Hydrocracker Unit for conversion of heavier ends of crude oil to high value superior quality kerosene/ATF and Diesel. It also has the world's largest single train Linear Alkyl Benzene (LAB) plant which marked IndianOil's entry into Petrochemicals.

4.6.5 Bongaigaon Refinery (Assam)- IndianOil Corporation Limited (IOCL)

Bongaigaon Refinery & Petrochemicals Ltd. (BRPL) was incorporated on 20th February 1974, as a fully owned Central Government company. BRPL became a subsidiary of IndianOil Corporation Ltd. in March 2001. BRPL was amalgamated with the holding company, IndianOil Corporation Limited effective from March 25, 2009.

The present capacity of the Refinery is 2.350 MMTPA. The crude refining capacity utilisation of the refinery was 106.4% in 2016-17.

BRPL which was originally processing Assam crudes is now capable of processing imported crudes.

4.6.6 Haldia Refinery(West Bengal)- IndianOil Corporation Limited (IOCL)

Haldia Refinery was commissioned in January, 1975. The fuel sector of the refinery was built with French Collaboration and the Lube Sector with Romanian Collaboration.

The present capacity of the Refinery is 7.500 MMTPA. The crude refining capacity utilisation of the refinery was 102.7% in 2016-17.

Haldia refinery is the only refinery of IndianOil producing Lube Oil Base Stocks. Catalytic Dewaxing Unit commissioned in March 2003 to produce API Group-II lube base stock was first of its kind in the country.

4.6.7 Mathura Refinery (Uttar Pradesh)-IndianOil Corporation Limited (IOCL)

Mathura Refinery was commissioned in January, 1982. The primary units of the refinery were designed by USSR.

The present capacity of the Refinery is 8.000 MMTPA. The crude refining capacity utilisation of the refinery was 115.0% in 2016-17.

It is first Green Refinery of Indian equipped with elaborate environment monitoring system and ecological park. It also uses natural gas to control SO2 emissions from the refinery.

4.6.8 Panipat Refinery (Haryana)- IndianOil Corporation Limited (IOCL)

Panipat Refinery was commissioned in 1998.

The present capacity of the Refinery is 15.000 MMTPA. The crude refining capacity utilisation of the refinery was 104% in 2016-17.

Panipat refinery of IndianOil Corporation Ltd. is the first modern integrated refinery cum Petrochemical complex in public sector. The Purified Terepthalic Acid (PTA) plant is the largest in the country. The commissioning of Panipat Naphtha Cracker Unit, Mono ethylene Glycol (MEG) unit, Poly propylene (PP) unit, Linear Low density Poly Ethylene (LLDPE) and High density Poly ethylene (HDPE) units etc. heralded IndianOil's entry into Plastics Industry.

4.6.9 Paradip Refinery (Odisha)- IndianOil Corporaton Limited (IOCL)

Paradip Refinery was dedicated to the nation by the Hon'ble Prime Minister 07.02.2016. Pardip Refinery is IndianOil's most prestigious and capital intensive project till date and this is the 11th refinery of group of IOCL, located at Paradip, Odisha. This refinery will serve as an economic stimulus for industrial development in the region by way of immediate potential growth of ancillary and auxillary industries.

This refinery is the most modern refinery with state-of-the-art technologies from various technology licensors across the world. The refinery is designed to process 15.0 Million Metric Tonne Per Annum (MMTPA) crude with an overall Nelson complexity factor of 12.2, which makes it capable of processing broad basket of crude including high sulphur heavy crudes.

The Refinery is configured to produce LPG (700 TMTPA), Propylene (200 TMTPA), Motor Spirit (3.8 MMTPA), ATF (380 TMTPA) and HSD (6.9 MMTPA). The refinery is capable to produce Euro-IV/ Euro-V quality transportation fuel. The distillate yield from the refinery is expected to be best in class with 81.1% with no black oil production.

HPCL Refineries

4.6.10 Mumbai Refinery (Maharashtra)- Hindustan Petroleum Corporation Limited (HPCL)

Mumbai Refinery was first incorporated in 1952 as Standard Vacuum Refining Company of India (StanVac) which was commissioned in 1954. In 1962 StanVac was named ESSO India Limited. In 1969, Lube India Ltd came into existence for manufacturing Lube Oil Base Stock (LOBS). On 15th July, 1974 the undertakings of ESSO and Lube India Ltd were nationalized and merged to form Hindustan Petroleum Corporation Limited (HPCL).

HPCL Mumbai Refinery

The present capacity of the Refinery is 7.500 MMTPA. The crude refining capacity utilisation of the refinery was 113.3% in 2016-17.

HPCL-Mumbai refinery is the only refinery of HPCL to produce Lube Oil Base Stocks. The refinery also produces special products like Food Grade Hexane, Rubber Processing (RPO), Diana Processing oil etc.

4.6.11 Visakh Refinery (Andhra Pradesh)- Hindustan Petroleum Corporation Limited (HPCL)

HPCL's Visakh Refinery was commissioned in 1957 by Caltex Oil Refining (India) Ltd. The Refinery was taken over by the Government of India in 1976 and was consequently amalgamated with HPCL in 1978.

The present capacity of the Refinery is 8.300 MMTPA. The crude refining capacity utilisation of the refinery was 112.1% in 2016-17.

HPCL-Visakh Refinery first oil Refinery on the East Coast and was one of the first major industries of Visakhapatnam. With the commissioning of the Single Point Mooring (SPM) facility at Visakhapatnam in the year 2010, Very Large Crude Carriers (VLCC), which carry up to 2 million barrels of oil, can now be received at Visakh Refinery. The Indian Strategic Petroleum Reserves Ltd. (ISPRL) is nearby to this refinery.

BPCL Refineries

4.6.12 Mumbai Refinery (Maharashtra) – Bharat Petroleum Corporation Limited (BPCL).

The refinery in Mumbai was commissioned in January 1955 under the ownership of Burmah Shell Refineries Ltd. Following the Government acquisition of the Burmah Shell, Bharat Petroleum Corporation Ltd came into existence on 24th January 1976.

The present capacity of the Refinery is 12.000 MMTPA. The crude refining capacity utilisation of the refinery was 112.5% in 2016-17.

BPCL-Mumbai refinery has pioneered the processing of indigenous crude oil and currently can handle processing of 72 types of crude oil. The refinery has also Lube Base Oil Unit for production of environment friendly Group II base oil.

4.6.13 Kochi Refinery (Kerala) – Bharat Petroleum Corporation Limited (BPCL)

The Kochi Refinery Ltd (KRL), a public sector undertaking was set up in pursuance of formation agreement dated 27th April, 1963 between Govt. of India, Philips Petroleum Co. of USA and Duncan Brothers of Calcutta. The refinery has been amalgamated with Bharat Petroleum Corporation Ltd in 2006.

The present capacity of the Refinery is 15.500 MMTPA. The crude refining capacity utilisation of the refinery was 124.2% in 2016-17.

The refinery is equipped to receive crude oil in Very Large Crude Carriers (VLCC). Kochi refinery has undertaken an ambitious plan to diversify into petrochemical manufacturing for value addition.

CPCL Refineries

4.6.14 Manali Refinery (Tamil Nadu) -Chennai Petroleum Corporation Ltd. (CPCL)

Chennai Petroleum Corporation Limited (CPCL), formerly known as Madras Refineries Limited (MRL) was formed as a joint venture in 1965 between the Government of India (GOI), AMOCO

Commissioning of Delayed Coker Unit of Manali Refinery, CPCL

and National Iranian Oil Company (NIOC). CPCL became a subsidiary of IOCL in 2001.

The present capacity of the Refinery is 10.500 MMTPA. The crude refining capacity utilisation of the refinery was 93.3% in 2016-17.

CPCL-Manali refinery is one of the most complex refineries in India with Fuel, Lube, Wax and Petrochemical feedstocks production facilities. The 5.8 MGD Sea Water Desalination Project to augment the water requirements of its refinery was first of its kind in the industry.

4.6.15 Cauvery Basin Refinery (Nagapattinam-Tamil Nadu) – Chennai Petroleum Corporation Limited (CPCL)

CPCL's second refinery, located at Cauvery Basin at Nagapattinam was commissioned in 1993.

The present capacity of the Refinery is 1.000 MMTPA. The crude refining capacity utilisation of the refinery was 50.0% in 2016-17.

CBR is a small well-head refinery processing crudes from nearby ONGC fields, Rawa crude and KG-D6 crude. An Oil Jetty was commissioned in 2003 in Nagapattinam area for handling crude and products for Cauvery Basin Refinery.

NRL Refinery

4.6.16 Numaligarh Refinery (ASSAM) - Numaligarh Refinery Limited (NRL)

Numaligarh Refinery, popularly known as " Assam Accord Refinery" was commissioned in October, 2000. Current shareholding pattern of NRL is: Bharat Petroleum Corporation Limited (61.65%), Oil India Limited (26%) and Government of Assam (12.35%).

The present capacity of the Refinery is 3.000 MMTPA. The crude refining capacity utilisation of the refinery was 90.0% in 2016-17.

NRL is the largest refinery in the North-East equipped with modern units Hydrocraker and Delayed Coker for maximising distillate yield.

MRPL Refinery

4.6.17 Mangalore Refinery (KARNATAKA) - Mangalore Refinery and Petrochemicals Ltd. (MRPL)

Mangalore Refinery and Petrochemicals Limited (MRPL) was commissioned in March 1996. MRPL was originally set up as a Joint Venture refinery, promoted by Hindustan Petroleum Corporation Ltd. (HPCL) and the Aditya Birla Group of Companies. In March, 2003 MRPL became a subsidiary of ONGC.

The present capacity of the Refinery is 15.000 MMTPA. The crude refining capacity utilisation of the refinery was 106.7% in 2016.17.

The Refinery has got a versatile design with high flexibility to process Crudes with 24 to 46 API gravity and has high degree of Automation. MRPL is the only Refinery in India to have 2 Hydrocrackers producing Premium Diesel (High Cetane). It is also the only Refinery in India to have 2 CCRs producing Unleaded Petrol of High Octane.

Panoramic night view of MRPL

ONGC Refinery

4.6.18 Tatipaka Refinery (Andhra Pradesh) – Oil & Natural Gas Corporation Limited (ONGC)

The refinery, set up as mini refinery (Phase-I) of ONGC, was commissioned in September, 2001 at Tatipaka in East Godavari District of Andhra Pradesh.

The present capacity of the Refinery is 0.066 MMTPA. The crude refining capacity utilisation of the refinery was 136.4% in 2016-17.

Joint Venture Refineries

4.6.19 Bina Refinery – Bharat Oman Refineries Limited (BORL) (Madhya Pradesh)

Bina refinery was set up by Bharat Oman Refineries Limited (BORL), a joint venture of Bharat Petroleum Corporation Limited (BPCL) and Oman Oil Corporation Limited (OOCL) was commissioned in May 2011.

The present capacity of the Refinery is 6.000 MMTPA. The crude refining capacity utilisation of the refinery was 106.7% in 2016-17.

Bina refinery is the first refinery central part of India and augments the availability of petroleum products in central and northern India. Other facilities include Single Point Mooring facility (SPM), Crude Oil Storage Terminal (COT) at Vadinar in Gujarat and 935 km long cross country crude pipeline from Vadinar to Bina (VBPL).

4.6.20 Guru Gobind Singh Refinery – HPCL-Mittal Energy Limited (HMEL), Bathinda (Punjab)

Guru Gobind Singh Refinery (GGSR), owned by Hindustan Mittal Energy Limited (HMEL), a joint venture between HPCL and Mittal Energy Limited, was commissioned in April, 2012.

The present capacity of the Refinery is 11.300 MMTPA. The crude refining capacity utilisation of the refinery was 116.7% in 2016-17.

The refinery is a testimony to a successful Public Private Partnership in the oil and gas sector.Given the strategic location of Bathinda, the refinery will serve fuel requirements of the northern States of India.HMEL has also incorporated a wholly owned subsidiary HPCL-Mittal Pipelines Limited (HMPL) to set up and operate an SPM for crude oil receipt, storage and cross country transportation of crude oil.

Private Sector Refineries

4.6.21 Reliance Industries Limited (Domestic Tariff Area) (RIL-DTA) (Private Sector), Jamnagar (Gujarat)

The refinery was commissioned in July 1999.

The present capacity of the Refinery is 33.000 MMTPA. The crude refining capacity utilisation of the refinery was 99.4% in 2016-17.

RIL-DTA was the first private sector refinery in the country. RIL-DTA is the World's biggest grassroots Refinery having a petrochemical plant for the production Paraxylene, a polymer plant for the production of Polypropylene.

4.6.22 Reliance Industries Limited-SEZ (RIL-SEZ) (Private Sector), Jamnagar (Gujarat)

The refinery was commissioned in Dec 2008.

The present capacity of the Refinery is 35.200 MMTPA. The crude refining capacity utilisation of the refinery was 138.5% in 2016-17.

The SEZ refinery has a unique design and path breaking configuration with 'Clean Fuels' process plant. It is designed with high level of flexibility to change grades based on economy and to capture margins based on market dynamics. The new SEZ refinery is the first refinery in India to produce Euro-IV grades of gasoline and diesel.

4.6.23 Essar Oil Limited (EOL) (Private Sector), Vadinar (Gujarat)

The refinery was commissioned in November, 2006.

The present capacity of the Refinery is 20.000 MMTPA. The crude refining capacity utilisation of the refinery was 104.5% in 2016-17.

Essar refinery is the single-location second largest refinery in the country.


3 CRORE
FREE LPG CONNECTIONS DISTRIBUTED TO BPL BENEFICIARIES
SCHEME TARGET DISTRIBUTION OF FIVE CRORE CONNECTIONS IN THREE YEARS


ପଞ୍ଚାୟତସ୍ତରୀୟ କାର୍ଯ୍ୟକ୍ରମ


WOMEN IN LPG
(WINLPG)
WLPGA

Chapter 5

Marketing & Distribution

5.1 Retail Marketing Infrastructure

The retail marketing of petroleum products in India is done by the Public Sector Oil Marketing Companies (OMCs) i.e. Indianoil Corporation Ltd (IOCL), Hindustan Petroleum Corporation Ltd (HPCL), Bharat Petroleum Corporation Ltd (BPCL), Numaligarh Refinery Ltd (NRL), Mangalore Refinery & Petrochemicals Ltd (MRPL), Bharat Oman Refineries Ltd (BORL) and private companies like Reliance, Essar & Shell.

There are 285 OMC Terminal / Depots, 184 LPG Bottling plants, 55,702 OMC Retail Outlets, 19,375 LPG Distributorships, 6551 OMC SKO/LDO Dealers in the country as on 31.12.2017. The prices of sensitive petroleum products such as PDS SKO and Domestic Liquefied Petroleum Gas (LPG) are controlled by Government. All other products are deregulated and are subject to market forces. The Ministry broadly regulates the distribution policies of the sensitive petroleum products. Eligible customers of LPG are getting their subsidy directly in their bank account.

5.2 Demand & Supply of Sensitive Petroleum Products

5.2.1 MS/HSD/SKO

Demand of MS, HSD and SKO was fully met during 2015-16, 2016-17 and 2017-18 (April – November). The quantity of petrol made available during 2016-17 was 36.6 MMT. The quantity of Diesel made available during 2016-17 was 102.1 MMT.

The actual availability of MS in the country in the current financial year 2017-18 (April – November) (Provisional) is 24.8 MMT. The actual availability of HSD in the current financial year 2017-18 (April-November) (Provisional) is 70.7 MMT. The allocation of PDS SKO for the year 2017-18 is 50,48,900 KL which has been released over four Quarters of 2017-18.

BPCL Retail Outlet, Kochi

5.2.2 Allocation of PDS Kerosene to States / UTs

a. Superior Kerosene Oil (SKO) is one of the sensitive petroleum products distributed through Public Distribution System (PDS). Allocation of PDS SKO is made by the Government of India to different States / Union Territories (UTs) on a quarterly basis for distribution under Public Distribution System (PDS) for cooking and lighting only. PDS Kerosene has been allocated to States / UTs based on historical allocations. Further distribution within the States / UTs through their PDS network is the responsibility of the concerned States / UTs.

b. PDS Kerosene allocation of States / UTs have been rationalized since 2010-11, by taking into account the factors such as increase in domestic LPG / PNG connections, non-lifting of PDS Kerosene quota, electricity coverage etc. by the concerned States / UTs. However, PDS Kerosene allocation to States / UTs for the year 2016-17 and 2017-18 have been rationalized in line with the recommendations of Ministry of Finance. Ministry of Finance, Department of Expenditure, Public Finance (Central-I) Division has recommended in September, 2017 that the allocation of PDS Kerosene to States should be brought down gradually through monthly cuts, in accordance with the recommendations of the Expenditure Management Commission (EMC) and the distribution of PDS Kerosene should be targeted to the really needy who need it for illumination and cooking purposes. Accordingly, an allocation of 50,48,900 KL of PDS Kerosene has been made to the States/UTs for the year 2017-18.

5.3 Initiatives in Marketing of Sensitive Fuel Products

5.3.1 Initiatives for Quality Assurance of MS/HSDL

Several technological and regulatory measures have been taken to contain adulteration and prevent diversion.

a. Automation of Retail Outlets: In order to monitor the activities at Retail Outlets by adapting the latest technological improvements, automation of Retail Outlets is being implemented. There are nearly 30,956 number of ROs selling more than 100 KL of fuel per month. For nearly 21,722 ROs, automation has been completed and for 17,358 ROs, No Automation No Operation (NANO) has been implemented w.e.f January 2016.

b. Tamper proof locking system: OMCs have introduced new tamper proof tank truck locking systems to prevent enroute adulteration by transporters.

c. Third Party Certification of Retail Outlets: OMCs are required to obtain third party certification for all the retail outlets selling more than 100 KL per month. Number of ROs whose third party certification has been done as on 01.01.2018 is 13930.

d. GPS tracking of Tank trucks: In order to prevent adulteration during transportation, OMCs have been directed to install GPS for complete monitoring of the movement at all the company owned / dealer owned / contractor owned tank trucks. Nearly 45,646 tank trucks have been covered with Vehicle Management System by OMCs as on 01.01.2018.

5.3.2 Promotion Digital Payments

Under Promotion of Digital Payment initiative, there has been a significant expansion of digital payment infrastructure at retail outlets. As on 01.02.2018, 84895 POS terminals and 82106 e-wallet facility have been provided at 50747 (94%) petrol pumps across the country, these Outlets cover more than 95% of sales. Template for detailed action plan, promotion strategy and incentives of digital payment has already been prepared and monitored on weekly basis by MoP&NG.

(0.75%) discount is being given to consumer on the purchase of fuel at the Petrol Pumps of the Oil Marketing Companies (OMCs). The discount is being given in the form of case back in the bank account of the consumers. MDR or any other charges on all debit card transactions at the Retail outlets is not levied to either Dealers or Customers. MDR for debit card transactions are being settled by the OMCs are offering an incentive of ₹ 5/- (i.e. an upfront discount of ₹ 5/-) on each online refill of LPG payment made by a consumer through credit/debit cards on internet banking w.e.f. 01.01.2017. Loyalty programs are currently being run by all OMCs that provide earning of loyalty points on purchase of fuel. Consumer awareness campaigns are being organized at 42347 petrol / CNG outlets. Standees w.r.t Cashless facilities have been placed at More than 49084 ROs.

5.4 Retail Marketing Infrastructure of LPG

The retail marketing of petroleum products in India is done by the Public Sector Oil Marketing Companies (OMCs) i.e. Indianoil Corporation Ltd (IOCL), Hindustan Petroleum Corporation Ltd (HPCL), Bharat Petroleum Corporation Ltd. (BPCL) and Private Companies such as Reliance, Essar, Shell, etc. Presently, National LPG coverage is 78.7%. There are 189 LPG Bottling Plants operated by Public Sector Oil Marketing Companies and19375 LPG Distributorships in the country as on 01.12.2017. The prices of domestic LPG is controlled by the Government. From 01.04.2017 to 01.01.2018, 683 new LPG distributorships have been commissioned by OMCs and 949 Letter of Intents (LOI) have been issued by OMCs to setup new distributorships. Currently, selection process for more than 6100 new distributorships to setup of LPG distributorships by OMCs is underway across the country.

5.5 Major Initiatives Undertaken

5.5.1 PAHAL (DBTL Scheme)

Government of India has launched Direct Benefit Transfer for LPG consumer (DBTL) scheme namely, `PAHAL', in 54 districts of the country on 15.11.2014 and as on 02.01.2018, 19.43 Crore LPG consumers have joined the scheme. The scheme aims to rationalise subsidies based on approach to cut subsidy leakages, but not subsidies themselves. LPG consumers who join the PAHAL scheme, will get the LPG cylinders at non-subsidised price and receive LPG subsidy (as per their entitlement) directly into their bank accounts. With the implementation of PAHAL, new regime of transparency in subsidy management has been put in place empowering LPG consumers in the country.

PAHAL has further helped in identifying 'ghost' accounts, multiple accounts and inactive accounts. This resulted in curbing diversion of subsidised LPG to commercial purposes.

With the implementation of PAHAL Scheme, it has resulted in estimated savings as under

Year	Estimated Savings
2014-15	14,818 crore
2015-16	6,443 crore
2016-17	4,608 crore
2017-18 (Apr-Nov.)	3,799 crore

5.5.2 Pradhan Mantri Ujjwala Yojana (PMUY)

The Government has launched "Pradhan Mantri Ujjwala Yojana" (PMUY) for providing LPG connections to 5 crore women belonging to the Below Poverty Line (BPL) families over a period

of 3 years starting from FY 2016-17. Hon'ble Prime Minister of India has formally launched the scheme on01.05.2016. Objective of the scheme is to provide clean fuel solution to poor households especially in rural areas. Use of fossil fuels and conventional fuel like cow-dung, firewood etc has serious implications on the health of Rural womenfolk and Children.

Under the scheme, the Government provides deposit free LPG connection to the adult woman member of BPL family, which includes, security deposit towards cylinder and Pressure Regulator, DGCC Card, Suraksha Hose and administrative/installation charges and the Government is bearing an expenditure upto ₹ 1600/- for each new connection. The customer will have to bear the cost of Hot Plate and purchase of first refill. Alternatively, it is also financed at zero interest cost by the OMCs and recoverable through EMIs. As per the scheme, the eligible BPL household beneficiary is identified through available data of Socio Economic Caste Census (SECC), 2011 data. More than 3.38 crore connections have been released under the scheme as on 08.02.2018.

5.5.3 LPG Panchayat

The Government is organising Pradhan Mantri LPG Panchayat, which is an interactive communication platform of rural LPG users which encompasses safe usages of LPG, its benefit to environment, women empowerment and women health, and motivate rural mass to continued use of LPG as cooking fuel. The Pradhan Mantri LPG Panchayat has been launched on 23.09.2017 at Gandhinagar, Gujarat. One of the Pradhan Mantri LPG Panchayat was organised in Rashtrapati Bhawan on 13.2.2018, which was presided over by Hon'ble President.

Hon'ble President with the beneficiaries during LPG Panchayat organised in Rashtrapati Bhawan, New Delhi

5.5.4 Give It Up Campaign

As a part of subsidy management, Hon'ble Prime Minister of India gave call to well-off LPG consumers to voluntarily surrender their subsidy by launching 'GiveItUp' campaign. GiveItUp campaign has evoked huge response from socially committed individuals and has resulted in more than 1.04 crore consumers giving up their LPG subsidy voluntarily.

GiveItUp campaign has heralded new chapter in social 'volunteerism 'by the citizens of this country and has set a new benchmark of public good delivery mechanism.

5.5.5 Rationalisation of LPG Subsidy (Higher Income Group)

Government has taken steps to rationalise the subsidy outgo by excluding such LPG consumers or his/her having spouse taxable income of above ₹ 10 lakhs from availing LPG subsidy with effect from 01.10.2016. Necessary operational guidelines have been issued to OMCs to give effect to the direction of the Ministry. As on 01.01.2018, 8.05 lakh consumers have either submitted self declaration or identified for exclusion using information provided by Department of Revenue.

5.5.6 Commissioning of New Distributorships

Currently, selection process for all types of distributorships is undertaken under Unified Guidelines for Selection of LPG distributorships. Approval for setting up of 115 LPG distributorships on nomination basis under Durgam Kshetriya Vitarak (DKVs) has been issued to the Government of Chattisgarh, Andhra Pradesh, Andaman & Nicobar Islands, Himachal Pradesh and Maharashtra. Advertisements for the selection of 6149 new LPG distributorships have been released in various States across the country and selection process is underway.

5.5.7 Online draw for new LPG Distributorships

For the first time, OMCs have changed the selection process from physical to digital mode with the introduction of online receipt of application, processing the online draw. This initiative is a part of promoting Digital India movement and to bring more transparency and accountability in the selection process. Online draw for selection of LPG distributorships for 2299 locations across the country have been successfully conducted in 32 States / UTs as on 26th December, 2017.

5.6 Consumer Centric Initiatives

Several digital Initiatives for empowering of consumers of LPG were undertaken:

5.6.1 SAHAJ

'SAHAJ' is a digital initiative undertaken for providing hassle free experience to consumers applying for new LPG connection. The Oil Marketing Companies have launched the facility of release of LPG connection with online payment and issuance of 'e-SV' under the Digital India Initiative and the facility is now available on PAN India basis. 'e-SV' is the electronic subscription voucher which has the details of number of cylinders and pressure regulator loaned to the consumer against the security deposit. This document is emailed to the customer upon release of LPG connection online. Online payment facility for booking of refills and bill payment is also included under this. Online Inter-Company De-duplication is also made possible using 'e-SV'. This would also eliminate multiple visits to the distributor's showroom by the prospective consumers for completing formalities and problems arising out of them. It will also cut down on the time taken for release of connections.

5.6.2 Digilocker

'Digital locker' facility has been implemented with a view to move towards paperless office. Under this facility, Subscription Vouchers (SVs) and Transfer Vouchers (TVs) are made available to consumers from Digilocker. Ministry of Petroleum & Natural Gas is the largest issuer of e-SV document linked to Aadhar in the country. This enables the consumers to get the connections without hassles and also ensures safety and security of the documents without the fear of loss or damage.

5.6.3 Online Payment

As part of Digital India Initiatives, OMCs have launched the facility for Online New connections (SAHAJ), in which customer is also having an option for making the online payments through Net banking & credit/debit card for release of new LPG connections. By this facility customer can now book & pay online for the refills booked by Netbanking / debit / credit cards.

5.6.4 Emergency Helpline No. `1906'

This multilingual LPG Emergency Helpline was dedicated to the nation on 01.01.2016 by the Hon'ble Minister of PNG. This facility is available 24*7 operations with 2 shifts of 12 hours each for attending emergency LPG leakage complaints. The call center is having a web based application for logging and viewing monitoring the call logs & updation of the contact details of the mechanic & field officers. From 01.04.2017 to 01.01.2018, 170649 complaints were received & 170626 complaints were resolved using this emergency helpline number.

5.6.5 Smart Delivery Management system

The new age consumer looks for a hassle free experience in all types of transactions. Keeping this in mind and in line with the continuing effort of Oil Marketing Companies (OMCs) to bring transparency in the supply and distribution of LPG, this initiative was undertaken. Smart Delivery Management System is an initiative to promote friendly mobile application for delivery boys with features like smartcard based delivery options, real time delivery confirmation for deliveries made, better control on delivery boys and supply chain and capturing of geographical coordinates of delivery location.

5.6.6 Facility for On-line payment for refill booking

In order to promote cashless transaction, consumers have been given facility to make on-line payment for their refill booking. This helps a consumer to get the delivery of refill at his residence without his / her presence and effectively address the issue related to overcharging, if any.

5.6.7 Promoting Digital Mode of Transactions

OMCs have undertaken steps to promote cashless mode of transactions in LPG through putting in place required infrastructure. OMCs have announced cash discount of ₹ 5 per refill to such consumers who have booked their refill online. HPCL is piloting payment using BHIM application.

Chapter 6

International Cooperation and Engagement Abroad


LNG Producer-Consumer Conference 2017

As the centre of gravity shifts from the oil producing countries to the consuming nations, India has emerged as the focal point in the world of oil and gas as the third largest energy consumer in the world. This has resulted in India asserting its market influence in the global arena to reorder the anomalies currently existing in the global energy markets. As geopolitical environment changes have an impact on the hydrocarbon sector and considering the dependency on the Middle East region for India's Oil and Gas sourcing, there has been a conscious effort to diversify the sourcing options. In this regard, and with a view to ensure energy security of the country, India's oil and gas companies have established their presence in 26 countries adding nearly 25 MMTOE of equity oil and gas to the existing production.

Currently, India is one of the world's fastest-growing economies. The energy sector plays a vital role in fuelling this growth. Already in this century, India's energy demand has more than doubled, from 4% of the global total to over 7%. By the 2030s, as India's economy is expected to grow at a rate of 7% per annum, it is projected that India will consume more than 10% of the world's energy per annum. According to International Energy Agency (IEA), India's primary energy demand will double by 2040. This means that India's energy needs will have sustained impact on the world energy system. During the period between 2005 and 2016, India's GDP increased at a CAGR of 7% and India's primary energy consumption increased at a CAGR of 6.7%, from 394 million tons of oil equivalent (MTOE) to 724 MTOE.

India is not naturally endowed with hydrocarbon resources. Though managed well, maintaining production from aging domestic fields is a challenge. Oil and natural gas are major sources of primary energy in India, accounting for 35.6% share in India's primary energy basket. India holds just 0.3% of the world's proven

Hon'ble Prime Minister Shri Narendra Modi with Global CEO's during Energy Consultation Meeting

oil reserves and accounts for 5.5% of the global oil consumption. Over 80% of oil consumed in India is imported. Similarly, India has 0.8% of the world's proven natural gas reserves, while it accounts for 1.5% of the worldwide gas consumption. India imports nearly 40% of its natural gas consumed in the form of LNG. With the Indian economy expected to sustain current momentum in the coming years, the oil and natural demand is expected to continue to rise with supplies not keeping pace with growing demand. Thus, India faces a challenge in its efforts to ensure energy security. Energy availability - in adequate quantity, good quality and at affordable prices, therefore, a pre-requisite to sustain targeted levels of economic growth and the desired levels and spread of social development.

Further, oil is geo-politically a sensitive commodity. The Middle East and North Africa, which supply 60% of India's oil requirements, have witnessed high degree of geopolitical uncertainty in recent past. Therefore, India has to remain prepared and diversify its energy sourcing. The sharp drop in oil prices brought about by a fundamental demand-supply balance, has worked in India's favour. However, the ephemeral nature of such cyclicality is historically proven, and long term energy security that India strives for will come basically from an enhanced and diversified presence internationally in a variety of oil and gas assets. Thus, acquisition of hydrocarbon resources overseas is a continuing imperative.

The continuous endeavour of the Ministry of Petroleum and Natural Gas, has, therefore, been to ensure India's energy security and to ensure availability of affordable sources of energy for our economy and also to our domestic consumers. To ensure energy security, Government has encouraged Public Sector Oil and Gas companies to aggressively pursue equity oil and gas opportunities overseas by sustaining and promoting engagement with foreign countries and international organisations in the hydrocarbon sector. India is actively engaged in bilateral and multilateral cooperation with foreign countries. The Ministry is engaged in oil diplomacy and is encouraging PSUs to adopt global vision in their pursuit of hydrocarbon assets abroad to strengthen country's energy security.

Accordingly, PSUs have been acquiring oil and gas assets abroad independently or through participating in consortia with other Indian public sector oil companies or foreign oil companies. They acquire assets abroad after carrying out an exercise of due diligence, including technical and commercial evaluation. The process amongst other things includes consideration of oil and gas reserve, geological studies of

Shri Dharmendra Pradhan, Minister P&NG during International Think Tank Meeting

the area, current and futuristic oil prices, geo-political and security situations prevailing in that country, assessment of risks involved and suitability of terms and conditions of acquisition. However, the acquisition of hydrocarbon assets has a long life cycle. The time line from exploratory activities to production stage of an asset ranges from 10-20 years. Sometimes, these activities get delayed due to political situations prevailing in that country or due to geo-political developments and are inherent risks.

Indian public sector companies such as ONGC Videsh, Indianoil, Oil India Ltd, GAIL India Ltd, Bharat Petro Resources Ltd (BPRL, a subsidiary of Bharat Petroleum Corporation Ltd) and Price Petroleum which is a

Shri Dharmendra Pradhan, Minister P&NG with Founder and President of WEF

subsidiary of Hindustan Petroleum Corporation Ltd (HPCL) have made international forays in Exploration and Production activities and have successfully established their footprint across continents from Vietnam in the east to Venezuela in the west. The Ministry is working in close cooperation with the Ministry of External Affairs and Indian High Commissions / Embassies abroad for addressing specific issues faced by Indian companies abroad and to diplomatically engage countries rich in hydrocarbon assets to provide access for India oil and gas PSUs in international acquisition efforts.

India has taken the centre stage in efforts towards greater economic integration in South Asia. There has been series of engagement in the hydrocarbon sector with the neighbouring countries for a coordinated approach towards developing the entire region in the field of oil and gas. This includes projects to construct pipelines to connect our neighbours like Bangladesh and Nepal. India has been able to cater the complete hydrocarbon requirements of Bhutan and Mauritius while for the first time India exported petroleum products to Myanmar. India has been supplying high speed diesel to Bangladesh. Indian companies are also in discussion with Sri Lankan and Japanese companies to set up an LNG terminal in Sri Lanka. These steps have connected the South Asian region ever so closely and taken the bilateral engagements to a new level.

Given the criticality of energy security, India has setup Strategic Petroleum Reserves (SPR) at various locations, which can be used in the event of supply side disruptions. Under Phase – I, 5.33 MMT of SPR has been created at three locations, viz. Visakhapatnam (1.33 MMT), Mangalore (1.50 MMT) and Padur (2.5 MMT) which can cater to supply approximately 10 days based on the consumption during 2016-17. During the budget statement 2017-18, Government announced to construct SPRs under Phase II at two new locations and the Ministry is working towards obtaining required approvals to set up these SPRs at Chandikhol in Odisha and Padur in Karnataka.

Shri Dharmendra Pradhan, Minister P&NG with Ghana Delegation

6.1 Activities of International Cooperation Division

The role of International Cooperation (IC) Division of Ministry of Petroleum & Natural Gas is to ensure and strengthen India's energy security by sustaining and promoting engagements with foreign countries and international organizations in oil and gas sector. IC Division also facilitates Indianoil and gas Public Sector Undertakings (PSUs) to aggressively pursue opportunities for acquiring quality oil and gas assets overseas. The Division also encourages the companies to diversify oil and gas sources to maintain a balanced portfolio. The Division, wherever necessary, takes up issues with relevant governments pertaining to overseas assets of Indian companies, including through visits at the level of Minister, Secretary and other senior officials of the Ministry and at bilateral and multilateral meetings. In this context, Joint Working Group meetings, Energy Dialogues and Joint Commission Meetings / Inter-Governmental Commission meetings are held regularly with important partner countries.

India is also actively engaged in multilateral cooperation in the hydrocarbon sector with International agencies like OPEC, IEA, IEF (International Energy Forum), GECF etc. India and OPEC have set up Institutional Dialogue since May 2015. India has become Association Country of IEA in March 2017 and is working closely with IEF to further its energy diplomacy. India which is the current chair of IEF will be hosting the 16th IEF Ministerial Meeting from 10-12 April, 2018 in New Delhi. The bilateral and multilateral engagements are also useful for developing and enhancing cooperation in the areas of technology collaboration, joint R&D programmes, data sharing, statistical model building and analytical tools for energy sector forecasts, etc.

6.2 Highlights of MoPNG's Overseas engagement

In pursuit of new avenues and to fortify existing bilateral cooperation in the hydrocarbon sector, India witnessed heightened level of engagements with the neighboring countries under the umbrella of our policy shift from 'Look East' to 'Act East'. There has been a conscious effort to take the neighboring countries along and share our developmental experiences with these countries,

particularly in the Oil and Gas sector for energy security of the entire region. Key highlights of activities pursued by International Cooperation division during FY 2017-18 are as follows:

6.2.1 Engagement with Bangladesh

a. A Sale & Purchase Agreement for supply of petroleum products to Bangladesh from India was finalised at New Delhi on 08.04.2017 in the presence of PM of India and Bangladesh. The agreement between NRL and BPC was formally signed on 22.10.2017 at Dhaka in the presence of Minister of External Affair, GOI.

b. The first rail rake carrying High Speed Diesel (HSD) on the new and shorter route from Siliguri to Parbatipur was flagged off during the visit of PM of Bangladesh to India.

c. A Heads of Agreement (HOA) signed between Petronet LNG Limited (PLL) and Petrobangla for setting up of an LNG terminal in the presence of PM of India and Bangladesh at Delhi in April, 2017.

d. 2nd India-Bangladesh Energy Dialogue: The 2nd Energy Dialogue between India and Bangladesh on Oil and Gas was held on 18th March 2018 at Dhaka. The Indian side was led by Shri K D Tripathi, Secretary (PNG) and Bangladeshi side was led by Mr. Nazimuddin Chowdhury, Secretary, Energy, Ministry of Power, Energy and Mineral Resources. Various bilateral issues were discussed during the Dialogue.

6.2.2 Engagement with Myanmar

a. Visit of Union Minister for Construction, Electricity and Energy of Myanmar in New Delhi: Bilateral meeting was held between Shri Dharmendra Pradhan, Minister of Petroleum &

Export of first consignment of High Speed Diesel (HSD) from India to Myanmar

Natural Gas and Mr. Mr. U Win Khaing, Union Minister for Construction, Electricity and Energy of Myanmar in New Delhi on 20th December 2017. The two Ministers took a stock of bilateral engagements and areas of cooperation in oil & gas sector.

b. Symbolising the growing hydrocarbon engagement between India and Myanmar, the first consignment of 30 MT of High Speed Diesel was dispatched from India to Myanmar by land route (vis Tamu-Moreh custom check point) on 4th September, 2017.

c. NRL has entered into an agreement with Parami Energy Group of Companies for the supply of diesel and collaboration in the retail petroleum sector of Myanmar.

d. NRL began export of Paraffin wax to Myanmar.

6.2.3 Engagement with Nepal

The Agreement for supply of petroleum products to Nepal was renewed for a period of another 5 years between Indianoil Corporation Ltd (IOCL) and Nepal Oil Corporation (NOC) during March 2017 in the presence of Minister, PNG, Shri Dharmendra Pradhan and Mr Deepak Bohara, Minister of Supplies of Nepal. India conveyed it's commitment to meet the energy requirements of Nepal through the upcoming project of Motihari – Amlekhgunj petroleum product pipeline which will ensure continuous and uninterrupted supply of products to Nepal. Various other projects are also under consideration in the hydrocarbon sector.

Signing of MoU between Indianoil Corporation Ltd. (IOCL) and Nepal Oil Corporation (NOC) in the presence of Shri Dharmendra Pradhan, Minister P&NG and Minister of Supplies, Nepal

6.2.4 Engagement with Sri Lanka

India has traditionally close and friendly relations with Sri Lanka and it endeavors to enhance bilateral relations in the hydrocarbon sector. A MoU was signed between India and Sri Lanka during April, 2017 for collaboration in host of energy and infrastructure projects in Sri Lanka. The MoU proposes Indian investment in development of oil tank farms in Trincomalee, setting up of LNG power plant and terminal and setting up of piped gas infrastructure in Colombo.

6.2.5 Engagement with Mauritius

Minister of Petroleum and Natural Gas, Shri Dharmendra Pradhan called on Hon'ble Prime Minister Mr. Pravind Kumar Jugnauth of Mauritius on 26th May 2017 in New Delhi. The bunkering and oil jetty projects being jointly taken up by Mangalore Refineries and Petrochemicals Ltd (MRPL), Indianoil Corporation along with State Trading Corporation of Mauritius was also discussed besides cooperation in the Natural Gas Sector of Mauritius. During the meeting, Minister, P&NG shared the strong and ongoing engagement with Mauritius in the hydrocarbon sector.

Shri Dharmendra Pradhan, Minister P&NG with Hon'ble Prime Minister of Mauritius

6.2.6 Engagement with Indonesia

The 2nd India-Indonesia Joint Working Group (JWG) on Oil and Gas

The 2nd JWG meeting between India and Indonesia on Oil and Gas was held on 20th April 2017 in Jakarta. The JWG was held under the umbrella of 1st India-Indonesia Energy Forum which covered the policy framework of India and Indonesia, oil and gas infrastructure, cooperation opportunities in capacity building and business opportunities in the oil and gas sectorof both countries. During the meeting, the MoU on cooperation in the field of Oil and Gas with Indonesia was renewed.

6.2.7 Engagement with Kazakhstan

A delegation led by Shri Dharmendra Pradhan, Minister for Petroleum and Natural Gas, visited Astana, Kazakhstan from 19-20 September, 2017 to co-chair the 13th meeting of the India-Kazakhstan Inter-Governmental Commission (IGC) with Mr.Kanat Bozumbayev, Minister of Energy of Republic of Kazakhstan. During the meetings both Ministers discussed entire gamut of India-Kazakhstan bilateral relations covering all areas of contemporary relevance and issues of mutual concern and ideas of stepping up the cooperation in energy sector, trade, economic, investment, transport & connectivity, agriculture, information technology, space, healthcare and cultural spheres between the two countries with his counterpart.

6.2.8 Engagement with Qatar

Shri Dharmendra Pradhan, Minister of Petroleum & Natural Gas met Dr. Mohammed Bin Saleh Al Minister of Energy & Industry of Qatar in New Delhi during June 2017.The Ministers discussed existing level of bilateral relations in hydrocarbon sector between the two side and explored cooperation in new areas.

6.2.9 Engagement with US

Import of 1st Crude Cargo from US By sourcing crude, first ever, from USA, Indianoil and gas PSUs opened a new chapter in the India-USA bilateral engagement. Indian PSUs IOCL, BPCL, HPCL and MRPL together have, so far, placed an order for 11.85 million barrels of crude from USA. This is in line with India's effort to diversify crude sourcing. The first cargo of US crude was delivered on 2nd October 2017 at Paradip port.

6.2.10 Engagement with Israel

The India-Israel engagement in the oil and gas sector was virtually non-existent began with a meeting between Shri Dharmendra Pradhan, Minister for Petroleum and Natural Gas and his Israeli counterpart Dr Yuval Steinitz, Minister for Energy of Israel in the margins of the World Petroleum Congress at Istanbul in July 2017. Both Ministers discussed ways to develop bilateral relationship in the oil and gas sector. In order to identify the areas for cooperation between the two countries, both Ministers set up a Joint Working Group.

a. **1st India – Israel JWG on Oil and Gas:** The first meeting of the JWG took place in Israel during 22-24 August 2017 and was used to identify mutual areas of cooperation between the two countries in the areas of: participation of Indian E&P companies in Israeli bid rounds, sharing Indian expertise in the E&P sector with Israel, collaboration in developing and sharing technology for oil and gas sector, including for Metal – Air battery, automation of retail outlets, joint research on energy efficiency and energy storage, etc.

b. **Allotment of Block to Indian Consortium in Israeli bid round:** In a first, an Indian consortium comprising of ONGC Videsh, Bharat PetroResources Ltd (BPRL), IOCL and Oil India Ltd (OIL) was awarded an offshore block by Israel's Energy Ministry in the Israeli bid rounds held during November 2017 to explore for oil and gas in the eastern Mediterranean.

c. **MoU on cooperation in the Oil and Gas sector with Israel:** An MoU was signed between India and Israel on cooperation in the Oil and Gas sector. The cooperation envisaged under the agreement will facilitate promotion of investments in each other's countries, technology transfer, R&D, conducting joint studies, capacity building of human resources and collaboration in the area of Start-ups. The MoU was signed during the visit of Prime Minister Benjamin Natanyahu of Israel to India in January 2018.

6.2.11 Engagement with Saudi Arabia

Inauguration of Saudi Aramco India Office: Minister, PNG inaugurated Saudi Aramco's ARAMCO ASIA INDIA office in Gurugram jointly with Mr Amin H Al-Nasser, President and CEO of Saudi Aramco. Saudi Aramco through its subsidiary ARAMCO Asia India (AAI) established its formal business presence in India in 2016. AAI would now formally engage in crude oil and LPG marketing, engineering & technical services, and other business development activities from its office in India.

6.2.12 Engagement with Japan

Memorandum of Cooperation (MOC) on LNG cooperation with Japan: During the visit of Shri Dharmendra Pradhan Minister of Petroleum and Natural Gas to Tokyo in October 2017 to attend LNG Producer-Consumer Conference, an Memorandum of Cooperation (MoC) was signed on establishing a liquid, flexible and global LNG Market. The MoC will contribute to the diversification

of gas supplies for India. This will strengthen our energy security and lead to more competitive prices for consumers. The MoC provides a framework to cooperate in facilitating flexibility in LNG contracts, abolition of Destination Restriction Clause and also explore possibilities of cooperation in establishing reliable LNG spot price indices reflecting true LNG demand and supply. Both India and Japan are also working together with Sri Lanka to set up an LNG Terminal near Colombo in Sri Lanka.

6.2.13 Engagements with International Organizations

i. Engagement with OPEC

a) **The 2nd India-OPEC Institutional Dialogue:** 2nd India-OPEC Institutional Dialogue was held during 22-23 May, 2017 in Vienna between Shri Dharmendra Pradhan, Minister, PNG and Secretary General of OPEC Mr. Mohammad Sanusi Barkindo. Minister emphasised on 'Asian Dividend rather than paying Asian Premium' and stressed OPEC to work towards "Responsible Pricing" which is also important to India for its socio-economic and developmental reasons.

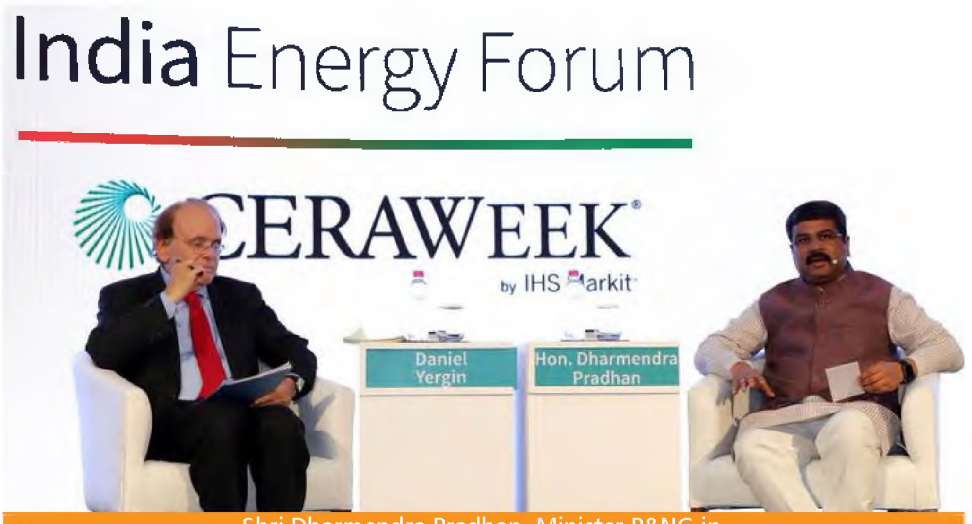
b. **Visit of Secretary General, OPEC to India during October 2017:** Minister, PNG held a meeting with Secretary General OPEC, Mr. Sanusi Mohammad Barkindo on 8th October, 2017 in New Delhi. During the meeting, Shri Pradhan emphasized the need for a purposeful and improved dialogue among producer and consumer countries. Minister highlighted that India should be considered as "preferred destination" for OPEC countries for supply of Crude Oil.

ii. **Engagement with IEA:** India became an IEA Associate Member on 30th March 2017. The announcement coincided with the visit of Mr Fatih Birol, ED IEA in the presence of Minister, PNG. India is proposing to join the Technology Cooperation on Advanced Motor Fuels Programme, which is a sub-programme of IEA.

iii. **Engagement with IEF:** India assumed the Chairmanship of International Energy Forum (IEF, Riyadh), in September 2016 for a two year period. IEF is the most representative multilateral organization for oil and gas covering all six continents and accounting for around 90% of global supply and demand for oil and gas.

India's chairmanship culminates with the hosting of the 16th Ministerial Meetings during 10-12th April, 2018.

6.2.14 International Meetings and Conferences



Shri Dharmendra Pradhan, Minister P&NG in CERAWEEK Session with Daniel Yergin, Vice Chairman IHS Market

i. CERAWEEK - India Energy Forum

Minister for Petroleum and Natural Gas inaugurated the India Energy Forum on 9th October 2017 organized in collaboration with IHS Markit in New Delhi. This was for the first time an IHS CERAWEEK event was organised in a regional format outside Houston and in India. Minister also participated in a Ministerial Dialogue on India's Energy Future.

ii. International Think Tank of MoPNG

a) An International Think Tank (ITT) was constituted by MoP&NG to assist in policy formulation in the hydrocarbon sector. Members of the ITT includes eminent experts of Indian Origin holding positions in oil & gas MNCs, Research Organizations, Universities and national and International Financial Institutions.

b) The 1st meeting of the ITT was held on 10th October, 2017 and was chaired by Minister, Petroleum and Natural Gas to discuss the challenges confronting India and the way forward for the Indianoil and Gas sector for the future.

iii. Participation in 22nd World Petroleum Congress (WPC)

a) A delegation led by Shri Dharmendra Pradhan, Minister, Petroleum & Natural Gas visited Istanbul, Turkey from 10-12 July to attend 22nd WPC. Shri Pradhan chaired a Ministerial Session on 'Current Economic Strategies in the Oil and Gas Sector' and a Plenary Session on 'Supply, Demand challenges for Oil, Gas and Products'. During the visit, Minister launched an event on Hydrocarbon Exploration & Licensing Policy (HELP) for promoting the upcoming oil & gas bidding rounds in India.

Shri Dharmendra Pradhan, Minister P&NG chairing a session at 22nd World Petroleum Congress (WPC), Istanbul, Turkey

b) On the sidelines of the visit, Minister held bilateral meetings with his counterparts from Turkey, Russia, Israel and Lebanon. Meetings were also held with ED of IEA, Dr. Fatih Birol, top CEOs including BP and Shell. He also had a meeting with Mr. Rex Tillerson, the US Secretary of State.

iv. Participation in 6th LNG Producer – Consumer Conference, Japan

LNG Producer-Consumer Conference 2017, Tokyo, Japan

A delegation led by Shri Dharmendra Pradhan, Minister for Petroleum and Natural Gas, visited Tokyo, Japan from 17-18 October, 2017 to participate in the 6th Annual LNG Producers-Consumers Conference. Minister Pradhan delivered a keynote speech at the Ministerial session on 'Developing LNG market in Asia – Government Perspectives". During his visit, he also met with his Japanese counterpart, Minister of Economy and Trade (METI) and Industry of Japan, Mr. Hiroshige Seko and discussed the bilateral engagements in the hydrocarbon sector. Shri Pradhan also held meetings with representatives of Japanese companies including Osaka Gas, Mitsui OSK lines, Japex and JERA for exploring areas of further engagement with the Indian companies.

v. Participation in 7th Asian Ministerial Energy Roundtable (AMER), Thailand

A delegation led by Shri Dharmendra Pradhan, Minister for Petroleum & Natural Gas visited Bangkok, Thailand from 01-03 November 2017 to attend 7th Asian Energy Ministers' Round Table organised by International Energy Forum (IEF). During the visit, Shri Pradhan met his counterparts from Saudi Arabia, UAE, Qatar, Thailand, Bahrain, Brunei, Bangladesh, Myanmar, Kuwait, Yemen and other countries. Minister chaired a Plenary sessio on "Natural Gas: Overcoming Market and Policy Hurdles to the Golden Age of Gas".

vi. Participation in World Economic Forum

Shri Dharmendra Pradhan, Minister (P&NG) visited Davos, Switzerland from 24th to 26th January, 2018 to attend World Economic Forum under the theme "Creating a Shared Future in a Fractured World". During the visit Minister had bilateral meetings with Saudi Energy Minister and also with top CEOs and leaders of Oil & Gas Companies. The forum also highlighted the issues relating to skill development and entrepreneurship.

Hon'ble Prime Minister Shri Narendra Modi addressing the World Economic Forum 2018 at Davos

Shri Dharmendra Pradhan, Minister P&NG at the World Economic Forum 2018 at Davos

Overseas Projects / Assets

Sl. No.	Country	Name of the Project	Participating Companies and their Share
1.	Vietnam	Block 06.1, Offshore	ONGC Videsh-45% TNK-35% (Operator) Petrovietnam-20%
		Block 128, Offshore	ONGC Videsh- 100%
2.	Russia	Sakhalin-1, Offshore	ONGC Videsh – 20% Exxon Mobil –30% (Operator) Sodeco – 30% SMNG – 11.5% RN Astra – 8.5%
		Imperial Energy, Russia	ONGC Videsh-100%
		Vankorneft	ONGC Videsh 26% OIL, IOCL, BPRL – 23.9%
		Taas-Yuryakh	OIL, IOCL, BPRL – 29.9%
		License 61	OIL: 50% Petroneft: 50%
3.	Sudan	GNPOC, Block 1, 2 & 4, Sudan	ONGC Videsh – 25% CNPC – 40% Petronas – 30% Sudapet – 5% (Jointly Operated)
		Khartoum-Port Sudan Pipeline (741 Km), Sudan	ONGC Videsh-90% (Operator) OIL-10%

Sl. No.	Country	Name of the Project	Participating Companies and their Share
4.	South Sudan	GPOC, Block 1, 2 & 4, South Sudan	ONGC Videsh – 25% CNPC – 40% Petronas – 30% Nilepet – 5% (Jointly Operated)
		SPOC/Block 5A, South Sudan	ONGC Videsh– 24.125% Petronas–67.875% Nilepet – 8% (Jointly Operated)
5.	Myanmar	Block A-1, Myanmar	ONGC Videsh – 17% Daewoo–51% (Operator) KOGAS – 8.5% GAIL – 8.5% MOGE – 15%
		Block A-3, Myanmar	ONGC Videsh – 17% Daewoo–51% (Operator) KOGAS – 8.5% GAIL – 8.5% MOGE – 15%
		Shwe Offshore Mid-Stream Project, Myanmar	ONGC Videsh – 17% Daewoo–51% (Operator) KOGAS – 8.5% GAIL – 8.5% MOGE – 15%
		Onshore Gas Transportation Pipeline, Myanmar	ONGC Videsh – 8.347% CNPC-SEAP – 50.9% (Operator) Daewoo - 25.041% GAIL - 4.1735% KOGAS - 4.1735% MOGE - 7.365%
		Block B-2,	ONGC Videsh - 97% (Operator) M&S - 3%
		Block EP-3, Myanmar	ONGC Videsh - 97% (Operator) M&S - 3%
		Block: M4, Myanmar	OIL:60% (Op) Oilmax: 10% Mercator: 25% Oil Star:5%
		Block :YEB, Myanmar	OIL:60% (Op) Oilmax: 10% Mercator: 25% Oil Star:5%
6.	Mozambique	Rovuma Area-1	ONGC Videsh - 16% Anadarko - 26.5% (Operator) OIL - 4% ENH - 15% Mitsui - 20% BPRL - 10% PTTEP - 8.5%
7	Iraq	Block 8, Iraq	ONGC Videsh - 100%

Sl. No.	Country	Name of the Project	Participating Companies and their Share
8.	Iran	Farsi Offshore Block, Iran	ONGC Videsh – 40% (Operator) IOC – 40% OIL – 20%
9.	Libya	Block 43, Libya	ONGC Videsh- 100%
		Area 95-96	Sonatrach – 50% Indianoil – 25% OIL – 25%
10.	Syria	Block 24, Syria	ONGC Videsh – 60% IPR International – 25% (Operator) Tri Ocean Mediterranean – 15%
		Al Furat Petroleum Co., Syria	Himalaya Energy (Syria) B.V. – 33.33% to 37.5% Shell – 66.67% to 62.5% (Operator –Al Furat Petroleum Company)
11.	Brazil	Block BM-SEAL-4, Brazil	ONGC Videsh-25% Petrobras -75% (Operator)
		BC-10, Brazil, Offshore	ONGC Videsh - 27% Shell - 50% (Operator) Qatar Petroleum International - 23%
		BM-SEAL-11 (3 blocks), Sergipe Basin	Petrobras (Operator)- 60%, IBV 40%
		BM-C-30 (1 block), Campos Basin	Anadarko Petroleum (Operator) - 30%, British Petroleum - 25%, Maersk - 20%, IBV 25%
		BM-POT-16 (2 blocks), Potiguar Basin	Petrobras 30% (Operator), BP - 30%, GalpEnergia - 20%, IBV 20%
12.	Colombia	Mansarovar Energy Colombia Limited (MECL), Colombia	ONGC Videsh–25-50%, Sinopec-25-50% Ecopetrol-50% (Jointly Operated)
		Block RC-8, Colombia	ONGC Videsh – 40% (Operator) Ecopetrol - 40% Petrobras – 20%
		Block RC-9, Colombia	ONGC Videsh – 50% Ecopetrol - 50% (Operator)
		Block RC-10, Colombia	ONGC Videsh – 50% (Operator) Ecopetrol - 50%
		Block LLA-69, Colombia	ONGC Videsh - 50% SIPC - 50% (Jointly Operated)
		Block GUA OFF 2	ONGC Videsh - 100%
		CPO-5, Colombia	ONGC Videsh – 70% (Operator) Petrodorado – 30%
		SSJN7, Colombia	ONGC Videsh – 50% Pacific Rubieales Energy (PRE) – 50% (Operator)

Sl. No.	Country	Name of the Project	Participating Companies and their Share
13	Venezuela	San Cristobal Project,	ONGC Videsh-40% PDVSA-60% (Jointly Operated)
		Carabobo-1Project, Venezuela	ONGC Videsh – 11% IOC – 3.5% OIL – 3.5% Petronas – 11% PDVSA – 71% (Jointly Operated)
14	Kazakhstan	Satpayev Project, Kazakhstan	ONGC Videsh – 25% KMG – 75% (Operator)
15.	Azerbaijan	ACG, Azerbaijan	ONGC Videsh-2.7213% BP-36% (Operator) SOCAR-12% Chevron-11% INPEX-11% Exxon-8% StatOil-8%
		BTC Pipeline (1760 Km), Azerbaijan	ONGC Videsh-2.36% BP-30.1% (Operator) SOCAR-25% StatOil-8.71% TPAO-6.53% ITOCHU-3.4% Chevron-8.9% INPEX-2.5% ENI-5% TOTAL-5% Conoco Philips-2.5%
16.	Bangladesh	Block SS4, Bangladesh	ONGC Videsh - 45% (Operator), OIL - 45% BAPEX - 10%
		Block SS9, Bangladesh	ONGC Videsh - 45% (Operator), OIL - 45% BAPEX - 10%
17.	New Zealand	Block- 14TAR-R1,	ONGC Videsh - 100%
18.	Indonesia	Nunukan Block	BPRL- 12.5% PT Pertamina Hulu Energy-35% (operator) PT Medico – 40% Videocon Indonesia -12.5%
19.	Australia	Block EP – 413 (onland)	BPRL- 27.803%
		T/L 1 & T/18P	-
20.	East Timor	Block JPDA 06-103	BPRL- 20%
21.	USA	Niobrara Shale Oil/ Condensate JV asset	Carrizo (Niobrara) LLC – 60% OIL - 20% Indianoil – 10% Haimo Oil & Gas -10%
		Eagle Ford Shale acreage in Texas State	GAIL 20% PI

Sl. No.	Country	Name of the Project	Participating Companies and their Share
22.	Canada	Pacific Northwest LNG Project	Progress Energy Canada Ltd. – 62% Sinopec – 15% Indianoil – 10% Japex – 10% Petroleum Brunei – 3%
23.	Nigeria	OPL- 205 OML – 142	Summit Oil 30%, Suntera Nigeria 205 Ltd – 70% Suntera 50%, Indianoil 25%
24.	Gabon	Shakthi	OIL – 45% Indianoil – 45% Marvis Pte Ltd -10% New PSC: OIL – 50% Indianoil – 50%
25.	Yemen	82	Medco – 45% Kuwait Energy – 25% IOC- 15% OIL- 15%
26.	Namibia	PEL 0037	Tullow Namibia– 35% (Operator) Pancontinental Namibia–30% OVL - 30% Paragon Oil and Gas - 5%
		PEL 30	Eco Oil and Gas Namibia– 32.5% (Operator) Azimuth Namibia Ltd – 32.5% ONGC Videsh – 15% Tullow Namibia – 10% National Petroleum Corp of Namibia (Pty) Ltd – 10%

Chapter 7

Development of North-Eastern Region

7.1 Preamble

7.1.1 The history of oil and gas exploration in India dates back to the 19th century in the state of Assam located in the extreme North-Eastern corner of India. The first well that struck oil was in Makum area near Margherita during 1867 drilled by McKillop, Stewart & Co., barely 9 years after Drake's well in 1859 in Titusville, Pennsylvania. Subsequently, a number of wells were drilled in Makum and Namdang areas of Margherita and produced crude oil in minor quantities for more than two decades. The Assam Railway & Trading Co. Ltd, which was involved in the business of timber, coal, tea & construction of railway lines, drilled the first commercial well Digboi-1 (September 1889 -November 1890, total depth of 662ft) with an initial production of 200 gallons per day, opened up a new chapter in exploration and production of oil in this part of the world and the oil industry of India was officially born. During the subsequent years before independence of India, Digboi oil field was extensively developed and searched for new oil fields continued.

7.1.2 Other significant milestones in oil and gas exploration in North East took place mainly during post independence. These include the discoveries of the Nahorkatiya and Moran fields by Assam Oil Company (AOC) and Rudrasagar oil fields by ONGC in 1953, 1956 and 1960 respectively. Subsequently, more than 100 oil and gas fields, that include fields such as Jorajan, Kumchai, Hapajan, Shalmari, Dikom, Kathaloni, Tengakhat, Bhogpara, Chabua, Baghjan, Barekuri, Mechaki, Lakwa, Lakhmani, Geleki, Amguri, Kharsang, Charali, Borholla-Champang, Khoraghat, Baramura, Tichna, Gojalia, Rokhia, Khobal, Hortokihave been discovered by Oil India Limited (OIL) and Oil & Natural Gas Corporation Limited (ONGC) in the North Eastern states of Assam, Arunachal Pradesh, Nagaland, Tripura and Mizoram.

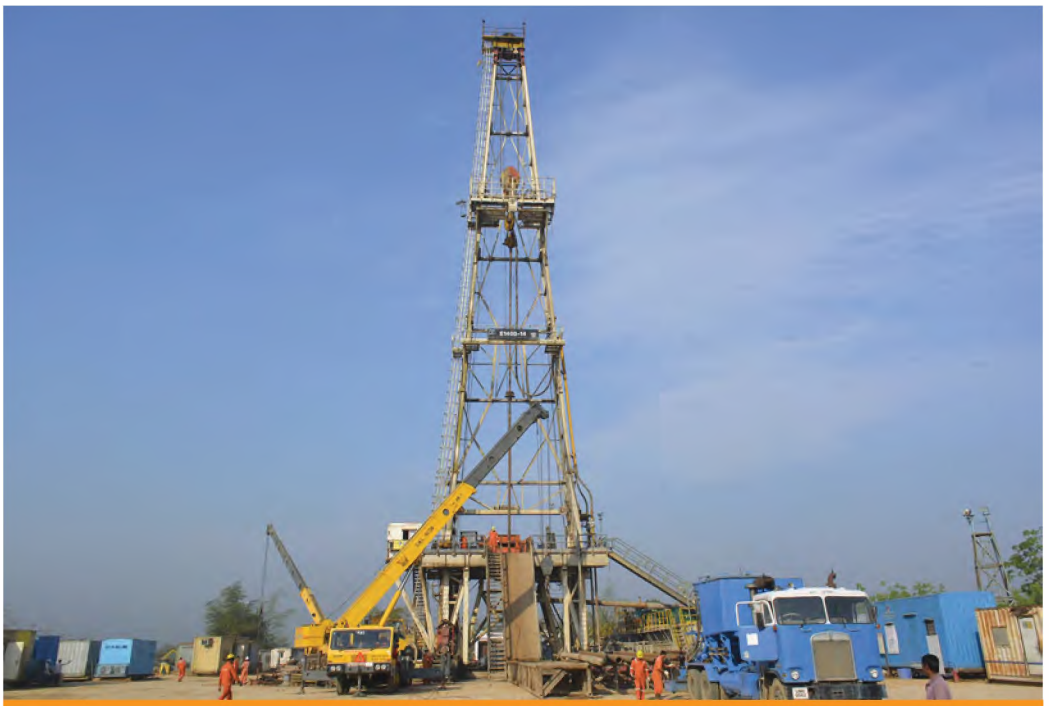
7.1.3 Since then, both the National Oil Companies viz., OIL and ONGC have proven substantial amount of producible hydrocarbons and have technical know-how of producing and managing complex reservoirs and contributing to about 9 MMT per annum of oil plus oil equivalent of gas (O+OEG) from their producing assets in North-East.

7.1.4 The prognosticated hydrocarbon resources of the country has been reassessed based on the newly acquired data. The prognosticated hydrocarbon resources (O+OEG) of Upper Assam Shelf basin has been upgraded to the order of 6001.2 MMT from the level of 3180 MMT and for Assam-Arakan Fold Belt basin, the total prognosticated hydrocarbon resources is of the order of 1632.8 MMT from the earlier estimates of 1860 MMT. Thus, there is a total 7634 MMT of prognosticated hydrocarbon resources in the North- East. About 2220 MMT of in-place hydrocarbon reserves have been established so far by E&P companies, which means about 71% of hydrocarbon resources are under "yet to find" category.

Indane - Clean fuel drive

7.1.5 The two National Oil Companies (NOCs) , namely, ONGC and OIL have been engaged in the North East Region for exploration and exploitation of oil and gas for more than 55 years and generated a vast geo-scientific database and geological understanding of the basin.

7.1.6. With the advent of New Exploration Licensing Policy (NELP) by the Government in 1999, the E & P activities were further intensified by award of new acreages to various national and international E & P Companies on the basis of open bidding system. This has helped in inducting new technology in drilling and production of hydrocarbon as well as enhancing geo-scientific knowledge and overall understanding of Assam-Arakan Basin.



ONGC Rig Operation in progress at Tripura

7.2 Exploration Activities in North-East under the Nomination Regime

7.2.1 Oil India Limited since its inception in February 1959 has been actively pursuing exploration & development activities in the state of Assam. During 1962-65, various new technologies were adopted such as deviation drilling, dual completion, pressure maintenance etc. In 1968, exploration programme in Kharsang, Arunachal Pradesh began and in Kusijan areas, west of Digboi hydrocarbon was discovered.

7.2.2 During 1969-79, extensive geophysical survey and development effort in Assam and Arunachal Pradesh was carried out which led to the discovery of the Jorajan field in 1972 and establishment of gas resources in Eocene of Tengakhat (west of Naharkatiya) in 1973.

7.2.3 During nineties, intensive exploration/exploratory well drilling & development activities resulted in discovery of fields such as Bogapani, Kumchai, Hapjan, Shalmari and Rajgarh. Deeper Exploration: After discovery of hydrocarbon in the deeper Eocene-Paleocene horizons, more thrust was given to explore into these horizons in different fields of Upper Assam. As a result, production from deeper reservoirs during late 1990's surpassed the production from shallower reservoirs (Barail and Tipam). This led to significant discoveries involving deeper prospects subsequently with depths ranging between 3550-3800 m in the central basement high areas of Dikom-Kathaloni-Chabua-Matimekhana to more than 5500 m in Mechaki areas towards the eastern flank of Upper Assam Basin.

7.2.4 As on 31.12.2017, OIL holds 3 exploration blocks in North East under nomination regime. From 2000 onwards, OIL is aggressively participating in NELP exploration blocks apart from nomination blocks and holds 3 exploration blocks under NELP regime.

7.2.5 ONGC started its exploration work in Assam in 1956. Seismic surveys and geological mapping of the outcrop areas were initiated while gravity-magnetic surveys began in 1961. The analysis of seismic data along with the outcrop mapping data generated by ONGC and earlier workers helped refining the basin architecture and its evolution.

7.2.6 The first wild cat well of ONGC was drilled on Disangmukh structure in 1960, however, the first commercial oil discovery was on Rudrasagar structure in the same year. As a result of initial successes encountered in pursuing structural prospects the focus remained on identification of such prospects through seismic data. Since then ONGC has drilled more than 700 exploratory wells in the state of Assam.

7.2.7 The reservoirs of Barail Group belonging to Upper Eocene to Lower Oligocene age and those of Tipam Group of Upper Miocene age proved to be most prolific and drew significant attention of explorationists. A significant number of oil and gas fields, including Panidihing, Disangmukh, Lakwa, Lakhmani, Sonari, Geleki, Demulgaon, Amguri and Charali, were discovered with this exploration philosophy.

7.2.8 During the past nearly five decades, it has been ONGC's endeavour to prove the extension of the established hydrocarbon bearing areas of Sivasagar and Dhansiri Valley of North Assam Shelf and at the same time step out and explore new areas. In the process it has established hydrocarbon fields in the logistically difficult areas of Cachar and neighbouring states of Tripura and Nagaland.

7.2.9 Currently ONGC holds 4 exploration blocks in the states of Assam and Nagaland under nomination regime. In addition, ONGC holds 3 exploration blocks under NELP regime in North East.

7.3 Exploration Activities in North-East under the PSC Regime

7.3.1 Under the PSC regime, exploration blocks were first awarded in the States of Assam in the year 1998 under Pre-NELP rounds of bidding. Subsequently, blocks were awarded under various rounds of NELP. The 31 awarded blocks (Assam-21, Manipur- 2, Mizoram- 3, Nagaland-2 and Tripura-3) cover an area of 43,722 Sq. km. Out of these, 9 blocks are operational, 4 blocks have been proposed for relinquishment by operators and 18 blocks have been relinquished. In addition, there are 2 discovered fields that are in operation under PSC regime, namely, Kharsang in Arunachal Pradesh and Amguri in Assam.

7.4 Crude Oil & Natural Gas Production in North-East

7.4.1 The contribution in crude oil production by North Eastern States is about 12.3% of the total production. In 2017-18 upto December 2017, crude oil production in North East is about 3.317 million metric tonne (MMT).

The state-wise and company-wise trend of crude oil production in last 5 years is given below:

Table-7.1: Crude oil production in last five years in North-East (MMT)

State/ Region		2012-13	2013-14	2014-15	2015-16	2016-17	2017-18 upto Dec.
Assam	OIL	3.639	3.445	3.405	3.219	3.250	2.542
	ONGC	1.222	1.263	1.061	0.965	0.950	0.736
	Total	**4.861**	**4.708**	**4.466**	**4.184**	**3.278**	**3.278**
Arunachal Pradesh	OIL	0.022	0.021	0.007	0.006	0.008	0.005
	Pvt/JV	0.099	0.09	0.069	0.051	0.048	0.034
	Total	**0.121**	**0.111**	**0.076**	**0.057**	**0.056**	**0.039**
North East	ONGC	1.222	1.263	1.061	0.965	0.950	0.736
	OIL	3.661	3.466	3.412	3.225	3.258	2.547
	Pvt/JV	0.099	0.09	0.069	0.051	0.048	0.034
	Total	**4.982**	**4.819**	**4.542**	**4.241**	**4.256**	**3.317**

7.4.2 From the table 7.1, it may be observed that OIL has the share of 76.8% in crude oil production in North East, followed by ONGC with a share of 22.2%. The share of Pvt/JV companies in crude oil production is about 1.0%, which is from the Kharsang field in the state of Arunachal Pradesh.

7.4.3 The contribution in natural gas production by North Eastern States is about 14.4% of the total production. In 2017-18 upto December 2017, natural gas production in North East is about 3535 million metric standard cubic metre (MMSCM).

The state-wise and company-wise trend of natural gas production in last 5 years is given below:

Table-7.2: Natural gas production in last five years in North-East (MMSCM)

State/ Region		2012-13	2013-14	2014-15	2015-16	2016-17	2017-18 upto Dec.
Assam	OIL	2425	2409	2509	2618	2693	2031
	ONGC	485	459	449	405	434	382
	Pvt/Jv	-	-	-	-	-	24
	Total	**2910**	**2868**	**2958**	**3023**	**3127**	**2437**
Arunachal Pradesh	OIL	19	19	12	12	12	9
	Pvt/Jv	22	22	22	18	16	12
	Total	**41**	**41**	**34**	**30**	**28**	**21**
Tripura	**ONGC**	**647**	**822**	**1140**	**1332**	**1430**	**1077**
North East	ONGC	1132	1281	1589	1737	1864	1459
	OIL	2444	2428	2521	2630	2705	2040
	Pvt/JV	22	22	22	18	16	36
	Total	**3598**	**3731**	**4131**	**4385**	**4585**	**3535**

7.4.4 From the table 7.2, it may be observed that OIL has the share of 57.7% in natural gas production in North East, followed by ONGC with a share of 41.3%. The share of Pvt/JV companies in natural gas production is about 1%.

7.4.5 The production from Champang field of Nagaland started in 1980-81 with 0.0002 MMT of crude oil and subsequently reached a peak of 0.1363 MMT during the year 1989-90. The operations in Nagaland have been suspended w.e.f. 11.05.1994 as per the directives of the State Govt. and has not yet resumed.

7.5 Discovered Small Field Policy

7.5.1 In order to accelerate exploration and production activities in North East, Government of India has already 9 discovered fields under first round of discovered Small Field Policy. One block is in the State of Arunachal Pradesh and other 8 blocks are located in the state of Assam.

The details of these block is as under:

Table 7.3. Contract Areas Awarded under DSF-2016 in North East Region

	Location Area	Contract Area Name	Operator	Consortium
1	Arunanchal Pradesh	KHEREM	Hindustan Oil Exploration Limited	HOEC (40), OIL (40), PPCL (20)
2	Assam	BARSILLA	Ramayna Ispat Private Limited	RIPL (29), BDNEPL (29), DFPL (23), MIPL (19)
3		CHARAIDEO	Oilmax Energy Private Limited	OILMAX (100)
4		DIPLING	Ramayna Ispat Private Limited	RIPL (29), BDNEPL (29), DFPL (23), MIPL (19)
5		DUARMARA	Oilmax Energy Private Limited	OILMAX (100)
6		HILARA	Prize Petroleum Company Limited	PPCL (100)
7		JERAIPATHAR	IndianOil Corporation Ltd	IOCL (100)
8		LAXMIJAN	Megha Engineering and Infrastructures limited	MEIL (100)
9		PATHARIA	Vijayasri bhaskar Industries Private Limited	VBIPL (100)

7.6 Alternate Hydrocarbon Sources in North East

7.6.1 **Coal Bed Methane (CBM) :** In order to harness the CBM potential in the North-East, 1 CBM block, namely, AS-CBM-2008/IV has been awarded in the state of Assam, covering an area of about 113 Sq. Km. The block was awarded under CBM IV round of bidding to the Consortium of M/s Dart Energy and OIL. The estimated CBM resource in this block is about 60.3 BCM.

7.6.2 **Shale Gas:** Based on the data available from conventional oil/gas exploration in the country for the last so many years, it appears that few sedimentary basins, including Assam Arakan Basin may be prospective from Shale gas point of view. Resource estimation for Shale Oil/Gas has been taken up for various Indian basins, including Assam Arakan. In October 2013, MOP&NG has issued guidelines for exploration and exploitation of Shale Oil & Gas by NOCs in the nomination acreages under which ONGC and OIL have identified 50 blocks and 5 blocks respectively. Out of 55 blocks, 3 blocks operated by ONGC and 4 blocks operated by OIL are in the state of Assam.

7.7 Refineries in North East

There are four refineries in the North East Region. Three refineries are owned by IOCL and one by Numaligarh Refinery Limited, a subsidiary of BPCL.

The refineries along with their refining capacities are mentioned hereunder:-

1) Digboi Refinery (Assam)-0.65 MMTPA- IndianOil Corporation Limited

2) Guwahati Refinery (Assam)-1.00 MMTPA- IndianOil Corporation Limited

3) Bongaigaon Refinery (Assam)-2.35 MMTPA- IndianOil Corporation Limited

4) Numaligarh Refinery (Assam)- 3.00 MMTPA- Numalrigarh Refinery Limited

Digboi Refinery is the oldest operating refinery in the world and produces premium grade paraffin wax and micro-crystalline wax. NRL, the latest one, popularly known as "Assam Accord Refinery" was commissioned in October, 2000 and equipped with modern units like Hydrocracker and Delayed Coker for maximising distillate yield.

There is a plan to expand the refining capacities of these refineries as per details below:-

Refinery	Capacity (MMTPA)	
	Existing	Year 2025
Guwahati Refinery	1.0	1.7
Bongaigaon Refinery	2.35	2.7

IndianOil Guwahati Refinery

7.8 North East Vision 2030

7.8.1 The North East Vision Document has been a focused and consultative exercise to develop a common and shared aspiration for benefiting people of the north east region. With involvement and inputs of various stakeholders, industry players and state governments, the Vision document not only includes the ambition for the region but also an actionable roadmap.

7.8.2 The objectives of the plan are to leverage the region's hydrocarbon potential, enhance access to clean fuels, improve availability of petroleum products, facilitate economic development and to link common people to the economic activities in this sector. The states covered include Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and Tripura. The Ministry also undertook series of consultations with the state Governments while drafting the vision document.

7.8.3 The Vision rests on five pillars: People, Policy, Partnership, Projects and Production. For people, it foresees clean fuel access to households alongside fostering skill development and involvement of the local community. The policy focus areas include moderation in light of specific terrain and weather conditions of the region coupled with ensuring fund planning for new projects. As for partnership, the stress is on greater involvement of state governments in planning and implementation, and on boosting trade with neighbouring nations. In projects, the focus is on pipeline connectivity for carrying liquefied petroleum gas (LPG), natural gas, and petroleum products, oil and lubricants (POL); building refineries and import links; and development of compressed natural gas (CNG) highways and city gas distribution network. The production side emphases include production enhancement contracts, technology deployment and fast-track clearance, and development of service provider hubs.

7.8.4 Beyond production, the focus areas include exploring hydrocarbon linkages and trade opportunities with Bangladesh, Myanmar, Nepal & Bhutan; implementation of 'Make In India' in the region; development of health & medical facilities; industrial policy & infrastructure related action points; focus on skill development; and employment generation requirement in the region. The vision statement lays out a detailed roadmap for the entire hydrocarbons value chain, covering upstream, midstream and downstream segments. This report includes an action plan – of immediate, medium-term and long-term initiatives – to help achieve the objectives.

7.8.5 The Vision aims at doubling Oil & Gas production by 2030, making clean fuels accessible, fast tracking projects, generating employment opportunities and promoting cooperation with neighbouring countries.

7.9 Expression of Interest for Exploration Blocks in North Eastern Region

7.9.1 Under Hydrocarbon Exploration & Production Policy (HELP), Government has obtained "Expression of Interest" for 57 areas which are to be carved out by the bidders under Open Acreage Licensing Policy (OALP) in the first window from 1st July, 2017 to 15th November, 2017. Out of these EoIs , 55 blocks are being offered in January, 2018 for international competitive bidding process. Out of these 55 blocks, 19 exploration blocks are located in North Eastern region.

Chapter 8

R&D & New Technologies

8.1 Introduction

Oil Companies have undertaken number of R&D Projects which have resulted in improvement of technology in upstream and downstream sector.

8.2 R&D by IOCL

During the year 2016-17, the INDAdept[G] technology developed by Indianoil's R&D Centre was commissioned at Guwahati Refinery for reducing sulphur content of cracked gasoline streams to be able to meet Euro- IV & VI sulphur specification with minimum RON loss. Ind-Coker[AT], another technology developed in-house, was successfully demonstrated at Panipat Refinery with significant improvement in the distillate yield. In addition, delayed coking technology jointly licenced by IndianOil and EIL was successfully implemented for revamp of the 0.6 MMTPA Coker-A unit at Barauni Refinery and Oilivorous-S technology developed by the R&D Centre of IndianOil was successfully used for containing the oil spill at Chennai. 105 Patents were filed during the year 2016-17, out of which 6 are Indian and 99 are foreign patents. 27 patents were granted during the year 2016-17 (India-6, USA-7, Canada-1, France-1, Germany-2, Great Britain-1, Italy-1, Japan-5, Russia-1, and Saudi Arabia-2).

R&D Activity in progress at ONGC Ahmedabad

8.3 R&D by GAIL

8.3.1 **Pipeline Health Monitoring Robot (PHMR):** GAIL is operating more than 11,000 kms of natural gas pipelines. Securing the integrity of Pipeline is of utmost importance. Currently, intelligent Pipe Inspection Gauges (PIGs) are used for monitoring the Health of pipelines. However, such inspection procedures are data-intensive and expensive. GAIL in association with IIT-Kanpur is developing a Robot for Pipeline Health monitoring with smart sensor based technology which is expected to be cost effective and more reliable. A 8"dia prototype Pipeline monitoring Robot has been successfully developed and demonstrated. A Patent has been applied on the novel development. Extensive trials are being conducted.

8.3.2 **Development of Novel adsorbents for Methane Storage:** Adsorbed Natural Gas (ANG) is a very promising energy efficient technology as it is safe and cost effective compared to Compressed Natural Gas (CNG). However, for its success, development of suitable adsorbents with high adsorption and desorption capacity is required. GAIL in association with NCL, Pune has developed a new class of porous and high surface area materials based on "Covalent Organic Framework (COF)" for natural gas storage applications. The novel COF material prepared has shown promising Methane storage ability owing to its exceptionally high surface area and chemically-tunable structures. Currently, the developed materials are undergoing extensive studies to determine the structural and cyclic stability.

8.4 R&D by ONGC

8.4.1 ONGC has established separate R&D institutions to undertake specific activities in key areas of Exploration, Drilling, Reservoir Management Production Technology, Ocean Engineering and Health, Safety and Environment (HSE) Management. Regional laboratories have also been established at various Assets and Basins of ONGC to support these institutes. ONGC through its R&D Institutes is pursuing adaptation/customization and applied research.

8.4.2 ONGC has also established Gas Hydrate Research & Technology Centre (GHRTC) at ONGC, Panvel and is functional since 14th September, 2016 and studies pertaining to fundamentals of gas hydrates, research for exploration and potential exploitation of gas hydrates, techno-economics and commercialization of gas hydrates in a safe and environment friendly manner are being carried out.

8.4.3 In the year 2017-18, ONGC carried out R&D work for conventional and Non-conventional Hydrocarbons includes studies undertaken at different Institutes of ONGC.

8.4.4 As per DPE guidelines, several projects from ONGC Institutes have been selected and included in the MoU with MoPNG. During 2017-18, ONGC is working on the following R&D projects and will be completed by 31st March 2018.

- Production enhancement through stimulation of tight carbonate reservoirs in wells of western offshore field.
- Innovative techniques for Gas Production enhancement in low gas production wells of Assam / Tripura / Mehsana.
- Development of chemical formulation for water shut off in gas wells of ONGC fields and its field execution.

8.4.5 **Industry-Academia Participation:** To create a strong Industry-academia interface, ONGC has initiated the "PAN IIT Collaborative Research Program" with seven IITs viz. IIT Kharagpur, Delhi, Kanpur, Mumbai, Madras, Roorkee and Guwahati. Presently, the program has been divided into

three Phases having fifteen, twelve and five projects respectively for Phase I, II and III. This initiative would add a new dimension to the Industry-Academia interface in India.

8.4.6 **R&D Initiatives by ONGC in the field of IOR/EOR activities:** ONGC puts efforts on continuous basis for performance analysis of fields and suitable corrective measures are taken for improvement in the field performance and recovery. In fact, improving recovery factor to 40% is one of the strategic goals of ONGC. The extraction efficiency or recovery factor of fields operated by ONGC is comparable with the International standards; however, efforts are further being made for its improvement. The salient measures including the use of state of art technology to enhance global recovery factor are as under:

- Simulation studies for Low Salinity water flooding as EOR pilot for L-III reservoir of Mumbai High South.
- Laboratory studies for Minimum Miscibility Pressure (MMP) determination of CO_2 on crude oil of GS-11 sand / GS-8 sand of Gandhar field.
- Low Salinity Water flood as an EOR Process for Bassein pay of South Heera Field.
- Feasibility of Air Injection in KS-IV sand of Jhalora Field.
- Updation of MHN L-III simulation model and identification of opportunities for further field development.
- Feasibility of Miscible gas injection in major pays of NBP Field.
- Preparation of Geocellular Models

8.4.7 **R&D Patents Registered by ONGC:** R&D is one of the key driver of productivity and economic growth of any country. To accomplish this, ONGC has undertaken an important initiative to patent its R&D technological innovation/ invention to protect output of an R&D Project. During the current year 2017-18 upto December, 2017, ONGC has registered the following three patents.

a. Non-carcinogenic corrosion inhibition for oil and gas well completion and packer fluids (Institute of Engineering and Ocean Technology).

b. An electrochemical cell and a process for the electrolysis of cupric chloride to produce copper (ONGC Energy Centre Trust).

c. Electrochemical cell used for the production of Copper using Cu-Cl thermochemical cycle (ONGC Energy Centre Trust).

8.4.8 During in the current year, ONGC has made R&D expenditure of ₹ 238 crore in 2017-18 upto December, 2017. R&D expenditure made by ONGC in last 3 years is as under:

Financial Year	R&D Expenditure (₹ crore)
2014-15	545
2015-16	540
2016-17	592

New Technologies

8.4.9 Concerted efforts to upgrade and induct technology are being continuously made in ONGC as per the industry requirement. During 2017-18 several Technologies were evaluated/ inducted in ONGC. The brief about the technology is given below.

- Gravity and Magnetic data processing, modeling and Interpretation Software
- Nobel Gas Mass Spectrometer
- StimGun Propellant-Assisted Perforating System
- GSMP (General surface multiple prediction) de-multiple Software
- Cyclic Steam Stimulation (CSS) followed by In-situ combustion (ISC) Process
- Polymer flooding in heavy oil reservoirs
- Immiscible gas injection in Borholla field
- Gas assisted Gravity Drainage (GAGD) process has been carried out in Kasomarigaon field.
- Microbial Enhanced Oil Recovery (MEOR) Process technology adopted in Mehsana and Ankleshwar fields

8.5 R&D by CPCL

8.5.1 **Renewable crude and liquid Hydrocarbon fuels from Algae:** The Scientific Advisory Committee of MoPNG has approved Phase I of our collaborative research proposal with Aban Infrastructure on Algae to Biofuels project for funding by CHT/OIDB at a cost of ₹ 386 lakhs. The project duration

Shri Dharmendra Pradhan, Minister P&NG dedicating Green R&D Centre of HPCL, Bangaluru to the Nation

is 24 months. This proposal envisages Mass cultivation and harvesting of marine algal consortium in open raceway ponds for bio crude production. The civil works (Construction of blow down sump, Raceway ponds) &Procurement of lab equipment are in progress. The project is expected to be completed during April 2019.

8.5.2 **Development of eco-friendly and low-cost synthetic process for the production of exo-tetrahydrodicyclopentadiene (JP-10):** JP-10 is a gas turbine missile fuel used in defence applications. It is a single component fuel with high energy & density compared to the currently used JP series fuels. It is an exploratory study to develop a process to produce JP-10 fuel indigenously by a joint effort with IITM Chennai. The main objective is to develop process for the hydrogenation of dicyclopentadiene into endo-tetrahydrodicyclopentadiene and its isomerization into exo-tetrahydrodicyclopentadiene in two step conversion process using eco-friendly and low-cost catalytic process.

Pilot plant studies will be carried out using IIT developed new catalyst Ni on sulphated Zirconia. The project is scheduled to be completed during March 2018.

8.5.3 **Recovery of hydrocarbon from Crude sludge via microwave-assisted pyrolysis:** The main objective is to convert dry crude sludge to useful hydrocarbon feed stock. The sludge is subjected to fast pyrolysis under microwave irradiation in the presence of susceptor/catalyst materials and will be converted to diesel range liquid hydrocarbons.

This study will demonstrate microwave assisted pyrolysis as a new and promising technology to recover liquid hydrocarbons from dry crude sludge; otherwise a refinery waste exhibits safe disposal issues. MoU was signed between IIT-M and CPCL. The initial characterization of crude sludge was completed. The procurement of lab equipment is in progress. The project is scheduled to be completed during October 2018.

8.5.4 **Recovery of water vapour loss through evaporation from cooling tower:** The objective is to recover the drift and evaporation water vapour loss from the cooling tower. The study will be carried out in collaboration with an external agency. A prototype cooling tower will be fabricated to conduct the pilot plant study. The external agency was identified through EOI (expression of interest). Tender inputs are in progress. The project is expected to be completed during September 2018.

8.5.5 **Pilot plant Study on production of Ultra Low Sulphur Kerosene by adsorptive desulphurization technique:**

The objective of the study is to produce ultra low sulphur kerosene by less severe process route than the conventional desulfurization process. A catalytic vapour phase adsorptive desulfurization process will be used to reduce the sulphur level in kerosene. The preparation of catalyst was completed and pilot studies will be initiated in Dec'17. The project is scheduled to be completed during January 2018.

R&D & New Technologies

IOC, R&D Center

Chapter 9

Bio-Fuels

9.1 Bio-Fuels

Energy demand across the transport sector is the highest across major sectors in terms of end usage. As vehicle ownership expands, so will the demand for petroleum products. It is estimated that the demand for diesel and petrol will rise from 80.4 MMT and 26.1 MMT respectively in the year 2017-18 to 110 MMT and 31.1 MMT by the year 2021-22 if the present situation prevails. Therefore, bio-fuels seek to provide a higher degree of national energy security in an environmentally friendly and sustainable manner by supplementing conventional energy resources, reducing dependence on imported fossil fuels and meeting the energy needs of India's vast rural population by use of non-food feedstocks. Government has been promoting and encouraging production and use of a) ethanol derived from sugar molasses and/or second generation biofuels (biomass, agricultural waste etc.) for blending with petrol and b) biodiesel derived from inedible oils, tree borne oil seeds and oil waste for blending with diesel.

9.2 EBP Programme

The Government through Oil Marketing Companies (OMCs), is implementing Ethanol Blended Petrol (EBP) Programme under which, OMCs sell ethanol blended petrol with percentage of ethanol up to 10%. In order to augment the supply of ethanol, Government opened alternate route for ethanol production from other non-food feedstocks besides molasses, like cellulosic and ligno cellulosic materials including petrochemical route. It was also decided to administer the price of ethanol under EBP Programme. This decision has facilitated in significantly improving the supply of ethanol from 38 crores litres during ethanol supply year 2013-14 to 111 crore litres during 2015-16.

Government continued to administer ethanol prices for the EBP Programme taking into account various factors such as firming of sugar prices, falling crude prices and consequent under-recoveries of OMCs. These factors led to revision of ethanol ex-mill price to ₹ 39/- per litre during ethanol supply year 2016-17. Additionally, Central/State Government taxes and transportation charges were payable. For the ethanol supply year 2016-17, about 66.51 crore litres of ethanol could be procured due to lower sugarcane production in the Country.

Government has increased the administered price of ethanol for the EBP Programme during the ethanol supply year 2017-18 at ₹ 40.85/- per litre. Additionally, GST and transportation charges are also payable.

These proactive measures have instilled faith in the ethanol suppliers. For the ongoing ethanol supply year 2017-18, the suppliers have offered highest ever quantities of 139.5 crore litres during a single supply year.

Government amended the Industrial (Development & Regulation) Act – 1951, clarifying the role of the Centre and the State with respect to denatured ethanol. This decision of the Government has started yielding results with States like Karnataka **withdrawing** all notifications, orders, circulars issued in respect of denatured alcohol. This has facilitated smooth movement of ethanol.

9.3 2G Ethanol Programme

Oil PSUs are also working in the direction of setting up 12 Second Generation (2G) ethanol Biorefineries in 11 States with an objective to boost production of ethanol in the country. These 2G Ethanol Biorefineries are being set up in Punjab, Haryana, Uttar Pradesh, Gujarat, Maharashtra, Madhya Pradesh, Karnataka, Andhra Pradesh, Odisha, Bihar and Assam.

Few of the Oil PSUs have completed Detailed Feasibility Report (DFR) of their projects and are planning to commence the mechanical erection works at the earliest subject to a few statutory approvals & clearances.

One of the Oil PSUs viz. Numaligarh Refinery Limited (NRL), has obtained Environmental Clearance for setting up its plant in Numaligarh (Assam) on **06.11.2017.**

To bring in Commercial viability in setting up 2G Ethanol Biorefineries, Ministry of Petroleum & Natural Gas in December, 2017 has also requested Ministry of Corporate Affairs to grant special dispensation to Oil PSUs for utilizing 10% of the project cost or Rs 75 crore, whichever is lesser, for each project from the CSR funds.

9.4 Biodiesel Programme

The Government, vide notification dated 29th June, 2017, has allowed direct sale of Biodiesel (B-100) for blending with High Speed Diesel to all consumers, in accordance with the specified blending limits and the standards specified by the Bureau of Indian Standards. During the period April- November, 2017 Biodiesel quantity procured was 43551 KL vis-à-vis 34910 KL procured during the same period in 2016 i.e. increase of 24%.

Minister P&NG flanked by DSMs of BPCL during launch of Safal Outlet

9.5 Conferences and Seminars

A "Bioenergy- Urja Utsav" was organised on 7th – 8th July, 2017 at Pune (Maharashtra), to showcase the achievements of Bioenergy sector in past few years, create awareness among farmers/ students about Bioenergy, promote technologies relating to Bioenergy sector and develop an inclusive National policy framework for creating conducive environment for Bio-Energy stakeholders. The prime focus of the programme was on Bioethanol, Biodiesel, Biogas and future fuels. This event witnessed over 5000 footfalls in two days.

Ministry of Petroleum & Natural Gas organised the "World Biofuel Day" during 10th August, 2017 to 13th August, 2017 across 100 districts of the Country to sensitize the youth and farmers on the benefits of Biofuels over fossil fuels and encourage their participation in the Biofuel programme. The theme for the programme was "Education & Action today for Secure Future".

The World Biofuel Day was celebrated in New Delhi in presence of Hon,ble Union Minister for Road Transport and Highways and Shipping and Hon'ble MoS(I/C), PNG, senior officials of MoP&NG, representatives from concerned Ministries, Oil PSUs, Farmers & Students.

Prospects of International collaboration focusing Advanced Motor Fuels (AMF) and biofuels were explored by way of participation in conferences and meetings organized by International Energy Agency (IEA). MoP&NG is actively considering becoming a member to IEA run Technology Collaboration Programmes (TCPs) in the field of AMF and bioenergy.

The delegation from this Ministry also participated in the Indian Pavilion activities during the United Nations Framework Convention on Climate Change, Conference of Parties-23. They also participated in the High level event of the Biofuture Platform sponsored by the Brazilian Government on the sidelines of CoP-23 on 16.11.2017 in Bonn, Germany.

9.6 Fuel Economy Norms for Heavy Duty Vehicles

The Steering Committee constituted for formulating fuel economy norms for Heavy Duty Vehicles (Trucks & Buses) under MoP&NG had proposed draft notifications to Ministry of Power and Ministry of Road Transport and Highways. In response, Ministry of Power issued Gazette Notification dated 16.8.2017 regarding constant speed fuel consumption standard for heavy duty commercial vehicles of category M3 and N3 with gross vehicle weight exceeding twelve tonnes in accordance with the Central Motor Vehicle Rules, 1989, for the purpose of manufacturing or importing for sale of the said category of motor vehicles.

Thereafter, Ministry of Road Transport & Highways has been requested by this Ministry to issue Notification (along with administrative order) under Motor Vehicle Act, 1988.

9.7 Fuel Economy Norms for Light Commercial Vehicles (LCVs) and Medium Commercial Vehicles (MCVs)

A Steering Committee for formulation of fuel economy norms for Light Commercial Vehicles (LCVs) and Medium Commercial Vehicles (MCVs) has been formed under the Chairmanship of Joint Secretary (Refinery), MoP&NG on 27.11.2017, which is expected to submit its report within six months.

9.8 Transfer of work related to Biofuels from Ministry of New and Renewable Energy to Ministry of Petroleum and Natural Gas

Recently, the work related to biofuels has been transferred from Ministry of New & Renewable Energy to Ministry of Petroleum & Natural Gas. Identifying, the need to bring in renewed focus in the field of biofuels in view of the technological developments, emerging international perspectives and evolving National scenario, this Ministry has started the process of formulating the National Policy on Biofuels – 2018. There is also a plan to come up with a scheme to incentivize setting up of 2G Ethanol Biorefineries based on crop residues and Municipal Solid Waste (MSW). The draft policy and scheme was circulated to all the stake holders inviting their suggestions/comments during the Consultative Workshop on 22nd November, 2017 organized by this Ministry.

Shri Dharmendra Pradhan, Minister P&NG addressing the gathering at the Consultative Workshop on New National Policy on Biofuels and Pradhan Mantri JI-VAN Yojana

Chapter 10

Conservation of Petroleum Products

PM's quote on Conservation in Mann Ki Baat

" If every citizen resolves that he will discharge his duties honestly, if every citizen resolves that he will not use petrol or diesel one day in a week-- these are not very big things. But these will contribute to the realisation of the dream of this country, this 'New India', that is being nurtured by 125 crore countrymen, and this realisation will be achieved before their eyes. In essence, every citizen must discharge his civic duties and responsibilities. This in itself would be a good beginning to the New India."

10.1.1 Petroleum Conservation Research Association (PCRA) is a registered society set up under the aegis of Ministry of Petroleum & Natural Gas, Government of India. As a non-profit organization, PCRA is a national government agency engaged in promoting energy efficiency in various sectors of economy. It helps the government in proposing policies and strategies for petroleum conservation, aimed at reducing excessive dependence of the country on oil requirement. It also sponsors R&D activities for the development of fuel-efficient equipment / devices and organizes multi-pronged field activities for creating mass awareness for the conservation of petroleum products through social media sites like Facebook, Twitter, Google+, YouTube and My Gov.

10.1.2 PCRA carries out various Field Activities, which is one of the core areas of its operations. Through sectoral field activities, PCRA engineers and its empanelled experts reach the targeted groups under various sectors of economy by conducting activities like Energy Audit, Fuel Oil Diagnostic Studies and walk-through Audits, Technical Seminars, Institutional Training Programme, Driver Training Programme, Transport Workshop, Model Depot Project, Van Publicity, Kisan Melas and Educational programs for students of agricultural colleges, Workshop of LPG Savings, Youth Programs, Children engaging activities like quiz, essay, debate and painting competitions, exhibitions etc. These activities are designed to cover a large spectrum of socio-economic profile of our country in different sectors viz. Industry, Transport, Domestic, Agricultural and Commercial. For FY 2017-18, targets were fixed in a manner so as to increase the outreach of these programmes on Fuel Conservation and could achieve a total of 12488 nos. of chartered activities during April-November. The total drivers trained through training programmes during Apr.-Nov., 2017 is 103546. As against Energy Savings identification target of 65500 MTOE for the FY 2017-18 through PAT Audits, total savings identified is 119588 MTOE. Recently, PCRA successfully completed its landmark initiative of conducting audits under PAT Cycle-II for 13 refineries.

10.1.3 PCRA has also associated itself with the Standard & Labeling Programmes for equipment consuming petroleum products, which includes Domestic LPG Stoves, Diesel driven Monoset Pumps for Agriculture (2-10 HP) and Diesel Generator Sets having engine capacity upto 19 KW, which are under various stages of implementation.

10.1.4 **Fuel conservation campaign**

Children being the future of India, were also motivated through National Level Painting, Essay and quiz competitions during the year 2017-18. The essay competition was conducted in 23 Indian languages (Hindi, English, Urdu, Assamese, Bengali, Bodo, Gujarati, Kannada, Maithili, Malayalam, Oriya, Punjabi, Tamil, Telugu, Marathi, Sanskrit, Kashmiri, Konkani, Nepali, Santhali, Manipuri, Sindhi and Dogri) for school students across the country. Participation of about 40 Lakhs students from nearly 31000 schools across the country has been recorded. The competitions are over and the winners have been announced. The first prize winners will be awarded by the Hon'ble Minister of Petroleum & Natural Gas and Skill Development & Entrepreneurship during the inaugural function of Saksham-2018 to be held in New Delhi on 16.01.2018.

One for the Album-Proud winners of PCRA National Level Essay, Painting & Quiz Competition

10.1.5 Study tour of prize winners of National Level Competitions-2016 to Japan

The first prize winners of PCRA Essay, Painting & Quiz Competitions for the year 2016 were taken to Japan on a study trip for 5 days, as part of their prize. The children visited OISCA school, Hamamatsu by Bullet Train, Air base museum, Suzuki plaza, Toshiba Science Museum, The National Museum of Emerging Science and Innovation, Miraikan, ECCJ, Shinagawa Waste Management facility, Yokohama smart city and Tokyo SkyTree as well as other attractions of Tokyo.

10.1.6 Cyclothon

In order to encourage people to use bi-cycles for their short distance travelling needs instead of using motorized vehicles a mega Cycle Rally viz. "Saksham Pedal Delhi" was organized on 5th November 2017 at JLN Stadium, New Delhi. It was inaugurated by Hon'ble Minister of P&NG and SD&E. It saw more than 5000 participants.

In the R&D front, some of the important ongoing projects during 2017-18 are :–

- Design and Development of roof top biogas plant on solid state fermentation using kitchen waste.
- Development of improved PNG domestic cooking burner.
- Thermal Treatment of Plastic Waste for Recovery of Fuel Oil and Gas.
- Development of a statistical model for trade-off between fuel economy and CO2 emission for in use 2 wheelers in India.
- Improving thermal efficiency of LPG domestic cooking stoves.
- Estimation of Fuel Consumption during Idling of vehicles at Bhikaji Cama Intersection and savings after employing suitable mitigation measures.
- Development of ultra-low density refractory granules for Kiln Cars trolleys.
- Study on carpooling among office goers and its benefits.
- Impact of road condition on fuel consumption of vehicle.

PCRA participated in the prestigious India International Trade Fair 2017 held from 14th Nov'17 to 27th Nov'17 at Pragati Maidan, New Delhi, to educate and create awareness amongst the masses about the importance of fuel conservation amongst the masses. The quiz and interactive sessions were organized.

PCRA Pavilion at IITF 2017, New Delhi

10.1.7 Saksham-2018

In order to provide sustained impetus on fuel conservation efforts PCRA undertakes nationwide people centric mass awareness campaign, called "Saksham (Sanrakshan Kshamta Mahotsav) starting 16th January in association with PSU Oil & Gas Companies. During this one-month drive, various sections of society viz. students, youths, farmers, housewives, drivers, industrial workers, etc. are being engaged to profess and propagate the need to conserve by judicious utilization of petroleum products. Sectoral emphasis is being given towards inclusion of one & all in underlining and appreciating the individual's effort in reducing consumption of energy and lessening GHG emissions through multiple activities.

Chapter 11

e-Fuel Station

Pricing

11.1.1 The pricing of petroleum products was brought under Administered Price Mechanism (APM) effective July 1975 when the pricing of petroleum products was shifted from import parity principles to cost plus principles. Under APM (1975 to 2002) various oil pool accounts were maintained with the objective to i) ensure stability in selling price; ii) insulate consumers against international price fluctuations; and iii) subsidization of consumer price of certain products like kerosene for public distribution and domestic LPG by cross subsidization from other products like petrol, Aviation Turbine Fuel (ATF) etc. and indigenous crude oil.

11.1.2 Effective 01.04.2002, the APM was dismantled and the Government decided to provide subsidy on sale of PDS kerosene and domestic LPG at specified flat rates under the Budget. To administer these budgetary subsidies, the Government formulated a 'PDS kerosene and domestic LPG subsidy scheme' in 2002. Under this scheme it was decided that these subsidies will be phased out in 3-5 years.

11.1.3 The sharp rise and volatility of prices of oil and petroleum products in the international markets since 2004 became a matter of global concern. The Indian basket of crude oil, which averaged about $23/bbl at the time of dismantling of APM in March 2002 and $36/bbl in May 2004, went up to an average of $85.09 per barrel during 2010-11. The average price of Indian basket of crude oil further increased to $111.89/bbl during 2011-12. The prices of crude oil, after continuously being at the level of more than $100/bbl for over three years, started falling sharply during the second half of 2014. As a result, the average price of Indian crude oil basket during 2015-16 and 2016-17 was recorded at $46.17/bbl and $47.56/bbl respectively whereas the same is at $53.56/bbl during the current financial year 2017-18 (up to 31st December, 2017).The trend of Indian basket of crude oil during 2002-03 to 2017-18 is given at **Annexure-I**.

11.1.4 Even though APM was dismantled effective 1.4.2002, since 2004, the consumers of sensitive petroleum products viz. Petrol (decontrolled w.e.f. 26.06.2010), Diesel (decontrolled w.e.f.19.10.2014), PDS kerosene and Domestic LPG were being insulated from the impact of unprecedented high international oil prices by the Public Sector Oil Marketing Companies (OMCs), namely Indianoil Corporation Ltd. (IOCL), Hindustan Petroleum Corporation Ltd (HPCL) and Bharat Petroleum Corporation Ltd. (BPCL). Inspite of international oil prices remaining persistently high, the retail selling price of the sensitive petroleum products were kept lower than what is warranted by the international oil prices. This resulted in huge under recoveries of OMCs with corresponding subsidization of prices for the consumers. The trend of under recovery in the two sensitive petroleum products i.e. PDS kerosene and Subsidized Domestic LPG is given in **Annexure –II**.

11.2 Petrol and Diesel : Daily Pricing

11.2.1 The Government has made the prices of petrol and diesel market determined effective 26th June, 2010 and 19th October, 2014 respectively. Since then, the OMCs take decision on prices of petrol and diesel in line with changes in international market and domestic conditions. The OMCs have not only increased but also decreased the prices of petrol and diesel in line with changes in international prices and rupee dollar exchange rate.

11.2.2 Effective 16th June, 2017, daily pricing of petrol and diesel has been implemented in the entire country resulting in closer alignment with the international prices. This has helped consumers

11.3 Domestic LPG (Subsidised)

11.3.1 In order to insulate the common man from the impact of rise in international oil prices, the Government continues to modulate the retail selling prices of Domestic LPG (up to cap of 12 cylinders per annum to each household). The prices of non-subsidized Domestic LPG are

however determined by the OMCs in line with changes in the international markets.

11.3.2 After launch of Direct Benefit Transfer of LPG (DBTL) effective 1st January 2015, its consumer get the LPG cylinders at market price and receive LPG subsidy directly into their bank accounts. This has facilitated better targeting of subsidy.

11.3.3 Based on the refinery gate price as on 1st January, 2018, the consumers are getting a total DBTL subsidy of ₹245.36/Cylinder (including cash compensation towards uncompensated costs charged in the RSP) under the DBTL scheme at Delhi

11.4 PDS SKO

11.4.1 In order to insulate the common man from the impact of rise in international oil prices, the Government continues to modulate the retail selling prices of PDS Kerosene. The consumers continue to get the product at subsidized rates and the OMCs are incurring under-recovery on its sale

11.4.2 Effective 1st Oct, 2016, Direct Benefit Transfer in PDS Kerosene Scheme 2016 (DBTK) was implemented in 4 districts in Jharkhand State. This scheme was extended to another 6 districts effective 1st April, 2017 and the entire state of Jharkhand was covered under DBTK effective 1st July, 2017. The States of Karnataka, Haryana, Telangana, Nagaland, Bihar, Gujarat and Goa have responded favourably by undertaking voluntary cut in their PDS SKO allocation. Further, the UTs of Delhi, Chandigarh, Daman & Diu, Dadra & Nagar Haveli and Puducherry have become Kerosene Free and all the remaining UTs are also likely to become Kerosene Free shortly. The State(s) of Haryana, Punjab and Andhra Pradesh have also become Kerosene

Aerial view of ONGC's URAN Plant

Free.

11.4.3 Based on the refinery gate price effective 1st January, 2018, the OMCs are currently incurring under-recovery of ₹12.43/Litre on PDS Kerosene at Mumbai.

11.5 Subsidy/ Under-recovery

The total subsidy / under-recovery on petroleum products and natural gas during the last 4 years and the current year is as under:

In ₹ Cr.

Particulars	2013-14	2014-15	2015-16	2016-17	H1, 2017-18
Petrol	0	0	0	0	0
Diesel	62,837	10,935	0	0	0
PDS kerosene	30,574	24,799	11,496	7,595	2,066
Domestic LPG	46,458	36,580	18	0	0
Total under-recoveries (A)	**139,869**	**72,314**	**11,515**	**7,595**	**2,066**
Total DBTL subsidy (claims)	3,869	3,971	16,056	12,133	7,502
Permanent Advance (PA) / one time incentive*	0	0	5,755	853	0
Project Management Expenditure (PME)*	43	0	200	0	25
Total DBTL related subsidies (B)	**3,912**	**3,971**	**22,011**	**12,986**	**7,527**
DBTK subsidy (claims) (C)	**0**	**0**	**0**	**11**	**24**
PDS Kerosene and Domestic LPG subsidy scheme, 2002*	2,580	0	0	3,293^	0
Freight subsidy (For Far-Flung Areas) Scheme, 2002*	21	23	0	0	0
Other subsidies (D)	**2,601**	**23**	**0**	**3,293**	**0**
Total subsidy/ under-recovery on petroleum products & natural gas (A+B+C+D)	**146,382**	**76,308**	**33,526**	**23,885**	**9,617**

* on payment basis.
^ The payment relates to the year 2014-15, however received in the year 2016-17.

For Financial year 2017-18, entire burden of subsidy on sale of PDS Kerosene & Subsidized Domestic LPG is

being borne by the Government.

11.6 Pricing of crude oil

Indian basket of crude oil represents the average of crude oil processed by Indian refineries in the ratio of actual processing of sweet crude and sour crude in the immediate preceding year. For sweet crude oil price, the daily Platts assessments for benchmark crude oil "Brent" is considered. For sour crude oil, the average of Platts assessment for benchmark crude oil "Dubai" and "Oman" is considered. During 2016-17, Indian refineries processed 72.38% sour crude and 27.62% sweet crude. Therefore, for 2017-18, Indian basket of crude oil represented the daily price assessment by Platts for benchmark under average of "Dubai" and "Oman" (sour crude) and "Brent" (sweet crude) in the ratio of 72.38:27.62.

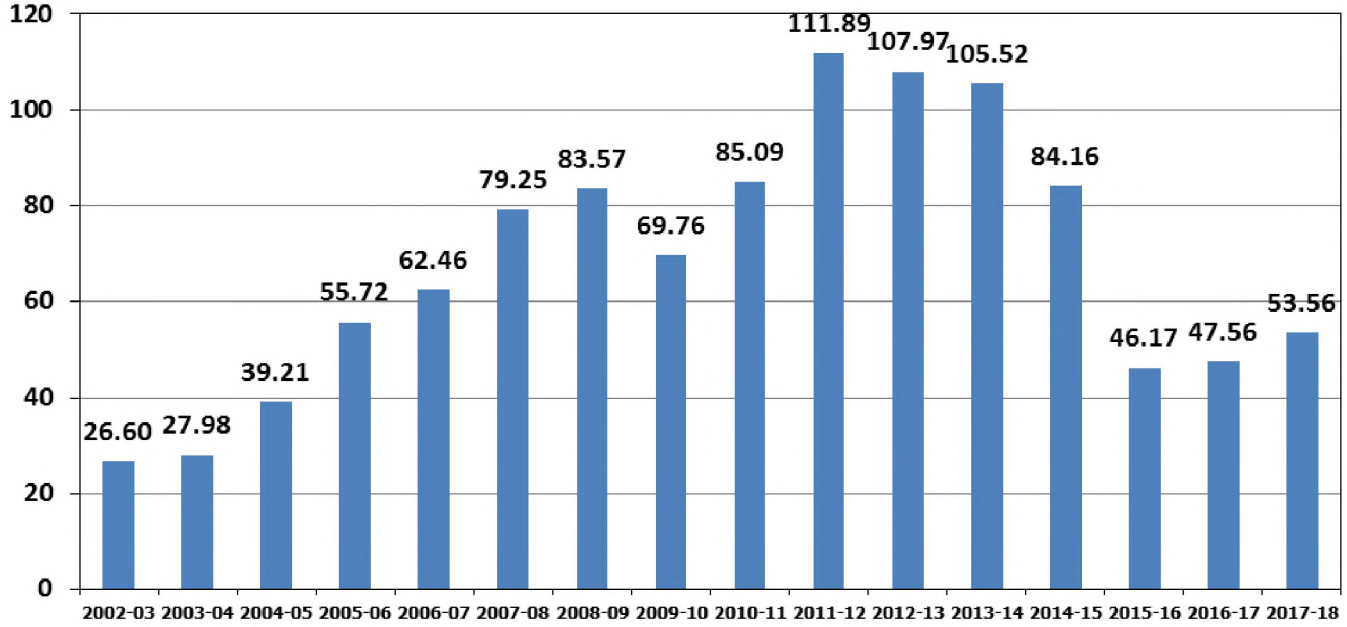
Domestic crude oil producing companies are also offered international crude oil prices benchmarked to international crude that corresponds to their crude assay. Import of crude oil takes place at international prices.

IOC LPG Refinery, Mysore

Annexure-I

Trend of Crude Oil: Indian basket

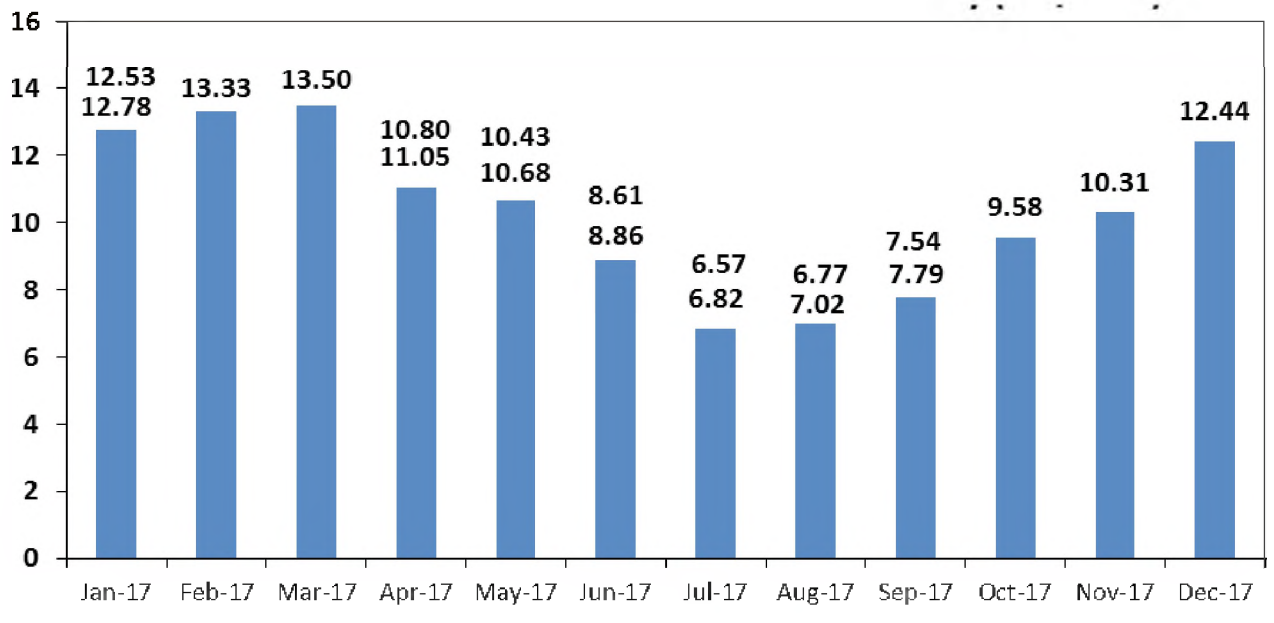
(In $/bbl)



Note: 2017-18 prices are up to 31/12/2017

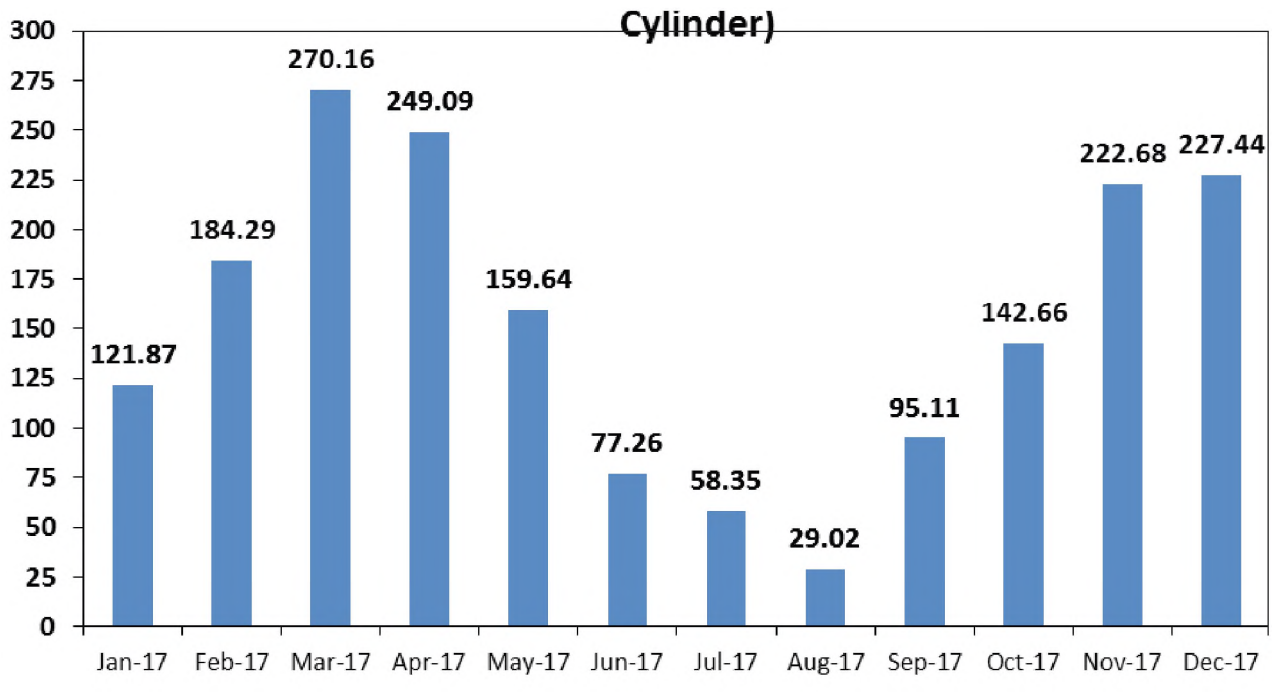
Annexure-II

Trend of Kerosene Under-recovery (₹/Litre)



Note:- In months where the price revision has been done on a fortnightly basis, the lower figure represents the under-recovery for the first fortnight and the upper figure for second fortnight.

Cash compensation by Govt. on LPG under DBTL (₹/14.2 kg Cylinder)



Chapter 12

Welfare of Scheduled Castes, Scheduled Tribes, other Backward Classes and Divyangjan

Welfare of SC, ST, OBC & Divyangjan

12.1 The guidelines in respect of the reservation for the Scheduled Castes, Scheduled Tribes, Other Backward Classes and Divyangjan issued from time to time by Department of Personnel & Training, Department of Public Enterprises, Ministry of Social Justice & Empowerment and Ministry of Tribal Affairs are being implemented in the Ministry of Petroleum & Natural Gas and the Public Sector Undertakings (PSUs) under its administrative control. The SCT Cell of this Ministry monitors the implementation of reservation in posts and services in the Ministry and PSUs under the Administrative control of the Ministry. The PSUs have also constituted Implementation Cells under the supervision of their Chief Liaison Officers / Liaison Officers to safeguard the interests of SCs, STs, OBCs and Persons with the Disability (PWD) (Divyangjan) employees and to redress their grievances. The Liaison Officers of the PSUs are responsible for ensuring implementation of the Presidential Directives as well as the various orders of the Government of India issued time to time on the subject. Remedial action on the grievances of the SCs, STs, OBCs and PWD employees of PSUs received through Members of Parliament, National Commission for SC and ST, National Commission for OBCs are taken. The status of appointment of SCs, STs, OBCs, PWDs are monitored by the Ministry through reports annually furnished by PSUs.

12.2 In pursuance of the observations of Parliamentary Committee on the Welfare of SCs/STs/OBCs and the Presidential Directives on Reservations for SCs/STs in service, a team lead by the Liaison Officer of this Ministry inspects the Reservation Rosters maintained by the Units of PSUs, annually. In 2017 the team has inspected rosters of 42 units of PSUs where Reservation Rosters are maintained.

Supporting ADAPT at Standard Chartered Marathon

Chapter 13

Welfare, Development and Empowerment of Women

Welfare, Development and Empowerment of Women

13.1 Ministry of Petroleum & Natural Gas and Public Sector Undertakings/Organizations under the administrative control of this Ministry have been taking numerous initiatives towards welfare and empowerment of women employees. With a view to deal with gender sensitization and to promote the cause of women empowerment, special programmes are organized focusing on their professional development and welfare activities. These include external and in-house training, programmes on women health, sponsoring them to attend the National Meet of the Forum of Women in Public Sector, etc.

Shri Dharmendra Pradhan Minister P&NG inaugurating the National Chapter of Women in LPG (WINLPG) along with Mr. James Rockall, CEO,WLPGA, Mr. Alison Abbott, Dir. WLPGA and Ms. Nikki Brown, Chair, WINLPG

Women Forum has been formed in all the Oil & Gas PSUs to look after the interest of the women employees. List of Do's and Don'ts prepared by the National Commission for Women circulated for attention of all employees. Committees have been set up to attend to redressal of complaints on 'Sexual harassment at work place.'

The number of women employees vis-à-vis total number of employees as on 31.12.2017 in the oil PSUs is tabulated as below:

Sl. No.	Name of Oil & Gas PSU	Total No. of Employees	Total No. of Women Employees
1.	ONGC	32847	2210
2.	ONGC Videsh Ltd.	332	32
3.	IOCL	33591	2793
4.	HPCL	10294	946
5.	BPCL	12196	1119
6.	GAIL	4485	268
7.	EIL	2851	348
8.	OIL	6956	386
9.	CPCL	1696	86
10.	NRL	865	42
11.	MRPL	1920	131
12.	Biecco Lawrie	218	2
13.	Balmer Lawrie	1161	91
14.	OIDB	20	04
15.	RGIPT	66	7

In line with the guidelines laid down by Supreme Court in the Case of Vishakha & Ors. Vs. State of Rajasthan & Ors. and orders issued by Department of Personnel & Training / Ministry of Women & Child development , an Internal Complaint Committee (Women Cell) is constituted in the Ministry for prevention and redressal of complaints of sexual harassment of working women. Presently Ms. Sushma Rath, Joint Secretary is the Chairperson of the Committee with four other members (including one member from NGO). The Committee holds its meetings on regular intervals.

PMUY Kolkata

Chapter 14

Undertakings / Organisations

14.1 Maharatana PSUs

14.1.1 Indianoil Corporation Limited (Indianoil)

IndianOil is a Maharatna National oil company with business interests straddling the entire hydrocarbon value chain - from Refining, Pipeline Transportation and Marketing of Petroleum Products to Research & Development, Exploration & Production, Marketing of Natural Gas and Petrochemicals. It is evolving to become India's flagship energy company.

IndianOil has built a renewable energy portfolio and its R&D centre is also in a major way venturing into alternative energy research. Wind and solar energy will continue to be the focus of company alternative energy drive.

IndianOil is ranked 168th among the world's largest corporation (and first among Indian enterprises) in the prestigious Fortune 'Global 500' listing for the year 2017.

During the year 2016-17, a new joint venture company, viz., Hindustan Urvarak & Rasayan Ltd., between IndianOil, Coal India Ltd., NTPC, Fertiliser Corporation of India Ltd. (FCIL) and Hindustan Fertiliser Corporation Ltd. (HFCL) was formed for the purpose of reviving and operating the fertiliser & chemical complexes at Gorakhpur & Sindri units of FCIL and the Barauni unit of HFCL.

A new subsidiary company, viz., IOC Singapore Pte. Ltd. was formed as an investment company in Singapore to enable acquisition of stake in E&P assets from Rosneft of Russia as well as to set up trading operations for procurement of crude oil and import / export of petroleum products.

Financial Performance

IndianOil is India's largest commercial enterprise, with a turnover of ₹4,38,710 crore for the year 2016-17 against ₹3,99,105 crore during 2015-16. During the year 2016-17, IndianOil registered a profit (after tax) of ₹19,106 crore against ₹11,242 crore in during 2015-16. GRM stood at US$ 7.77/bbl in 2016-17 as against US$ 5.06/bbl in 2015-16.

Physical Performance

IndianOil refineries achieved the highest ever crude throughput of 65.19 million tonnes during the year 2016-17 with capacity utilization (excluding Paradip Refinery) of 105.1%, as against a throughput of 56.69 million tonnes with a capacity utilization of 103.7% during 2015-16. IndianOil refineries (excluding Paradip Refinery) also achieved the best performance in energy parameters of Fuel & Loss, Specific Energy Consumption (MBN) and Energy Intensity Index (EII) at 8.49%, 74.9% and 101.5% respectively, as against 8.53%, 76.6% and 101.8% registered during 2015-16. Paradip Refinery, which was commissioned and began operations in March 2016 in a phased manner, has also fully stabilized during the year.

All the refineries of the IndianOil have commenced supplies of BS-IV grade auto-fuels w.e.f. 1st April, 2017.

During the year 2016-17, 3 new crude oil varieties were processed for the first time at various refineries, which have been added to the crude oil basket with an objective to widen the crude oil basket and to tie-up new crude oil sources for de-risking the crude oil procurement process.

Indianoil Pipelines achieved the highest ever throughput of 82.49 million tonnes during the financial year 2016-17 as against a throughput of 79.82 million tonnes in 2015-16. Crude Oil Pipelines recorded the highest ever throughput of 51.34 million tonnes during the year 2016-17, which is 1.6% higher than the previous year's throughput of 50.54 million tonnes. Petroleum product pipelines also recorded the highest ever throughput of 31.15 million tonnes during the year 2016-17 which is 6.4% higher than the previous year's throughput of 29.28 million tonnes. The gas pipelines achieved the highest ever throughput of 1,587 MMSCM during the year2016-17 as against a throughput of 1,380 MMSCM in 2015-16.

With the commissioning of 1,102 km of new pipeline sections during the year, the total length of the pipeline network of crude oil, product and gas pipelines as on 31st March, 2017 expanded to 12,848 km.

Indianoil continued to dominate the domestic market with the largest market share and sold 74.11 million tonnes of petroleum products during the year 2016-17, as against 72.60 million tonnes during the previous year. In addition, 4.72 million tonnes of petroleum products were exported during the year 2016-17 as against 3.46 million tonnes exported during the previous year.

IndianOil maintained its position as the second largest petrochemicals player in the country during the year 2016-17. IndianOil recorded highest ever petrochemicals sales of 2.585 MMT during the year 2016-17 as against 2.528 MMT in 2015-16. IndianOil is a major supplier of polymer products to leading multinationals. IndianOil PROPEL brand now has strong international presence. The petrochemical products are exported to 73 countries and polymers to 55 countries across the globe. During the year 2016-17, two new export destinations viz, Myanmar and Egypt were added.

During the year 2016-17, Regasified Liquefied Natural Gas (RLNG) sales of the IndianOil was 1.92 MMT. IndianOil now has in its portfolio 55 RLNG customers. Besides, internal consumption of RLNG takes place in three of its own refineries. IndianOil successfully imported 11 LNG cargoes during the year 2016-17. IndianOil also signed 17 Master Sales & Purchase Agreements with various international suppliers for import of LNG on spot/short-term basis. In the Pacific North West (PNW) LNG Project in British Columbia, Canada, the Corporation's equity LNG now stands at 1.3 MMTPA on FOB-basis for a minimum of 20 years.

IndianOil has been participating in the building of City Gas Distribution (CGD) infrastructure in the country. In this business segment, IndianOil has formed two JVCs, Green Gas Ltd. (GGL) and IndianOil-Adani Gas Private Ltd. (IOAGL). Currently, GGL operates two CGD networks, one each at Lucknow & Agra. IOAGL is developing CGD networks in seven geographical areas, viz., Chandigarh, Allahabad, Panipat, Daman, Ernakulam, Udhamsingh Nagar and Dharwad. IOAGL's CGD networks in Chandigarh and Allahabad were commissioned during the year 2016-17.

Marketing & Associated Infrastructure

To maintain its leadership position in the market place, IndianOil commissioned 881 retail outlets during 2016-17 (fuel stations, including 365 Kisan Seva Kendra outlets in rural areas) taking their total number to 26,212 (19,161 regular RO & 7,051 KSK). IOC automated over 10,000 ROs on a cumulative basis. Additionally, 100% Automation was achieved in 55 cities. The total network comprising 46,532 touch points as on 31st March 2017 was strengthened from 45,212 touch points last year. Apart from the largest network of retail outlets, 131 Terminal/Depots, 6520 consumers pump, 3904 SKO/LDO dealers and 104 AFS are some of the vital components of the logistic network. In addition, CNG facilities were commissioned at 90 retail outlets during the year 2016-17. The Kisan Seva Kendra (KSK) outlets of IndianOil increased their contribution to the total sales of company with Petrol (Retail) touching a new high of 14.7% and Diesel (Retail) touching 14.6%. IndianOil continued with its focus on the use of alternative energy, and 2,441 retail outlets were converted to operate on solar energy during the year 2016-17, taking cumulative number to 6,607.

IndianOil released the highest ever new domestic LPG connections to 1.53 crore customers, raising the Indane customer strength to 11.44 crore. Out of 1.53 crore new connections, 93.25 lakh connections were released under Pradhan Mantri Ujjwala Yojana (PMUY), the flagship scheme of the Government of India to the women of poor households with an objective to improving the health of poor families by providing clean cooking fuel. Additional bottling capacities of 570 TMTPA and tankages of 7,200 MT capacity were added during the year to meet the increased demand.

IndianOil's flagship lubricant brand SERVO maintained its market leadership position during the year 2016-17 and finished lube sales registered a growth of 2.3% over the previous year. 17 new lube grades were introduced during 2016-17 and 26 product approvals were obtained from Original Equipment Manufacturers (OEMs).

IndianOil's Aviation Service continued to maintain its leadership position during the year with a market share of 59.3%. During the year 2016-17, IndianOil commissioned its aviation fuel stations at Barrackpore (West Bengal), Sunabeda (Odisha), Shimla (Himachal Pradesh) and Bhuj (Gujarat).

Alternative Energy

IndianOil now has a portfolio of 188 MW of renewable energy, comprising 168 MW of wind-power capacity and 20 MW of solar photovoltaic (PV) capacity. About 12 MW solar PV capacity was commissioned and 21 million units (kWh) generated from solar PV during the year 2016-17, which corresponds to an emission mitigation of 17 TMTCO_2e (thousand metric tonnes carbon dioxide equivalent). During the year 2016-17, IndianOil generated 158 million units (kwh) from its wind-power units, which corresponds to an emission mitigation of 131 TMTCO_2e.

Under the Government of India's Swachh Bharat Abhiyan programme, IndianOil is in the process of installing 10 waste-to- energy plants of 5 tonnes per day capacity each to manage the municipal solid waste generated in Varanasi city. The first plant under the project was commissioned during the year and the electricity generated from organic waste at this plant is being used to illuminate street lights in the vicinity.

Exploration & Production

IndianOil presently has participating interest in 8 overseas blocks located in 7 countries namely Russia, Libya, Gabon, Nigeria, Venezuela, USA and Canada. These blocks are in different stages of petroleum exploration. IndianOil holds non-operating participating interest ranging between 3.5% and 50% in these 8 overseas blocks.

During the year 2016-17, IndianOil's cumulative oil & gas production increased by 145% (from 8,741 to 21,402.8 Mboe) and per day oil & gas production from producing assets increased by 466% (from 9,802 to 55,514 Boe/d) on a year-on-year basis. IndianOil 2P reserve rose by 114% during the year to the level of 961.40 MMboe. During the year 2016-17, IndianOil participated in Discovered Small Field Bid Round 2016 and acquired 3 Contract Areas in which the IndianOil is the sole operator.

The details of projects completed during 2016-17 are as under:

- Reverse osmosis plant at Gujarat Refinery
- Revamp of Coker-A Unit at Barauni Refinery
- IndaDeptG Unit at Guwahati Refinery
- Augmentation of Paradip-Haldia-Barauni Pipeline
- 351-km of pipeline sections as part of Salaya-Mathura Pipeline debottlenecking project
- Jatni-Raipur section of Paradip-Raipur-Ranchi pipeline project along with branch pipelines to Jharsuguda & Korba involving 751 km pipeline section
- POL Depots at Imphal, Jharsuguda and Korba
- Replacement of mainline pumping units in Salaya-Mathura Pipeline

Some of major ongoing projects are listed below:

Sl. No.	Name of the Project	Latest Approved Cost (₹crore)
1	Paradip Petrochemicals Phase-I, Polypropylene Project	3150.00
2	Distillate Yield Improvement (Coker) PJ at Haldia Refinery	4190.00
3	Installation of INDMAX Unit alongwith associated facilities at Bongaigaon Refinery	2582.00
4	Fuel Quality Upgradation Project at Gujarat Refinery	1315.00
5	Fuel Quality Upgradation Project at Barauni Refinery	1774.3
6	BS-VI Projects at Haldia Refinery*	3415.00
7	BS-VI Projects at Panipat Refinery*	3007.00
8	BS-VI Projects at Gujarat Refinery*	2771.00
9	BS-VI Projects at Bongaigaon Refinery*	1042.00
10	BS-VI Projects at Mathura Refinery*	533.00
11	Ennore-Thiruvallur-Bengaluru-Puducherry-Nagapattinam-Madurai-Tuticorin Natural Gas Pipeline	4497.00
12	Paradip Hyderabad Pipeline	2789.00
13	Koyali-Ahmednagar-Solapur Pipeline	2800.00
14	Augmentation of Paradip-Haldia-Durgapur LPG Pipeline and its Extension upto Patna and Muzaffarpur	1823.00
15	Haldia - Barauni Product pipeline	1038.00
16	Paradip Haldia Durgapur LPG Pipeline	1330.00
17	Jaipur Panipat Naphtha Pipeline along with Augmentation of Koyali Sanganer Product Pipeline	890.00
18	Branch pipeline from Patna to Baitalpur & Motihari on Barauni-Kanpur Pipeline (Revised Scheme)	664.00
19	Ennore Trichy Madurai LPG Pipeline	711.00
20	Laying of captive Dhamra-Haldia Refinery NG PL with spur line to Paradip Refinery	1342.00
21	LPG import facilities, Kochi	714.25
22	LPG import facilities at Paradip	690.00
* Stage 1 approved.		

Corporate Social Responsibility (CSR)

The thrust areas of IndianOil's Corporate Social Responsibility (CSR) activities, inter alia, include safe drinking water, healthcare & sanitation, education & employment enhancing vocational skills, empowering women & socially/ economically backward groups, environment sustainability, protection of national heritage and promotion of art & culture, rural development etc., which are in line with the CSR Vision and Mission of IndianOil. The programs are undertaken preferably in the vicinity of IndianOil's major installations/ establishments to improve the quality of life of the communities, which include marginalized groups such as SCs, STs, OBCs.

As against the current year's CSR budget allocation of ₹212.67 crore, the CSR expenditure was ₹213.99 crore. However, after considering the amount of ₹4.43 crore brought from the previous year, an amount of ₹3.11 crore remained unspent and has been carried forward to 2017-18.

Contribution to Exchequer

During the year 2016-17, ₹1,79,014 crore was paid to the exchequer as against ₹1,32,064 crore paid in the previous year. An amount of ₹1,02,817 crore was paid to the Central Exchequer and ₹76,197 crore to the State Exchequer as against ₹ 67,459 crore and ₹ 64,605 crore paid in the previous year to the Central and State Exchequer respectively.

Major Awards & Recognitions

- IndianOil retained its position as the top-ranked Indian company among the world's largest corporates in the prestigious Fortune 'Global 500' listing for 2017. The Company has also retained its top position in the annual rankings of Business Today (BT- 500), Businessworld (BW-500), Business Standard (BS-1000), The Economic Times (ET-500) and Financial Express (FE-1000) by net revenue.
- IndianOil's Refineries Headquarters at New Delhi became the first stand-alone office set-up in the world to win TPM Excellence Award-2016. The award was presented at an exclusive function held in Kyoto, Japan, on 23rd March, 2017.
- IndianOil bagged the Reader's Digest Most Trusted Brand Award in the Petrol Station category for the 10th consecutive year.
- Brand IndianOil was conferred Superbrand status for the fourth two-year term in a row by M/s. Superbrand India Pvt. Ltd., a leading global consumer survey brand.
- IndianOil won the 10th Express, Logistics & Supply Chain Leadership Award consecutively for the 9th time in a row, in the category of "Excellence in Manufacturing Supply Chain – Oil &Gas".
- IndianOil bagged the Silver Award for "Outstanding Performance in Citizen-Centric Service Delivery" for the year 2016-17, a national award on e-Governance.
- IndianOil also received Governance Now PSU Award 2016 (Jury's Choice) for its overall CSR activities.
- IndianOil won the National Talent Management Leadership Award-2016 at the fifth edition of the National Awards for Bestin- Class learning and Development, instituted by World HRD Congress.
- IndianOil's Marketing Division bagged the '25th Global HR Excellence Awards 2017' in Times Ascent World HRD Congress in the category of 'Talent Management' from among 150 competitors.

- IndianOil was adjudged as the 'Best Enterprise' at the 27th National Meet of Forum of Women in Public Sector (WIPS).

14.1.2 Oil and Natural Gas Corporation Limited (ONGC) Introduction

Oil and Natural Gas Corporation Ltd. (ONGC), engaged in exploration and exploitation of oil, natural gas and value added products (VAP), was incorporated on June 23, 1993 under Companies Act 1956, pursuant to Govt. of India's decision to transform the statutory Commission into a Public Limited Company, through Parliament Act for Oil and Natural Gas Commission (Transfer of Undertaking and Repeal Act, 1993). The authorized and paid up capital of ONGC as on 31.3.2017 is ₹15,000 Crore and ₹64,16.6 Crore respectively; share of Government of India being 68.07%. ONGC Videsh Limited is a wholly owned subsidiary of ONGC. Mangalore Refineries and Petrochemicals Ltd. (MRPL) is another partially owned subsidiary where ONGC has 71.62% equity stake with management control.

Major operational Highlights for the Year 2017-18 upto December, 2017

- During 2017-18 upto December, 2017, ONGC has made 9 hydrocarbon discoveries, out of which 4 discoveries (1 in NELP and 3 in Nomination) are in onland acreages, 5 discoveries in nomination offshore areas comprising of 2 discoveries in shallow water offshore and 3 discoveries in deepwater.
- Major success during the year marks with the Oil Discovery in well WO-24#3 in the West of Mumbai offshore, where all nine objects tested flowed oil and gas including the well-known pay- L-III, which produced 3,310 bpd of oil and 17,071m^3/day of gas. The discovery has indicated potential of about 29.74 MMTOE of In-Place Hydrocarbon Volume.
- Production commenced from ZC Platform under "Development of Western Periphery of MHS" project from 1st April 2017.
- BCPA3 Process platform under on-going "Enhanced Recovery from Bassein Field through Integrated Development of Mukta, Bassein & Panna Formations" project has been inaugurated on 25th September 2017 by the Hon'ble Prime Minister of India from Urja Bhawan, Delhi through video conferencing.
- Tapti Process Complex (TPP/TCPP) has been taken over by ONGC from JV-PMT and started processing gas from C-Series Cluster fields and Daman Development from 12th April 2017 onwards after commissioning of export line from C24-P1 platform to Tapti Process complex. This has resulted in augmenting gas production from C-Series and Daman in Western Offshore.
- ONGC has acquired 80% stake of GSPC (Gujarat State Petroleum Corporation Ltd) along with operatorship in the KG shallow water NELP Block KG-OSN-2001/3. ONGC has created a new asset and christened it as "HP-HT Asset" in Kakinada, in March 2017.
- ONGC's standalone gas production during the period April-December 2017 has increased by about 8% as compared to previous year. This is mainly due to more gas production from C-26 Cluster fields, Daman Development and Vasai East field (Additional development) in Western Offshore and sub-sea well S2AB in Eastern Offshore. It is to mention that production was commenced from above cluster/fields in the previous year (2016-17). Further, there has been increase in production in Onshore from Ramnad area in Cauvery Asset on account of fresh allocation & off-take by direct consumers and increase in associated gas production in Ankleshwar and Assam Assets commensurate with increased oil production.

- A New Pool discovery has been made in Kunjaban field of Tripura Asset with drilling of exploratory well KU#8.
- Oil accumulation has been discovered in tight shale layer between coal seams of Mehsana coal reservoir in Mansa field in Mehsana Asset.
- The largest Effluent Treatment Plant (ETP) with a capacity of 10,000 m^3/day and integrated Water Injection Plant (WIP) with a capacity of 900 m^3/day, commissioned in Lakwa field of Assam Asset.
- Low frequency Micro-Seismic Sounding (LFS) technology successfully implemented in Ankleshwar Asset through a pilot project in Gandhar field. Based on survey results of this technology, two wells were successfully drilled and completed.
- Assam Asset has implemented StimGun Propellent perforation Technology in Geleki field. This is a first time application of this technology from Baker Hughes in the Asset.
- Induction of new technology, OZO NANO for treatment of effluent water in Cambay Asset has helped to enhance effluent handling capacity of Akholjuni EPS from 40 m^3/day to 90 m^3/day.

Policy initiatives undertaken by ONGC

Strategic goals set for 2030 as per ONGC Perspective Plan 2030

- Sustained production growth 4-5%
- More than 130 MMTOE production in 2030 (50% international)
- 1,300 MMTOE proved reserves
- 6.5 GW alternate energy, 9 MMTPA LNG
- Full downstream value capture in petrochemicals

Strategic Initiatives

- Major development projects including IOR/EOR schemes are under various stages of implementation to enhance Crude Oil and Natural Gas Production.
- In order to increase the oil and gas production, ONGC has even taken up development of new marginal discoveries through innovative cluster development approach.
- A new and dedicated business unit viz. Eastern Offshore Asset has been constituted with an aim to put East Coast Discoveries on a fast track development through an integrated East Coast Hub.
- With a view to explore and produce from hitherto elusive unconventional plays; ONGC has established & operationalized the following four centers of delivery (COD).
  - i COD for Shale gas at Vadodara
  - ii COD for Coal Bed Methane at New Delhi
  - iii COD for HP-HT wells at Chennai
  - iv COD for Basement exploration at Mumbai

- Substantive decentralization of administrative authorities together with delegation of financial authorities carried out to empower the field executives.
- Best- in-class technology inducted in core areas of E&P activities like
  1. Acquisition, Processing and Interpretation of seismic data
  2. Drilling and Production technology
  3. IT and communication.

Technical Services initiatives

- Dual Fuel technology implemented successfully in Ankleshwar on pilot basis in March 2017. The technology enables to run diesel engines of drilling rig on a mix of diesel and gas, thereby saving the fuel cost substantially and also reducing carbon emissions considerably.
- To streamline maintenance activities and improve maintenance compliance, "Project IMPACT" was implemented by in-house team of Technical Services and ICE group in all 8 offshore drilling rigs. This has been done first time in ONGC, when the services of a consultant were not used for such implementation.
- ONGC signed MOU with Energy Efficiency Services Ltd. (M/s EESL) for procurement and replacement of conventional lights with Energy efficient LED lights in ONGC. 50,000 LED lights were already installed at the ONGC work centers from 01.04.2017 to till date, which in turn save approximately 13 million electricity units annually.
- With concentrated efforts and proactive approach of Central Workshop Vadodara, the average time taken to refurbish the work over rig in Central Workshop, has been reduced from 210 days to 150 days. Two work over rigs have already been refurbished within this new timeline.
- BOPs are one of the critical equipment and looking at the urgency of their timely repair, Central Workshop Vadodara has enhanced the refurbishment/ repair capacity to 50 Nos. of BOPs from FY 2018-19.

Drilling Services initiatives

- Low Toxicity Synthetic Oil Based Mud (LTSOBM) has been implemented on one of exploratory well of Upper Assam to reduce the downhole complications and improve the drilling rate.
- First time onland HPHT well has been successfully tested with the help of Cesium formate brine as testing fluid.
- In Assam to overcome the water-logged and slushy sites due to heavy rains trial testing of PortaDeck mats were carried out successfully at different locations. The use of these mats helped in carrying out rig building operations as well as movement of heavy vehicles during monsoon in slushy conditions, thereby saving precious rig time.

Information Consolidation for Efficiency (ICE) initiatives

- New query 'Provision for Non-Moving Materials" modeled, developed and published in Webice.
- ONGC has completed implementation of a new process for handling of condensate spiking to crude at Jorhat and Assam asset. New process order is configured to convert condensate

to crude via Production Planning process.

- ONGC has completed modifications in ATN program to accommodate GST requirements and Asset revaluation impact.

- ONGC has configured and rolled out Special Excise duty for sale & stock transfer of HSD at Hazira and Tatipaka plants as per business requirement.

Energy management/ conservation/ Renewable Energy initiatives

- ONGC is in process to reduce internal gas consumption at onshore locations by installing Combustion management and waste heat recovery on a heater treater of Mehsana on trial basis recently. System is under observation for benefits.

- ONGC is saving energy by Waste Heat recovery from gas turbines, Tank vapour recovery etc.

- ONGC is in process to install more LED lights at the ONGC work centers as energy efficiency measures. 50,000 LED lights were installed at the ONGC work centers during 2017-18 UPTO Decemebr, 2017.

- Renewable energy cell has chalked out a plan to enhance the capacity of Solar Power plants from 1.5 MW in 2016 to 25 MW by 2018. Detailed Feasibility study was carried out at various Office buildings of ONGC in the states of Uttrakhand, Gujarat, Assam and Tripura to work out the Roof Top solar potential.

14.1.3 GAIL (India) Limited

GAIL (India) Limited, a Government of India undertaking and the youngest Maharatna of India came into existence on 16th August, 1984 pursuant to the Cabinet decision with the mission "To accelerate and optimise the effective and economic use of Natural Gas and its fractions to the benefit of the national economy". GAIL, after having started as a gas transmission company during the late eighties, has grown organically to become an integrated energy major, having presence in entire gas value chain. Today, GAIL is India's flagship Natural Gas transmission and marketing company which manages over two third of gas transmission and half of the natural gas marketed in India.

Today, GAIL is the owner and operator of India's largest Gas Transmission Network (11,000 Kms gas pipelines), 2048 Km long LPG pipeline network including world's longest exclusive LPG Pipeline (1415 Km), six gas processing units with an aggregate capacity of 1.3 MMTPA of LPG, Propane, Pentane and SBP, India's largest gas based Petrochemical Complex with an installed capacity of 810 KTPA of Polyethylene. GAIL is also the co-promoter of two other petrochemical projects including 280 KTPA Brahmaputra Cracker and Polymer Limited (BCPL) Complex in Assam and 1.4 MMTPA ONGC Petro-additions Limited (OPaL) project in Gujarat. On upstream segment, GAIL has stakes in 12 Oil and Gas Exploration blocks including 2 overseas blocks (Myanmar). In addition, GAIL has acquired 20% stake in shale asset in USA. GAIL also operates a LNG regasification terminal at Dabhol (Maharashtra). To reduce carbon emission and to become a sustainable organization, GAIL has also taken steps towards implementing renewable energy projects. Currently, GAIL has a 5 MW solar plant in Rajasthan and also 118 MW wind power plants across India. Another 5.76 MW rooftop solar plant is under execution in Pata.

GAIL is a pioneer in City Gas Distribution business in India and it is expanding its operation to newer geographies through its Joint Ventures (JVs). Currently GAIL has 9 JVs covering major cities including Delhi, Mumbai, Pune, Hyderabad, Kanpur, Lucknow, Indore, Vadodara and Agartala.

Apart from these JVs, GAIL also has a wholly owned subsidiary, GAIL Gas Ltd which was incorporated on 27th May 2008 with following objectives: -

i Distribution & Marketing of Natural Gas

ii PNG for Domestic/ Commercial/ Industrial segment

iii CNG in Inter-City & Intra-City for Transport Sector

iv Secondary distribution of NG/ RLNG to end consumers

At present, GAIL Gas Limited has been is implementing CGD projects in Sonipat (Haryana), Dewas (MP), Meerut (UP), Firozabad (TTZ Area – UP & Rajasthan) and Bengaluru (Karnataka). Further, GAIL Gas Limited has also formed various Joint Venture (JV) Companies with Bharat Petroleum Corporation Ltd. (BPCL),Andhra Pradesh Gas Distribution Corporation Limited (APGDC),Vadodara MahanagarSevaSadan (VMSS), Rajasthan State Petroleum Corporation Limited (RSPCL)and Kerala State Industrial Development Corporation (KSIDC) to develop CGD projects.

Inauguration of Bengaluru City Gas Distribution Project

Physical and Financial performance of GAIL

Physical

Parameters	Units	Performance in 2016-17	Performance in 2017-18 (Up to Sept 2017)	Projected Performance in 2017-18 (As per RE)
Gas Transportation	MMSCMD	100.38	102.79	100.0
Gas Marketing	MMSCMD	81.21	81.55	81.6
Liquid Hydrocarbon Production	TMT	1111	626	1200
Petrochemical Production	TMT	599	303	730
LPG Transportation	TMT	3362	1803	3350

Financial

₹in Crore

Description	Performance in 2016-17	Performance in 2017-18 (Up to Sep 2017)	Projected Performance in 2017-18 (As per RE)
Turnover	48,789	23,922	47,851
Gross Margin (EBDITA)	7,287	4,377	6,691
Profit Before Tax	5,411	3,496	4,957
Profit After Tax	3,503	2,335	3,301

Major Projects

GAIL is currently implementing the following major Natural Gas pipelines which will help to complete the Natural Gas grid of India and will bring many new states in the ambit of natural gas.

Jagdishpur-Haldia & Bokaro-Dhamra pipeline (JHBDPL)

GAIL is constructing prestigious 'Pradhan MantriUrja Ganga' natural gas pipeline project spanning 2655kilometres from Jagdishpur to Haldia-Bokaro-Dhamra covering five States with a thrust to connect Eastern India with the gas grid network at an investment of approx. ₹13,000 Crore. This project is being implemented with the financial support of Central Government. This 16 MMSCMD capacity pipeline will supply gas primarily to three under revival fertilizer plants at Gorakhpur, Barauni and Sindri and also the urea manufacturing unit at Durgapur. The pipeline shall have two gas sources, one at Phulpur (Allahabad, U.P.) and the other at Dhamra RLNG Terminal (Odisha). The pipeline would help development of gas based industries in Eastern India and also provide clean fuel to various cities along the pipeline. City Gas Distribution projects enroute at pipeline at

Varanasi, Patna, Ranchi, Jamshedpur, Cuttack and Bhubaneshwar is also being developed. Kolkata CGD is identified for the development through a JV of GAIL and Greater Calcutta Gas Supply Corporation Ltd (Government of West Bengal Enterprise).

Kochi – Koottanad- Bengaluru/ Mangalore Pipeline (Phase-II)

Construction of Kochi – Koottanad- Bengaluru/ Mangalore Pipeline (Phase-II) is underway in Kerala (438 Kms) and Tamil Nadu (435 Kms). Kerala section of the pipeline is expected to be completed by 2019 whereas Tamil Nadu section will be completed within 30 months from availability of hindrance freeRoU/land.

Vijaipur- Auraiya -Phulpur Pipeline

In order to de-bottleneck the upstream network of JHBDPL Project for enhanced capacity, a Parallel pipeline from Vijaipur to Auraiya (357 Kms) and further to Phulpur (315 Kms) is under execution.

Coal Gasification

GAIL is entering into coal gasification by setting up surface coal gasification based urea project at Talcher. The project, with an estimated cost of ₹12,000 crores is envisaged for the production of 2200 MTPD ammonia and 3300 MTPD urea. A joint venture company Talcher Fertilizers Limited was formed with consortium partners namely GAIL, Coal India Limited (CIL), Rashtriya Chemicals and Fertilizers (RCF) and Fertilizer Corporation of India Limited (FCIL). Pre-project activities are on full swing with M/s Shell being selected the Licensor. Approvals from CCEA /GoI are targeted to be completed to lay foundation for starting the project activities during 2018-19.

Major Accolades / Awards received during 2016-17

- Dun & Bradstreet's 'India's Top PSUs & PSU Awards 2016' in the category 'Manufacturing: Gas - Processing, Transmission and Marketing
- SCOPE Meritorious Awards 2014-15 in the category 'RTI Act – 2005 Compliance'
- ASSOCHAM 2nd Corporate Governance Summit cum Excellence Award 2015-16 as a winner under Listed Public Sector Category

GAIL conferred with the "Economic Times 2 Good CSR Rating"- Only PSU to be feted in 'All Round Excellence' category

14.1.4 Bharat Petroleum Corportion Limited

Bharat Petroleum Corporation Ltd., (BPCL) a Government of India Undertaking came into existence on 24th January, 1976 subsequent to the Government of India acquiring Burmah-Shell Oil Storage & Distribution Company of India and Burmah-Shell Refineries Limited. The Government of India has conferred BPCL with Maharatna status on 12th September, 2017.

BPCL is an integrated oil company engaged in exploration & production and refining of crude oil and marketing of petroleum products. The Authorized Share Capital and Paid up Capital of the company as on 30.09.2017 is ₹2500 crores and ₹2,169.25 crores before adjustment of treasury shares of ₹202.37 crores respectively.

BPCL has Refineries at Mumbai and Kochi with a combined refining capacity of 27.50 MMTPA as on 30th November 2017. The Mumbai and Kochi Refinery are certified for ISO 9001, ISO 14001 and OHSAS 18001, had throughput of 8.96 MMT and 8.95 MMT respectively during 2017-18 (up to

November 2017).

BPCL with 12,208 employees has an all-India presence through its extensive marketing network with Market Sales of 30.31 MMT & market share of 25.4% (Apr.-Dec. 2017 provisional).

Marketing Profile

BPCL has a robust distribution network comprising of 41 depots, 13 major installations, 24 TOPs, 51 LPG bottling plants, 50 Aviation Service Stations, 14225 Retail Outlets, 4868 LPG Distributorships, 4 lubricant blending plants and 2241 KM BPCL group product pipelines as on 31.12.2017.

Financial Performance

The financial performance (RE) of the Corporation during April – September 2017: Gross Sales Turnover ₹1,30,673 crores and Profit After Tax (PAT) ₹3101.96 crores.

Exploration and Production

Bharat PetroResources Limited (BPRL), a 100% subsidiary of Bharat Petroleum Corporation Ltd. (BPCL), has Participating Interest (PI) in 22 blocks in 6 countries along with Equity stakes in 2 companies in Russia that hold the license to 4 Producing assets.

7 Indian blocks were acquired under various NELP bid rounds and recently 5 blocks were awarded to BPRL under the Discovered Small Fields Bid Round 2016. The foreign blocks were acquired through the bidding/farm-in process. As part of various consortia, BPRL has made world class discoveries in multiple geographies, specifically in Mozambique and Brazil; in addition to discoveries in Indonesia and India which are in various stages of appraisals/predevelopment.

In Mozambique, the Exploration phase has been completed and an estimated 75 Tcf Natural Gas Resources discovered in the Block. The current proposal is to monetize the resource through the LNG route by setting up an onshore LNG plant (Initially 2 trains of 6 MMTPA each) for which land has been allocated. The core Legal and Contractual agreements have been successfully concluded and the next major activity is to commence and complete the Resettlement Action Plan which will pave way to commence construction of the LNG trains.

In Brazil, appraisal plans are under way and BPRL is engaged with the Ministry of Mines and Energy, Brazil and the Petrobras (Operator) to expedite the development in SEAL Blocks. It is proposed to carry out extended well test in H2 2018.

In Indonesia, a new prospect Parang has been drilled leading to a discovery (ranked among the Top 10 Discoveries of 2017 by IHS Markit) augmenting the already discovered reserves wherein Gas was tested in 5 zone and Oil in 1 zone. Additionally, it is proposed to carry out further exploration by drilling of Keris Propsect.

BPRL is the Lead Operator of one onland block CB-ONN-2010/8 in Cambay basin Gujarat and has concluded a successful exploration program with two discoveries till date in the said block. The Field development plan (FDP) for the block has been submitted to the Directorate General of Hydrocarbons to commence development activities.

The Madanam discovery in our block CY-ONN- 2002/2 in Cauvery basin, India is currently under development and the commercial oil production is expected to commence after grant of PML by state government.

BPRL along with Oil India Limited and Indianoil Corporation Limited, acting jointly as the Indian Consortium, through a joint venture company formed by their wholly owned subsidiaries in Singapore, completed on 05th Oct 2016 two transactions, viz. acquisition of 23.9% shares of the charter capital of JSC Vankorneft, a company organised under the laws of the Russian Federation, which is the owner of Vankor and North Vankor Field licenses, from Rosneft Oil Company (Rosneft), a National Oil Company of Russia; and acquisition of 29.9% of the participatory share in charter capital of LLC Taas Yuryakh Neftegazodobycha ("Taas Yuryakh"), from LLC RN Razvedka I Dobycha, a wholly owned subsidiary of Rosneft.

So far BPRL has invested approx. ₹18000 crores for its projects.

Completed/Ongoing Projects

Conversion of CRU to Isomerization Unit at Mumbai Refinery

The project envisages conversion of Catalytic Reformer Unit (CRU) to Isomerization Unit (ISOM) along with associated facilities. This would enable Mumbai Refinery to meet 100% BS IV MS production. The approved cost of the project is ₹725 crores.

The project is completed and commissioned in February 2017.

Installation of Diesel Hydrotreatment Unit (DHT) at Mumbai Refinery

The project envisages installation of 2.6 MMTPA capacity DHT to meet the Auto Fuel Policy Mandate of producing 100% BS-IV HSD. The approved cost of the project is ₹1714 crores.

DHT Unit is commissioned on 27.06.2017 as per schedule.

Laying a Heat Traced Pipeline at Mumbai Refinery

The project envisages laying of a Heat traced pipeline and associated facilities at Mumbai Refinery for transporting High Pour Products. The approved cost of the project is ₹193.49 crores and is scheduled for mechanical completion by January 2019.

Installation of Gasoline Hydro Treatment Unit (GTU) to produce 100% BS-VI MS at Mumbai Refinery

The project envisages installation of Gasoline Hydro Treatment Unit (GTU) to produce 100% BS VI MS at Mumbai Refinery. The approved cost of the project is ₹554 crores and is scheduled for mechanical completion by December 2019.

Integrated Refinery Expansion Project (IREP) at Kochi Refinery

The project envisages expansion of the capacity of Kochi refinery by 6 MMTPA from the present 9.5 to 15.5 MMTPA and modernize the refinery to produce auto fuels conforming to BS –IV/V specs. The approved enhanced cost of the project is ₹16504 crores.

All units / facilities in IREP are mechanically completed in March 2017 as per schedule and all units have been commissioned.

Propylene Derivatives Petrochemical Project (PDPP) at Kochi Refinery

The project envisages production of niche Petrochemicals utilizing Polymer Grade Propylene produced from the Petro FCCU being set up as a part of IREP. PDPP project envisages production of Acrylic Acid,

Oxo Alcohols and Acrylates, utilizing approximately 250,000 MT per annum of Polymer Grade Propylene. The approved cost of the project is ₹5245.96 crores and is scheduled for mechanical completion in February 2019.

Laying a Heat Traced Pipeline at Kochi Refinery

The project envisages laying of a Heat traced pipeline and associated facilities at Kochi Refinery for transporting High Pour Products. The approved cost of the project is ₹337.06 crores and is scheduled for mechanical completion by August 2018.

BS VI Motor Spirit Block Project (MSBP) at Kochi Refinery for 100% BS VI MS production

The Motor Spirit Block Project (MSBP) consists of NHT, NSU, CCR, Light Naphtha Isomerization Units and associated facilities for the production of 100% BS VI grade MS from refinery. The approved cost of the project is ₹3313 crores and is scheduled for mechanical completion in October 2019.

Ennore Coastal Terminal Project

The project envisages construction of POL Terminal at Ennore with tankage of 117 TKL with receipt facility through Tankers and 16 bay gantry to cater to Chennai market in lieu of closure of all activities at existing Tondiarpet Installation, as per Government directives. The approved cost of the project is ₹393 crores with anticipated mechanical completion in April 2018.

Palakkad LPG Terminal Project

The project envisages construction of 3 X 1450 MT Mounded Storage Vessels (MSV), 8 bays TLF Gantry, LPG P/H (20 M X 8 M) and associated facilities. The approved cost of the project is ₹184 crores and project has achieved mechanical completion in December 2017.

LPG Import Facility at Haldia

The project envisages construction of 2X15000 MT refrigerated storage tanks for Propane & Butane, facilities for Ocean tanker unloading, Propane and Butane heating, Ethyl Mercaptan Dosing, LPG Bottling and dispatch in cylinders or in bulk through road tankers. This also entails laying of twin pipeline (one for Propane & other for Butane) from Jetty to Terminal. The approved cost of the project is ₹.694 crs. and slated for anticipated completion in October 2018.

Rerouting of Mumbai-Manmad pipeline

The project envisages laying of approx 50 km long 18" Dia API 5L X 65 Pipeline from Chainage 6 km to Chainage 51 km of Mumbai Manglya section, construction of 3 SV stations and associated facilities. The approved cost of the project is ₹449.58 crores and slated for anticipated mechanical completion in June 2019.

CSR

In alignment with the vision of organisation, the CSR initiatives strive to 'energise lives' of the marginalised / underprivileged communities. There are 5 thrust areas for CSR projects/activities which are Education, Water Conservation, skill Development, Health & Hygiene and Community development. The highlight of our current year's CSR work has been the projects as a part of "Swachh Bharat Mission" of Government of India which are "Project of Cleanliness and Sanitation activities at Swachha Iconic Place- Madhurai Meenakshi Temple surrounding" and "Solid Waste Management project in municipality areas of Chennai"

Contribution to Exchequer

BPCL's contribution to the Exchequer (RE) during April- September 2017 is ₹38,759.06 crores.

Major Accolades / Awards received:

- BPCL Corporate R&D Centre received "Innovation Award 2015/16 - Best Innovation in R&D" instituted by Ministry of Petroleum and Natural Gas (MoPNG) for development of "BPMARRK" - An innovative methodology for prediction of detailed refining characteristics of crude oil" on 20th April 2017.
- BPCL Mumbai Refinery is conferred with an award for energy performance [Lowest Specific Energy Consumption], among group refineries with Composite Energy factor below 5.2 for the year 2015-16 as a part of Jawaharlal Nehru Centenary Awards for energy performance. This award is instituted by Ministry of Petroleum & Natural Gas [MOP&NG].
- During the Hindi Advisory Committee meeting held by MOP&NG on 22nd April, 2017 in Srinagar, our Corporation was awarded Petroleum Rajbhasha Cup for Excellent Implementation of Official Language Hindi for the year 2015-16. The Trophy was given by Hon'ble MOS (I/C) P&NG, Shri Dharmendra Pradhan.
- BPCL Mumbai Refinery has been conferred the "Challenger's award" under the prestigious "Sustainability 4.0 Awards-2017", conducted jointly by Frost & Sullivan and TERI (The Energy & Resources Institute), in recognition of its Sustainability initiatives on 26th May, 2017.
- BPCL received the "Business award" for the "Business House that Handled Highest Cargo of Cochin Port" in the financial year 2016-17. The total cargo handled by BPCL's Kochi Refinery in 2016-17 was 14.64 Million Metric Tonnes which was 59% of the total cargo of Cochin

BPCL receives Rajbhasha Trophy from Shri Dharmendra Pradhan, Minister P&NG

Port. The award was received from the Chief Commissioner, (Customs, Central Excise and Service Tax) and Chairman, Cochin Port Trust at the Business Meet as part of Cochin Port Day.

- BPCL has been honoured with a prestigious award - "Project Management Company of the Year - 2016" given at the hands of Secretary, MoP&NG. "Project Management Company of the Year" award in the category ₹ 500 to 2000 crores instituted by Federation of Indian Petroleum Industry (FIPI) honours leading performers in managing and completing project in the oil & gas value chain in India. Award was given to BPCL and EIL for completing CDU-4 Project of Mumbai Refinery within time schedule and cost, while maintaining quality and safety standards during the implementation.
- BPCL was awarded the Leader Dx – IDC Digital Operational Transformation Award for successfully planning and executing the digital transformation (DX) of one or multiple areas of their business through the use of digital and disruptive technologies within Asia/Pacific on 4th August, 2017
- BPCL Mumbai Refinery received the prestigious 'Gold award', under the National Awards for Manufacturing Competitiveness (NAMC) 2016-17, conducted by the International Research Institute for Manufacturing (IRIM) on 22nd September 2017.
- BPCL Kochi Refinery bagged the Runners Up place in the National Safety awards for the Performance Year 2015, in the Scheme-I, Schedule-4 category, instituted by the Director General of Factory Advice Services & Labour Institutes (DGFASLI), Ministry of Labour & Employment on 17th September 2017.
- BPCL LPG SBU has been selected by OISD as a winner for the year 2015-16 under 'LPG Marketing Organization' category. BPCL has won this award for the 8th consecutive year.
- BPCL has been named "Thomson Reuters 2017 Top 100 Global Energy Leader" a listing of today's top energy companies. BPCL is one of the 25 top Global Oil & Gas company. This is in recognition of commitment to energy leadership across eight pillars of performance; Financial, Management & Investor Confidence, Risk & Resilience, Legal Compliance, Innovation, People & Social responsibility, Environment Impact and Reputation.
- For the 10th consecutive time Kochi Refinery has won the Kerala State Pollution Control Board's Excellence Award for the year 2016-17 for substantial and sustained efforts in pollution control and initiatives in environment protection among very large industries on 4th October, 2017
- BPCL received the Best Corporate Communication Campaign/Program-(Internal) (3rd Prize) and the Best Annual Report (Commendation Award) at the SCOPE Corporate Communication Excellence Awards 2017 on 7th December, 2017.

14.2 Navratna PSUs

14.2.1 Hindustan Petroleum Corporation Ltd. (HPCL)

Hindustan Petroleum Corporation Limited (HPCL) is a Navaratna and a Global Fortune 500 Company, ranked at 384 with an Annual Sales of ₹2,13,489 Crore during FY 2016-17 and having a strong presence in Refining & Marketing in India with over 21% Market share in the PSU category in the country.

The 2016-17 performance of the Corporation has qualified for "Excellent" rating in terms of the MOU signed with the Government of India (basis self-evaluation).

Acquisition of HPCL by ONGC

Cabinet Committee on Economic Affairs (CCEA) in its meeting held on 19th July, 2017 has given in principle approval for strategic sale of the Government of India's existing 51.11% of total paid up equity shareholding in Hindustan Petroleum Corporation Limited (HPCL) to Oil and Natural Gas Corporation Limited (ONGC) alongwith transfer of management control. The proposed acquisition in the oil sector, will create a vertically integrated public sector Oil Major company having presence across the entire value chain. This will give ONGC an enhanced capacity to bear higher risks, take higher investment decisions and to neutralize the impact of global crude oil price volatility. The acquisition of HPCL by ONGC will result in significant synergies, in terms of optimization of logistics costs, R&D activities, economies of scale of purchase of crude oil and optimization in refinery operations. For overseeing this transaction, CCEA approved setting up of an Alternative Mechanism, headed by the Finance Minister, which will help in taking quick decision with regard to the timing, price, Terms and Conditions and other related issues to the transaction. Post-acquisition by ONGC, HPCL will continue to be a Central Government Public Sector Enterprises (PSE), having become a subsidiary of ONGC. It can still maintain its cultural uniqueness and brand identity, distinct from ONGC. M/s Protocol Insurance Surveyors & Loss Assessors Pvt. Ltd. has been appointed as Assets Valuer. An Evaluation Committee (EC) under the Chairmanship of Financial Adviser, D/o Investment and Public Assets Management (DIPAM) has been constituted.

Physical Performance

As on September 2016, the total sale of products was 17.57 MMT, achieving a growth of 4.0% over historical. Pipeline throughput was 9.7 MMT and refineries processed 9.13 MMTPA of crude.

Financial Performance

As on September 2017, the Corporation has earned a profit of ₹2659 crore as compared to ₹2800 crore of the same period in 2016-17.

Marketing and Associated Infrastructure

HPCL owns and operates Refineries at Mumbai and Visakh with a capacity of 7.5 MMTPA and 8.3 MMTPA respectively. HPCL also owns the largest Lube Refinery in the country at Mumbai for producing Lube Oil Base Stocks with a capacity of 450 TMTPA. HPCL, in collaboration with M/s. Mittal Energy Investments Pte. Ltd., is operating a 11.25 MMTPA capacity Refinery at Bathinda in Punjab and also holds an equity of about 16.96% in the 15 MMTPA Mangalore Refinery and Petrochemicals Ltd. (MRPL).

HPCL has the second largest share of product pipelines in India with a product pipeline network is about 3,951 kms. For transportation of petroleum products and a vast marketing network consisting 14 zonal offices in major cities and 128 Regional Offices facilitated by a Supply & Distribution Infrastructure comprising of 41 Terminals/TOPs, 40 Inland Relay Depots, 38 Aviation Service Stations, 47 LPG Bottling Plants, 7 Lube Blending Plants and 22 Exclusive Lube Depots. The customer touch points constitute 14,628 Retail Outlets, 4,632 LPG Distributorships, 1,638 SKO/LDO dealerships, 231 CNG Outlets, 218 Auto LPG Dispensing stations and 115 Commissioning & Forwarding Agents as of September 2017.

Exploration & Production

In order to become integrated hydrocarbon company, HPCL has put specific focus on its upstream activities. The corporation has made a strategic move by forming a wholly owned subsidiary "Prize Petroleum Company Limited (PPCL)" as an independent arm. HPCL/ PPCL are in the process of consolidating their E&P activities and building internal capability by developing infrastructure and competent team.

HPCL has Participating Interest in 20 exploration blocks in India in consortium with other E&P companies. Out of these, there is discovery in one of the blocks for which FDP has been approved by DGH.

PPCL is continuously pursuing various E&P opportunities in India and abroad to have a balanced portfolio to exploratory, developing and producing oil and gas assets. During the year 2014-15, PPCL had acquired two oil & gas assets in Australia through its wholly owned subsidiary Prize Petroleum International Pte Ltd. (PPIPL), Singapore. One of these assets is producing and other has 4 discoveries. Two additional development wells have been drilled in producing asset in Australia during 2015-16. Both the wells have been put on production. In June 2017, hook up and commissioning of compression and condensate pumping modules on the platform was completed which is expected to maximize production over the life of the field. The development feasibility study for one of the 4 discoveries is in progress. PPCL is also operating one marginal producing field in Cambay Basin in India. PPCL was awarded all the 3 contract areas it had bid for in DSF bidding round 2016. Revenue Sharing Contract (RSC) with Govt. of India for the 3 contract areas was signed on 27th March 2017.

PPCL is also reviewing fields/blocks under Open Acreage Licensing Policy (OALP) under Hydrocarbon Exploration Licensing Policy (HELP) through visiting National Data Repository (NDR) at DGH, NOIDA.

New Projects

Refinery Projects

HPCL has 2 major Refineries expansion projects for optimum capacity utilization of secondary processing facilities namely Visakh Refinery Modernisation Project (VRMP) & Mumbai Refinery Expansion Project (MREP), primarily to meet the objectives of maximization of crude refining capacity from 8.33MMTPA to 15 MMTPA for VRMP and from 7.5 MMTPA to 9.5 MMTPA for MREP respectively are under execution.

HPCL is also planning to set up a Green Field Petrochemical Complex in A.P. along with M/s. GAIL.

Marketing Projects

HPCL has taken up a number of infrastructure projects for capacity expansion, viz. New LPG Bottling Plants at Sugauli in Bihar and Panagarh in West Bengal are under execution.

HPCL has taken up a number of infrastructure pipeline projects for capacity expansion, viz. i) Project for laying of Product Pipeline 164 kms. Long Uran Chakan LPG product pipeline is under implementation along with BPCL of 50:50 sharing basis ii) HPCL Visakh Vijaywada Secunderabad Pipeline (VVSPL) Capacity Expansion and laying of subsea pipeline from OSTT to SS Jetty at Visakh Port Trust iii) Extension of Visakh Vijaywada Secunderabad Pipeline (VVSPL) from Vijayawada to Dharampuri and construction of Marketing Terminal at Dharampur iv) HPCL MDPL capacity expansion & Palanpur Vadodara Pipeline Extension v) HPCL Ramanmandi Bahadurgarh Pipeline Capacity Expansion Project which are under execution.

Revamping of Nalagarh Depot and Revamping of Jabalapur Depot have been completed and commissioned during 2017.

In the Natural Gas segment, HPCL has initiated the project activities for setting up a 5 MMTPA LNG Terminal at Chhara, Gujarat in a JV partnership with M/s. S.P. Ports Pvt. Ltd. (a group company of M/s. Shapoorji Pallonji)

New Refineries:

HPCL has formed a joint venture with Government of Rajasthan for setting up of a new 9 MMTPA Refinery-cum-Petrochemical complex in Barmer District of Rajasthan.

HPCL is also participating in the 60 MMTPA Integrated Refinery-cum-Petrochemical complex at west coast in Maharashtra through a Joint venture company, Ratnagiri Refinery and Petrochemicals Limited.

14.2.2 Oil India limited (OIL)

1. Preamble

Oil India Limited (OIL), a Government of India Enterprise, 'A Navaratna Company' under the administrative set-up of Ministry of Petroleum and Natural Gas, is engaged in the business of exploration, production and transportation of crude oil & natural gas both in-country and overseas. The authorized capital of OIL is ₹2,000 Crore and the paid up capital is ₹601.14 Crore. At present, Government of India's shareholding is 67.64% of the paid-up equity share capital of OIL.

2. Domestic Portfolio

The domestic operations of OIL are spread over areas under onshore Petroleum Exploration License (PEL) and Petroleum Mining Lease (PML) in the states of Assam, Arunachal Pradesh, Mizoram, Andhra Pradesh, Puducherry and Rajasthan. Besides, OIL has also ventured into shallow and deep water in KG, Cauvery, Andaman and Mumbai offshore Basins either jointly or in partnership with other consortium partners.

OIL has 3 (three) PELs covering area of about 332 sq.km granted on nomination basis in the country and 22 (twenty two) PMLs spread across an area of about 5004 sq.km. These acreages are in the state of Assam, Arunachal Pradesh and Rajasthan. OILhas 8 (five) Blocks under NELP as Operator with an area of 9259.7 sq. km. in the state of Assam, Mizoram, Andhra Pradesh / Puducherry, Rajasthan. OIL has 3 blocks under NELP as non-operator with 6136 sq. km. in Krishna Godavari (Shallow Offshore), Gujarat-Kutch (Shallow Offshore), West Bengal (Onshore).OIL also has 2 blocks with 121 Sq. Km in Assam & Arunachal Pradesh under Pre-NELP JVs as non-operator viz. Kharsang PSC and Block AAP-ON-94/1.

3. Overseas Portfolios

OIL is currently holding overseas exploration blocks and PIs in other business ventures in ten countries, viz. Libya, Gabon, Nigeria, Yemen, Bangladesh, Myanmar, Venezuela, Mozambique, Russia and USA. In addition OIL also holds stake in 741 Km long pipeline in Sudan. The details of oil and gas producing blocks are given below:

Venezuela: Currently, Production has reached to 24000 Bopd from 76 wells in Project Carabobo in Venezuela. During the current FY 2017-18 (till 25th December, 2017), OIL's share of production in asset stood at 37.79 TMTOE.

USA: OIL and IOCL have jointly acquired 20% and 10% respectively in Carrizo Oil & Gas Inc's ("Carrizo") liquid rich shale assets in the Denver – Julesburg (D-J) Basin in Colorado, USA. The acquisition became effective from 1st October, 2012. OIL has formed 100% wholly owned subsidiary in Texas, USA in the name of Oil India (USA) Inc. Current production from the asset is around 300 BOEPD. During April- December 2017, OIL's share of production in asset stood at 12.67 TMTOE.

Russia: License 61 : The 4,991 sq. Km. license contains 7 oil fields and over 25 identified prospects and leads. The block started production in 2010. Current production from the license is around 2,400 barrels of oil per day. During April- December 2017, OIL's share of production in asset stood at 37.41 TMTOE.

Russia: Vankorneft: OIL along with Indian Consortium partners IOCL and BPRL has acquired 23.9% stake in Vankorneft, Russia w.e.f. 5th October 2016. The asset is held through WOS Oil India International Pte. Ltd and an SPV incorporated jointly with IOCL and BPRL in Singapore and is being managed by Trust Company. Licensee is producing at the rate of 326,251 bopd in December 2017.

Russia: Taas-Yuryakh: OIL along with Indian Consortium partners IOCL and BPRL acquired 29.9% stake in Taas-Yuryakh Neftegazodobycha (Taas), Russia w.e.f. 5th October 2016. The asset is held through WOS Oil India International Pte. Ltd and an SPV incorporated jointly with IOCL and BPRL in Singapore being

managed by Trust Company. Taas is a producing asset with OIL's share of production at 0.96 MMT of crude oil and 231.25 MMSCM of gas during the period April-Dec 2017. Expected peak production is 5 MMTPA in 2021. Taas holds two licences Kurungski and Srednebotuobinskoye, and is one of the largest green fields located in Eastern Siberia. Other partners in Taas are Rosneft (50.1%) and British Petroleum (20%).

4. Physical Performance

The exploration and production activities undertaken by OIL in 2017-18 upto December, 2017 are given below:

Parameter	Unit	2016-17 (Actual)	2017-18		
			Target	Actual (Upto Q3)	Anticipated (2017-18)
Seismic survey					
2D	GLKM	196.96	1305	42.24	125
3D	SQKM	141.38	1380	149.87	430
Drilling					
Exploratory	'000Mtr	81286	73.900	42.650	79,075
	Wells	23	21	9	22
Development	000Mtr	105.435	124.400	66.125	84,344
	Wells	37	41	19	30
Total (Exp+Dev)	000Mtr	186.435	198.300	108.775	163,419
	Wells	60	62	28	52
Crude Oil Production *	MMT				
Assam		3.2504	3.3238	2.5420	3.3297
Arunachal Pradesh		0.0077	0.0095	0.0056	
Rajasthan (Heavy Oil)		--	--	0.0008	
Total		3.2581	3.333	2.5484	
Natural Gas Production	MMSCM				
Assam		2692.672	2,772.00	2031.156	3,000
Arunachal Pradesh		11.866	13	8.746	
Rajasthan		232.019	240	157.081	
Total		2,936.556	3,025	2196.983	
LPG Production	'000T	34.580	32.00	24.607	32.00

Parameter	Unit	2016-17 (Actual)	2017-18		
			Target	Actual (Upto Q3)	Anticipated (2017-18)
* Excluding 40% JV share					

5. Hydrocarbon Discoveries and Reserve Position

OIL has made 4 (four) oil and gas discoveries during the 2017-18 upto Q3, 2017 in the nominated areas of Assam. As a result of exploration and development activities, OIL has established 2P in-place volume of 814.61 MMT (oil) & 379.15 BCM (Gas) in the domestic sector. Similarly, the 2P remaining producible oil & gas volume of the company stand at 78.85 MMT and 125.33 BCM respectively.

6. Crude Oil Transportation

OIL operates a total network of 1220 kms of Crude Oil Pipelines. This 5.38 MMTPA capacity pipeline transports crude oil produced from oilfields in Upper Assam to the public sector refineries at Numaligarh, Guwahati and Bongaigaon. The 600 kms pipeline segment between Bongaigaon and Barauni which has capacity of 3 MMTPA has been re-engineered to enable oil flow in either direction and is now transporting crude from Barauni to Bongaigaon. The pipeline runs through the states of Assam, West Bengal and Bihar traversing hostile terrain, dense forests and cuts across 78 rivers including the mighty Brahmaputra. In addition to above 0.65 MMTPA of crude oil is transported from Duliajan to Digboi Refinery through 30 kms pipeline. During the year, OIL transported total 7.166 MT of crude oil and 1.781 MT of products with pipeline utilization of 103.48%.

The natural gas produced in Assam is sold to different customers, viz. BVFCL, BCPL, AGCL, APGCL, NEEPCO, IOC (AOD), and APL and nearby Tea gardens. Since March, 2011 OIL is supplying gas to Numaligarh Refinery. The non-associated gas produced by OIL in Rajasthan is sold to Rajasthan Rajya Vidyout Utpadan Nigam Limited (RRVUNL).OIL also produces Liquefied Petroleum Gas (LPG) in its plant at Duliajan, Assam.

7. Renewable Energy Portfolio

OIL, as part of its strategic intent, has, over the last few years diversified into the Renewable (Alternate) Energy Domain, specifically into the Wind and Solar segments and as of 31st December 2017 has established Commercial nature Renewable Energy (RE) projects of 188.1 MW comprising of 174.1 MW of Wind Energy Projects and 14 MW of Solar Energy Projects. While the operational Wind Energy Power Projects are spread over the states of Rajasthan, Madhya Pradesh & Gujarat , the operational Solar Energy Power Projects are installed in Rajasthan.

8. Diversification

OIL holds 26% stake in Numaligarh Refinery Limited, 10% stake in Brahmaputra Cracker and Polymer limited, 23% stake in Duliajan – Numaligarh Pipeline Limited, 49% stake in Assam Petrochemicals Limited, 25% equity stake in Suntera Nigeria 205 Ltd., 50% shares in IndOil Netherlands B.V (through Oil India Sweden AB), 40% share in BREML (Beas Rovuma Energy Mozambique Ltd.), 50% share in World Ace Investments Ltd (through Oil India International B.V) and 10% share in BCPL.

9. Corporate Social Responsibility

As a responsible corporate citizen, OIL has given due importance to its social and community responsibilities,

and implemented following socio-economic schemes for the welfare development of people and communities in and around its operational areas in various states. As specified under Schedule VII of the Companies Act, 2013, the company has embarked upon various CSR projects under key thrust areas as follows:

Healthcare and Sanitation

- Project Arogya on reduction of Infant Mortality Rate (IMR) and Maternal Mortality Rate (MMR)
- Project Sparsha on mobile healthcare services through village healthcamps.
- Health camps & Eye Relief Camps conducted by NGOs.

Project Swachh Bharat Abhiyaan

- Swachh Iconic place initiative: Adoption of Kamkhya Temple for cleanliness, maintenance and upkeep. Other activities include seminars, walkathonsand Shramdaans by OIL employee across OIL spheres
- Supply of clean drinking water to rural operational areas under KG Basin Project.

Education

- OIL Super 30 project- 11 months free residential coaching for IIT with centres at Guwahati, Jorhat, Dibrugarh in Assam, Jodhpur in Rajasthan and Itanagar in Arunachal Pradesh.
- Career Counselling & Guidance and Edufair
- Scholarship to meritorious students / OIL Shikshya Ratna Puraskar (Teachers awards)
- Project Dikhya-Promote computer literacy among school students in OIL's operational areas
- Project Dikhya- Adult Literacy Campaign in OIL's operational areas
- Project Sakshyam on rehabilitation for persons with disabilities
- Assistance towards augmentation of educational infrastructure

Sustainable Livelihood Generation

- Project Rupantar for self-employment generation under Project Rupantar with a target of supporting SHGs/JLGs
- Project Jeevika on cluster based livelihood projects for sustainable income generation
- Agriculture Project under Oil India Rural Development Society (OIRDS)

Skill / Capacity Building

- Project Swabalamban on Skill/ Capacity Building Project through MoU with three agencies- Construction India Development Council (CDIC), Institute of Entrepreneurship (IIE), Guwahati

& IL&FS Educational Technology Services (IETS) and other agencies with whom OIL enters MoU

Projects on Women Empowerment

- Projects related to women empowerment and capacity building.

Environment and Sustainability

- Project OIL Urja on providing renewable , cost effective and clean energy solutions
- Conservation of Bio-Diversity of OIL Operational areas.

Promotion of Art, Culture and Heritage

- Statue of unity
- Promotion and preservation of Art, Cultural & other Heritage and eco-tourism projects and Support to socio-cultural activities-Drama, theatre, Dance etc.

Development of Sports

- Development and promotion of sports activities with focus on Rural Sports in OIL operational areas.

Augmentation of Rural Infrastructure

- Construction of Roads & bridges
- Construction of community halls and waiting sheds etc.
- LPG scheme on free connection to BPL families under Prime Minister Ujjwala Yojna (PMUY)

10. Strategic Initiatives

Given the challenges that the rapidly changing global environment poses to E&P players including OIL, a need was felt to have a comprehensive study of the organization structure, talent strategy and business processes to deliver the desired growth. Therefore, it was decided to develop a long term perspective plan with intermediate milestone for OIL for relooking comprehensively at the strategy to incorporate changes if any, based on the changing environment. It is envisaged that the restructuring exercise would deliver improved performance on key indicators, backed by more robust interfaces and improved practices. These initiative has been christened as project "UDAAN".

OIL has developed Perspective Plan 2030 during the year 2015-16 with intermediate milestones for 2020 and 2025. OIL has targeted production of 15 MMTOE in 2030.

14.2.3 Engineers India Limited (EIL)

Introduction

Engineers India Limited (EIL) was established in 1965 with its head office in New Delhi to provide engineering and related technical services for petroleum refineries and related projects. Over the years, it has augmented its span of services and excelled in various fields to emerge as a leading Project, Design, Engineering and Turnkey (LSTK) contracting company in the fields of:

- Petroleum Refining
- Petrochemicals, Chemicals & fertilizers

- Crude, Petroleum products & Gas Pipelines
- Offshore/ Onshore Oil & Gas
- Terminals & Storage
- Sub Surface Strategic Storage
- Mining & Metallurgy
- Infrastructure

EIL, in the year 2000-01, forayed into the infrastructure sector and since then it has secured several noteworthy and significant assignments related to modernization/development of international airports, intelligent buildings and water management. In 2010-11, EIL has also taken diversification initiatives into fertilizer, nuclear and solar power and upstream E&P.

An ISO 9001:2015 certified company, EIL has regional offices in Chennai, Vadodara and Kolkata; branch office in Mumbai, overseas engineering/ marketing office in Abu Dhabi, which is a hub of the company's activities in Middle East. There are Inspection/Procurement offices at various locations all over India and also in London, Milan and Shanghai with construction offices at different project sites both in India and abroad. Besides, EIL has a wholly owned subsidiary, Certification Engineers International Ltd for providing certification and inspection services.

EIL provides a comprehensive range of project related technology and engineering services spanning from project conceptualizing to project commissioning which includes revamp, capacity expansion and modernization of plants. The portfolio of services offered by the company includes:

Pre-Project Services

- Feasibility Studies
- Environment Impact Assessment Technology & Process Licensor election
- Cost Estimation

Project Implementation Services

- Project Management
- Process Design and Front End Engineering
- Basic and Detailed Engineering
- Procurement
- Inspection and Third Party Certification
- Construction Management
- Commissioning and plant start-up Assistance

Specialist Services

- Heat and Mass Transfer Equipment Design
- Environment Engineering

- Information Technology
- Specialist Materials and Maintenance
- Plant Operations & Safety including HAZOPS & Risk Analysis
- Corrosion Protection, Plant Integrity and Residual Life Assessment
- Refinery Optimization Studies
- Yield & Energy Optimization Studies

Turnkey Contracting

- EPC (Engineering, Procurement & Construction)
- OBE (Open Book Estimate)

EIL has a multi disciplinary engineering workforce and the company's employee strength at headquarters and in field offices including foreign offices was 2867 as on 30.11.2017.

In addition to pursuing excellence in engineering, EIL is a responsible Corporate Citizen and is committed to good Corporate Governance practices. The Right to Information Act 2005 has been implemented in the company with a Public Information Officer and an Appellate Authority nominated to address issues under the Act. Information as per provision of the Act is posted in the company's website www.engineersindia.com. Besides, a web-based complaint management system has been implemented for handling complaints/grievances from public, contractors, vendors, suppliers etc. Further, the Women's Forum of the company has a designated committee for dealing with complaints relating to sexual harassment.

Performance Highlights of 2017-18 (up to November, 2017)

Business Secured

During the current financial year (up to November, 2017), EIL secured new business worth ₹1998.68 crores.

Details of major jobs secured by the company are given below:

Domestic Jobs

- Consultancy Services for Guru Gobind Singh Polymer Addition Project for HMEL, Bhatinda
- Implementation of Slug Catcher Project at Uran on OBE Mode for ONGC
- SRU Revamping at ONGC Hazira plant on Open Book Estimate (OBE) mode of implementation for ONGC, Hazira
- Project Management Consultancy Services for Installation of New Kero Hydro Desulfurization Unit at BORL, Bina
- Project Monitoring and Consultancy for construction of various IT related facilities for Department of Information Technology, Govt. of Rajasthan
- Consultancy for Third Party Assessment for Establishment of Bhamashah State Data Centre (BSDC) at Jaipur for Department of Information Technology (Government of Rajasthan)
- Appointment as consultant for undertaking EIA Study (including RRA) and Licensor Selection & Preliminary Project Activities for Standalone Petrochemical Complex in Andhra Pradesh for GAIL (India) Limited.
- Consultancy Services for Delayed Coker Unit & Allied facilities under distillate yield

improvement for IOCL, Haldia

- PMC Services including Inspection and expediting of BBU and PPU 3rd Reactor Project (including CT-1) for HMEL, Bhatinda
- PMC Services for Pre-Project Activities (Stage-1) for Setting up of West Coast Refinery & Petrochemical Project (WCRP) for IOCL, Babulwadi
- Laying of Pipeline from H2SO4 Tank in Haldia Refinery to HOJ-3 under BS-VI project of Haldia Refinery (Additional Value) for IOCL, Haldia
- Consultancy Services for Retrofitting of HRD-DCW Package of Alumina Refinery at Damanjodi, Odisha

Overseas Jobs

- PMC & EPCM Services for Dangote Refinery Project, Nigeria (Variation order no. 3)
- Consulting Services for the Development of a Detailed Feasibility Study on the construction of an Oil Refinery Plant with a Crude Oil Supply Pipeline Project for Ministry of Industry, Government of Mongolia

Financial Performance

The turnover and profit before tax of the company for FY 2017-18 (up to September 2017) was ₹804 crore and ₹301 crore respectively. The details of the financial performance of the company for 2017-18 (up to September, 2017) are attached in Annexure-I and Annexure - II.

Policy Initiatives Undertaken (up to November, 2017)

The significant policy initiatives taken during the current financial year include the following:

(i) HR Development

Besides, the various ongoing HR interventions, measures, the following initiatives were pursued:

- Organised Trainings are conducted for domestic and international clients in specialised Domain areas which generates revenue for the Company.
- Vocational trainings provided to students in Technical and Professional streams.
- Creating a Learning Culture through regular Knowledge Sharing Sessions
- Revisit & Review of HR policies to bring in better employee engagement
- HR Audit has been undertaken during the year

(ii) Technology & Sustainable Development:

Technology development projects initiated

- Study of cross flow reactor hydrodynamics through CFD (computational fluid dynamics) modeling.
- Technology development for amine purification by removing Heat Stable Salts
- Radio tracer studies with porous spherical alumina type of catalyst to characterize hydrodynamics of improved three phase reactor configuration for hydro processing applications.
- Minimum fluidization velocity studies in 2-Dimensional cold flow set up.

- Framework and development of databank for Indian coal characterization
- Opportunity exploration for production of Dimethyl ether (DME) from Methanol including reactor design
- Development of methodology for Energy Optimization in petrochemicals sector.
- Development of de-Foaming Cyclonic Device for liquid-gas separation.
- Assessment and approval of projects under Startup India Initiative

(iii) Technology commercialization efforts made

- Grass root design of Tail Gas Treating Unit (TGTU) for MRPL completed.
- Commissioning of TGTU – HPCL Mumbai Refinery licensed by EIL.
- Commissioning of two SRUs (2 x 340TPD) of BPCL Kochi Refinery successfully completed.
- Commissioning of one out of two TGTUs of BPCL Mumbai Refinery licensed by EIL.
- Go ahead letter secured from IOCL for implementation of indDSK unit at IOCL- Gujarat developed jointly with IOCL (R&D).
- Awarded Job of Licensor selection and Detailed Feasibility Report for 2G Ethanol for MRPL, Mangalore. Subsequently, feasibility report have been prepared and sent to MRPL.
- Awarded Job of Licensor selection and Detailed Feasibility Report for 2G Ethanol at Maharashtra location for BPCL.
- Energy Efficiency Improvement Studies for 15 PSU Refineries is in progress.

(iv) R&D activities likely to be further initiated in 2017-18:

- Installation of above Ground Sulfur Seal for technology demonstration at NRL.
- Development of high level Oxygen Enrichment Technology for capacity enhancement of SRU (> 35%).
- Development of amine purification process for an Indian refinery.
- Design of Kero HDS (hydro de-sulfurization) unit of IOCL Gujarat
- Technology development for the production of DME (dimethyl ether) from methanol.

(v) Initiatives to be taken for strengthening technology tie ups

- Renewal of membership of Process Science Technology Center (PSTC), an industry-academia collaborative research program initiated by University of Texas, USA for year 2017-18
- Renewal of membership of Fractionation Research Incorporated (FRI), a non-profit cooperative research organization based at Oklahoma, USA for year 2017-18
- Renewal of membership of Process Integration Research Consortium (PIRC) of University of Manchester UK for year 2017-18

(vi) Patents filed/granted

- Four patents are in the process of filing

- The following Patent filed earlier was granted this year: Patent No. 283193 dated 09/05/2017: "a novel method for recovery of ethane / propane and liquefied petroleum gas from LNG" (SA / RKG)

14.3 Miniratna Category – I CPSES

14.3.1 Balmer Lawrie & Company Limited

Balmer Lawrie & Co. Limited (BL) is a multi technology, multi locational Company headquartered at Kolkata with operations spread through India. The company has significant transnational business interest with a joint venture in Dubai, Indonesia and subsidiary in UK. The Company also has several joint ventures in India.

The Company's business interest spans both Manufacturing and Services. The Company achieved a Gross Turnover of ₹2894.95 crores (inclusive of excise duty) during 2015-16 and Profit Before Tax of ₹234.54 crores. The Reserve & Surplus of the Company increased to ₹1037.76 crores as on 31.03.2016 compared to ₹874.56 crores as on 31.03.2015.

The major activities of the Company have been classified into Strategic Business units with fair autonomy in running of each business unit. The business units are shown as under classifying them under manufacturing and services :-

I. MANUFACTURING

(a) Industrial Packaging

(b) Greases & Lubes

(c) Performance Chemicals

II. SERVICE

(a) Logistics Infrastructure

(b) Tours & Travel

(c) Logistics Services

III. RESEARCH & DEVELOPMENT

(a) Technology Product Development, Kolkata

(b) Applications research Laboratory, Kolkata

(c) Product Development Centre, Chennai

The company also operates a wholly owned subsidiary in UK and vide joint ventures, two of which are outside the Country (one in UAE and the other one in Indonesia) and the rest are in India.

CSR activities undertaken by BL :-

- Education.
- Health.
- Drinking Water & Sanitation.
- Skill Development.

- Skill Development.

14.3.2. Chennai Petroleum Corporation Limited

1.0 Introduction

Chennai Petroleum Corporation Limited (CPCL), formerly known as Madras Refineries Limited (MRL) was formed as a joint venture in 1965 between the Government of India (GOI), AMOCO and National Iranian Oil Company (NIOC) having a shareholding in the ratio 74% : 13% : 13% respectively.

From time to time, the shareholding of CPCL has changed. In 2001, the GoI transferred its entire shareholding in CPCL to IndianOil. Subsequently Chennai Petroleum Corporation Ltd. (CPCL) became a subsidiary of Indianoil Corporation Ltd. (IndianOil) and consequently a Government Company. In July 2003, NIOC transferred their entire shareholding to Naftiran Intertrade Company Limited (NICO), its 100% subsidiary. Currently IOC holds 51.89%, while NICO holds 15.40%; the Financial Institutions, Public etc. hold the balance.

CPCL has two refineries with a combined refining capacity of 11.5 MMTPA. The Manali Refinery has a capacity of 10.5 MMTPA and is one of the complex refineries in the country with Fuel, Lube, Wax and Petrochemical feedstocks production facilities. CPCL's second refinery is located in Nagapattinam at Cauvery Basin (CBR). This unit was set up with a capacity of 0.5 MMTPA in 1993 which was later enhanced to 1.0 MMTPA.

CPCL has a Wax Plant of 30,000 tonnes capacity per annum, to produce paraffin wax for manufacture of candle wax, waterproof formulations and match wax. A Propylene Plant was commissioned in 1988 with an initial capacity of 17000 tones per annum to supply petrochemical feedstock to neighbouring downstream industries. The unit was revamped to enhance the propylene production capacity to 30,000 tonnes per annum in 2004.

The main products of the Company are LPG, Motor Spirit, Superior Kerosene, Aviation Turbine Fuel, High Speed Diesel, Naphtha, Bitumen, Lube Base Stocks, Paraffin Wax, Fuel Oil, Hexane and Petrochemical feed stocks. CPCL also supplies Linear Alkyl Benzene Feedstock (LABFS) to a downstream unit for manufacture of Linear Alkyl Benzene.

2.0 Performance

2.1 Physical Performance

The company processed 10256 Thousand Metric Tonnes (TMT) of crude oil in the year 2016-17 and processed 7031 TMT of crude oil for the period Apr'17 to Nov'17.

Parameter	2016-17 Actuals	2017-18 (upto Nov'17)
Crude Thruput in MMT	10.26	7.031
Total Distillate%	72.6	72.7

CPCL achieved the highest ever Total Distillates of 72.6% in 2016-17.

The Energy Intensity Index (EII) was 101.3 in 2016-17 as against the earlier best of 101.9 in 2014-15. Furthermore, CPCL also achieved highest ever MS production of 1105 TMT in 2016-17 as

compared to the earlier best of 1050 TMT in 2014-15.

2.2 Financial Performance

During the year 2016-17, CPCL achieved a turnover of ₹40585.90 Crores (Standalone Financial Statements). The turnover upto September 2017 during the financial year 2017-18 is ₹20136.83 Crores.

The details of financial performance are given below:

₹in Cr.

Parameter	2016-17 Actuals	2017-18 (upto Sept'17)
Turnover	40585.90	20136.83
Profit Before Tax	1365.05	563.02
Profit After Tax	1029.75	348.57

CPCL paid the highest ever dividend of 210% for the year 2016-17.

3.0 Projects

3.1 Upgradation Project

Residue Upgradation project, with a view to improve the distillate yield of Manali refinery, at an estimated cost of ₹3110.36 Crores (+10%) is under implementation. The Once-through HCU revamp was commissioned during Mar 17. The DCU was commissioned on 29.11.2017. The remaining units will be commissioned in a phased manner. The first batch of Petcoke was produced on 2.12.17.

3.2 New Crude Oil Pipeline (42" size)

A new Crude Oil Pipeline Project at an estimated cost ₹257.87 Cr with enhanced safety features to ensure reliable and faster crude transfer from Chennai Port to Manali Refinery is under implementation. The Pipeline laying jobs inside Chennai Port Trust and inside CPCL Refinery was completed. About 4.5 KM out of 12.3 KM of pipeline laying in public area completed. The overall physical progress achieved is 76%. The project is expected to be completed in the fourth quarter of 2017-18.

3.3 Auto Fuel BS –IV Quality Improvement Project:

CPCL is revamping the existing DHDS unit at Manali refinery, at an estimated cost of ₹367.11 Cr with capacity increase from 1.80 MMTPA to 2.34 MMTPA and to meet BS-IV Diesel demand of the state. The project is mechanically completed and commissioning activities are in progress.

3.4 Auto Fuel BS – V / BS – VI Quality Improvement Project:

In order to meet the BS-VI quality specifications of MS, CPCL is setting up new units like FCC GDS, Sulphur Recovery Unit with associated Utilities and Offsites facilities at Manali Refinery. Order for majority of equipment, pilling works, civil works & structural works have been awarded. It is also proposed to revamp the existing DHDT unit to meet the BS-VI Auto Fuel quality requirements for HSD. The estimated cost of the project is ₹1858 Cr. The project is expected to be completed in

2019-20.

3.5 Re-Gasified Liquefied Natural Gas (RLNG):

Usage of RLNG as Feed & Fuel in Hydrogen Reformers in place of Naphtha, Fuel in place of Naphtha in Gas Turbines and in place Fuel Oil in Process Heaters and Utilities Boilers is under implementation at an estimated cost ₹421 Cr. Project Management Consultant has been finalised. The project is scheduled to be completed in a phased manner starting from third quarter of 2018-19.

RLNG would be supplied by IOCL from their upcoming RLNG Terminal at Ennore to Manali Refinery.

3.6 Refinery Expansion Project at CBR

Pre-feasibility for a new 9 MMTPA Refinery Expansion Project at CBR was carried out through M/s Engineers India Limited. The project has been approved in-principle and DFR is under preparation. The estimated cost of the project is ₹27000 Crore ± 30% and is anticipated to be completed by 2022.

4.0 Corporate Social Responsibility & Sustainable Development

The Company has an approved Corporate Social Responsibility Policy and CPCL plays the role of a responsible corporate citizen while discharging its social obligations. The CSR & SD activities focuses on health, education, women empowerment, Swachh Bharat activities, infrastructure development etc for ensuring sustainable development of the society to which it belongs.

Even though the company was not required to spend any amount on CSR in view of losses during proceeding 3 financial years, a sum of ₹187.51 lakhs was spent during the year 2016-17 for various CSR initiatives. An amount of ₹912 lakhs has been allocated during 2017-18 for taking up various CSR&SD activities. CPCL has spent an amount of ₹498.50 lakhs towards various CSR activities upto Nov'17. Major areas of CSR activities carried out during the year 2017-18 are Health, Education, Women Development, Swachh Bharat, Divayangjans rehabilitation etc.:

14.3.3 Mangalore Refinery & Petrochemical Limited

Introduction

Mangalore Refinery and Petrochemicals Limited (MRPL) is a "Schedule –A" CPSE and a subsidiary of Oil and Natural Gas Corporation Limited (ONGC).

The present capacity of the Refinery is 15 MMTPA. MRPL achieved the highest ever crude throughput of 16.27 MMT during the year 2016-17 against 15.69 MMT during the previous year 2015-16 registering an increase of 3.69%. MRPL earned a Profit After Tax (PAT) of ₹3644 Crore during the financial year 2016-17 against profit of ₹1147 crore earned during the financial year 2015.16. Company has declared dividend of ₹6/- per equity share of ₹10/- each for 2016-17 totalling to ₹1051.56 Crore.

The Refinery has a versatile design with high flexibility to process Crude with 24 to 46 API gravity and has high degree of Automation. MRPL is the only Refinery in India to have 2 Hydrocrackers producing Premium Diesel (High Cetane) and to have 2 CCRs producing Unleaded Petrol of High Octane.

MRPL continues to expand its market spread in the direct sales segment of petroleum products in the state of Karnataka and its adjoining states. The Company has already achieved dominant market share for its MANGPOL branded Polypropylene in its marketing zone in a very short time. The Company also continues to maintain leadership position for sales of Bitumen, Sulphur, Pet

Coke and Xylol in its marketing zone. The Company continues to expand its Polymer product range with new grades and has also expanded its market reach. The Company has also succeeded in marketing the entire production Pet Coke on consistent basis with a sales volume of 838 TMT in 2016-17. The Company has commenced the retail expansion plan by releasing the advertisement for appointment of dealers for retail outlets in the state of Karnataka & Kerala and is in the process of expanding its retail network in its refinery zone.

MRPL dispatched first parcel of HSD – Euro-VI to HPCL during the month of October, 2016.

MRPL holds 51% of the equity share of the ONGC Mangalore Petrochemicals Limited (OMPL). OMPL has setup an Aromatic Complex with an annual capacity 914 KPTA of Para Xylene and 283 KPTA of Benzene in Mangalore Special Economic Zone.

Financial Performance Highlights

PERIOD		FY 2014-15	FY 2015-16	FY 2016-17	HY 2017-18 *
THRUPUT	(MMT)	14.65	15.53	16.27	7.51
TURNOVER (Gross)	₹ CRORE	62,412	50,864	59,415	26,905
EBITA	₹ CRORE	-1250	2464	6726	1572
PBT	₹ CRORE	-2156	1174	5531	1022
PAT	₹ CRORE	-1712	1148	3644	712
GRM	$/BBL	-0.64	5.20	7.75	6.30

* Un-audited half yearly result 2017-18.

Projects:

Existing Projects:

BS VI Up gradation

As per Auto Fuel Policy and directives for MoP&NG, the entire country has to move towards BS VI quality specifications for MS and HSD by 1st April 2020. Products from the Refineries have to meet BSVI quality specifications from 1st January 2020. Further MoP&NG has directed the refineries to complete necessary modifications and construction activities and attain mechanical completion by July19 and roll out the products to Oil marketing companies from 1st January 2020. MRPL requires additional units for MS and Revamp/Catalyst changes for HSD. As part of this project, new FCC Gasoline Treatment Facility, Sulphur Recovery Unit, Nitrogen and Utilities and Revamps of CHTU and DHDT is being carried out.

Axens, EIL, UOP are the licensors for the various units and EIL have been appointed as EPCM Consultant for the job. The Environment Clearance for the project was recommended by the EAC on 18/04/2017.

Engineering of these units are in advanced stages and tendering for material and works have commenced.

CCR2 Unit Revamp

MRPL currently has two numbers of NHT/ Plat former Unit. Both the units are of identical capacity and licensed by M/s UOP. The feedstock to the unit is heavy naphtha from crude distillation units and

Hydrocracker units. The objective of the unit is to upgrade the low octane heavy naphtha to High octane reformate. The existing CCR-2 unit is being revamped to produce higher quantity of Reformate, yielding higher quantity of MS.

UOP are the Licensor and M/s L&T, Chiyoda are appointed as EPCM consultant for the project.

The ordering works are in progress and the revamped unit is expected to get commissioned in 2018-19.

Railway Siding for Pet Coke

Dispatches by Railway Wagons will improve safety in transportation, reduced environmental pollution, Make MRPL products conveniently available in competitive markets and improve commercial realisation to MRPL. Construction of state of the art Railway siding for smooth evacuation of Petcoke with M/s Konkan Railway is being carried out. The Railway siding will be executed by M/s Konkan Railway Corporation Ltd and M/s Mecon have been appointed as the EPCM consultant to execute the balance of plant of the Project consisting of Closed conveyor system, Loading silos with Rapid Loading Systems, Measuring devices, Pollution control facilities etc.

The project is under execution and Engineering has been completed. Tendering is in progress and the project is expected to complete in December 2018.

Future Projects:

2G Ethanol

MRPL has been mandated by the Ministry of Petroleum and Natural Gas (MoP&NG), to set up a 2G ethanol plant in Karnataka State. 2nd generation bio-fuels or "Advance Bio-fuels" are produced from sustainable feedstock which are not in competent for fodder (viz. Surplus Rice straw, Wheat straw, Maize cobs, Maize stalk, Bagasse, Cotton stalk, etc.).

Based on the Biomass feedstock assessment study, MRPL is planning to set-up a 2G ethanol plant with a capacity of 60 KLPD. The Prefeasibility study of the project has been completed. As the next course of action, MRPL is planning to take up the detailed feasibility study.

The benefits from the advance bio-fuels will be,

- Ethanol is blended with petrol as a part of ethanol blending program from the Government, this will help in reducing the oil import bill of the country.
- Reduction in CO2 and CO emissions, thereby reducing the greenhouse gas emissions.
- Additional source of income to the farmers.

Power from open source:

MRPL is planning to meet all its future requirements through purchase of power through open access. A feasibility study was conducted by M/s PTC India Ltd. Basis this feasibility, a route survey and cost estimation for new facility to access power at 220kv level is under progress. This project is expected to complete in FY2019-20.

Desalination Plant:

To mitigate the risk of river water as a single source of water, an alternate source of water is being planned through the installation of desalination plant. The Project has obtained permission from the Government of Karnataka. Feasibility studies along with studies for Environment Impact Assessment etc., is being done.

The project is expected to be commissioned in FY 2019-20.

Skill Development Centre

As a part of National Skill Development Mission of the Government of India, MRPL has set up "MRPL Kaushal Vikas Kendra" (MRPL KVK) on 12th Feb, 2017. The first batch of 60 candidates of MRPL KVK is undergoing skill development training in "CNC Operator-Turning" and "Industrial Electrician" course at Nettur Technical Training Foundation (NTTF), Bangalore.

Conservation of Energy

Major Energy Conservation measures taken during the year are-

- Routing of Hot Diesel from phase1 crude distillation (CDU1) unit to Gas Oil Hydro-De-Sulphurising (GOHDS) unit, for additional waste heat recovery.
- Slop reduction by routing of DCU blow down bottom to drum quench & reducing blow overhead.
- Phase 1/2 non process plant area (buildings, street, control room, Offsites & township - total 7575 nos) lighting has been replaced with LED. Similarly, a process unit (Merox units- 250 nos) lighting has been replaced with flame proof LED lighting, on a trial basis. In the new CISF town-ship LED lightings (380 nos) have been installed for general lighting.
- Impeller Trimming of CPP-3 HP BFW Pump

The measures above resulted in Energy consumption reduction by 3345 SRFT/Year, equivalent to a net saving of ₹ 659 Lakhs/year, with an investment of `98 Lakhs.

NRL Team led by MD Mr. P. Padmanabhan receiving CHT award from Shri Dharmendra Pradhan, Minister P&NG at the 21st Refinery Technology Meet at Vizag in Apr'17

Major Energy conservation measures being implemented/ under consideration for reduction of consumption of energy

- Flare Gas Recovery for Phase-3 Complex
- Implementation of Diesel Pump around in Hydrocracker - 1&2 Recycle Splitter Column
- Heat recovery from Hydrocracker-1/2 Unconverted Oil by Cold DM Water
- Crude Distillation Unit-3 Crude Charge pump VSD installation
- Routing of Amine Regeneration Unit-3 Flash drum off gas to incinerator for recovering heat of combustion.

14.3.4 Numaligarh Refinery Limited

Introduction

Numaligarh Refinery Limited (NRL) was incorporated on 22nd April, 1993. NRL's establishment is rooted in the "Assam Accord" signed by the Government of India on 15th August, 1985. NRL is a subsidiary of Bharat Petroleum Corporation Limited (BPCL) and operates a 3.0 MMTPA petroleum refinery at Numaligarh in Golaghat district of Assam. NRL is a Category-I Miniratna PSU. The Company's net worth as on 31.03.2017 was ₹5,181 crores.

NRL's refinery has a high complexity factor owing to advanced secondary processing technologies that has enabled achievement of high distillate yield. Product slate of NRL comprises LPG, Naphtha, Motor Spirit (MS), Aviation Turbine Fuel (ATF), Superior Kerosene Oil(SKO), Mineral Turpentine Oil (MTO),High Speed Diesel(HSD), Raw/Calcined Petroleum Coke (RPC/CPC), Sulphur and Paraffin Wax.

NRL has an LPG Bottling Plant of 10 TMTPA capacity at Numaligarh. The company has two marketing terminals – one at Numaligarh, Assam and the other at Siliguri, Bengal from where products are despatched by road and rail Additional White Oil products, viz. MS, SKO and HSD are also transported from Numaligarh to Siliguri through the Numaligarh-Siliguri product pipeline (NSPL) owned and operated by Oil India Limited.

Performance

NRL has been operating with sustained profitability every year. NRL has succeeded in achieving highest Distillate Yield among all PSU oil refineries in the Country. NRL's Specific Energy Consumption (SEC) and Gross Refining Margin (GRM) are among the best in the Industry.

Physical and financial performance indicators of NRL during last three years and Apr-Nov'17 of the current financial year are as follows:

Physical Performance:

Parameter	14-15	15-16	16-17	17-18 (Apr-Nov)
Crude Receipt (TMT)	2,766	2,478	2,751	1,886
Crude Throughput (TMT)	2,777	2,520	2,683	1,894

Capacity Utilisation (%)	92.6	84.0	89.4	94.7
Distillate Yield (%)	90.69	90.42	86.5	85.89
Specific Energy Consumption (MBN)*	71.6	70.4	72.3	66.05
Energy Intensity Index (EII)	97.2	96.5	95.2	88.06

Financial Performance:

Parameter	[illegible]	15-16	16-17	17-18 Apr-Nov (Provisional)
Sales Turnover (₹/Crs)	10,823	11,923	13,945	10,037
PBT (₹/Crs)	1,134	1,883	3,148	1,887
PAT (₹/Crs)	718	1,222	2,101	1,229
GRM ($/bbl)	9.46	8.06	8.50	9.57
Net Worth	3,355	4279	5,181	

Projects

Projects under Implementation

a) Diesel Hydrotreater Unit (DHT):

In order to comply with the Auto Fuel Vision Policy, NRL is installing a Diesel Hydrotreater (DHT) of 0.7 MMTPA capacities for production of BS-IV/VI grade HSD at 100% capacity utilization of the refinery. Overall progress of the project as on 30.11.2017 reached 91.2% and 54 milestones were achieved as scheduled against total of 61 milestones for the project. Cumulative expenditure in this project up to 30.11.2017 was ₹451.30 crores with total financial commitment of ₹800.00 crores. The project is targeted to be completed by January 2018.

b) Mounded Bullet Project:

The LPG storage facility is being modernised from existing Horton Spheres to Mounded Bullet. Mounded storage of LPG is considered safer compared to over ground storage vessels as it provides intrinsically passive and safe environment and reduces the Boiling Liquid Expanding Vapour Explosion (BLEVE) scenario to a great extent. The project is being implemented at an approved cost of ₹122.10 crores. As on 30.11.2017, overall progress against the project has reached 76.3% and cumulative expenditure was ₹75.86 crores with total financial commitment of ₹121.53 crores. The project is targeted to be completed by May 2018.

Projects in Pipeline

a) Refinery Expansion from 3 to 9 MMTPA:

NRL is pursuing a project of expanding its refining capacity from 3.0 to 9.0 MMTPA, sourcing incremental crude oil through imports. Imported crude oil is envisaged to be transported through a new pipeline from Odisha port to Numaligarh. Feasibility studies for the project have been completed. The expansion proposal

has been approved by both the Boards of NRL and its holding company BPCL. The proposal is under active consideration of Central Government. The estimated cost of refinery expansion project along with laying of crude pipeline is ₹21,842 crores. Implementation of the NRL's refinery expansion project would be the single largest industrial investment in the North East region.

b) Bio-refinery project:

NRL is pursuing a proposal to set up a Bio-refinery for production of 49 TMT of fuel grade bio-ethanol per annum from bamboo in line with the National Ethanol Blending program. The estimated project cost is ₹950 crores. DFR for the project has been completed and in-principle approval has been obtained from the Board of NRL for setting up the plant by way of a joint venture (JV) company with 50:50 equity partnerships with M/s Chempolis Oy of Finland, who will be the technology provider. Environment Clearance for the project has been obtained in November 2017. The JV agreement is expected to be signed shortly.

To ensure adequate feed stock supply for the proposed Bio-refinery, Memorandum of Understandings has been signed with Arunachal Pradesh Bamboo Resources Development Agency (APBRDA), Nagaland Bamboo Development Agency (NBDA) and Govt. of Manipur for sourcing of bamboo.

c) Indo-Bangla Pipe line:

NRL has initiated a proposal to construct a product pipeline from NRL's terminal at Siliguri to Parbatipur in Bangladesh. NRL and Bangladesh Petroleum Corporation (BPC) has entered into a Sale/Purchase Agreement for operation of 1 MMTPA capacity Indo-Bngladesh Friendship pipeline(IBFPL) from NRL's Siliguri Marketing Terminal in India to Parbatipur in Bangladesh. The project is under Ministerial consultation between the two countries and the MOU between two Govts is being finalised by MEA. Product for export to Bangladesh on a sustained basis will be available after expansion of Numaligarh Refinery from 3 to 9 MMTPA. The proposal to the Committee for Non Plan Expenditure (CNE) for the grant from Govt. of India to Fund the Bangladesh portion of the pipeline project has been initiated by MEA. The kick off meeting to launch the IBFPL is expected to be held as soon as funding by MEA is approved.

Policy Initiatives Undertaken by NRL

NRL has undertaken several policy initiatives for growth and sustenance of the Company. Such initiatives comprise expansion of the refinery upto 9.0 MMTPA, sustained product export to neighbouring countries, particularly Bangladesh and Nepal, establishment of a Bio Refinery.

Conservation of Petroleum Products

NRL's Specific Energy Consumption is among the best in the Industry. NRL has implemented specific schemes such as Advance Process Control system for remaining process units to optimise process parameters and improving operating efficiency and reducing loss of petroleum products. Various measures are being persistently adopted for conservation of petroleum products. Some such measures comprise-

- Up-rating of GTG-2 to improve the heat rate and reduce the fuel consumption.
- Electrical system drive audit for efficiency improvement study for all motors.
- Identification of potential areas for use of Solar Power and implementation. A project of producing 1 MWp solar power is being planned to be installed in the refinery.
- Plate type exchanger replacing glass air pre-heater in APH section of CDU/VDU heater for better heat transfer.
- H2 recovery from (VV-13) sour off-gas by diverting to PSA instead of putting in FG header post H2S stripping in SRU. Feasibility study initiated.

NRL's Contribution to Development of the North East Region

NRL was established by the Government under provisions of the "Assam Accord" with the objective of providing the required thrust for socio-economic development of the North East region. Over the years, the company has been able to sustain stakeholders' expectations and is today the biggest operating industrial unit in the Region. Contribution of NRL for development of the North East regions is broadly summarised below.

Investment in Value Added Projects

NRL's refinery project was implemented within the approved project cost of ₹2,724 crores. Since commissioning of the refinery, NRL has been implementing several value added projects for ensuring sustenance and growth. All such projects are within the North East region, barring establishment of a marketing terminal at Siliguri at the North East border. NRL's total investment on such projects is in the range of ₹3,100 crores as per details below:

Sl	Project	Investment (₹ in crore)	Remark
1	LPG Bottling Plant of 10 TMTPA capacity	6	Commissioned in 2002-03
2	Coke Calcination Unit	90	Commissioned in 2004-05
3	Motor Spirit Plant of 225 TMTPA capacity	297	Commissioned in 2006-07
4	Siliguri Marketing Terminal	186	Commissioned in 2008-09 as linked project to the Numaligarh-Siliguri Product Pipeline of Oil India Limited
5	Diesel Quality Upgradation Project	435	Commissioned in 2010-11 for production of BS-III HSD at 100% capacity utilization
6	Naphtha Splitter Unit	87	Commissioned in 2013-14 for production upto 160 TMTPA Petrochemical Grade Naphtha
7	Wax Project	676	Commissioned in Mar'15. NRL has emerged as the largest Wax producing unit in the Country with production upto 50 TMTPA Wax
8	Investment in joint venture: Assam Gas Cracker project	127	10% equity participation at Brahmaputra Cracker and Polymer Limited
9	Investment in joint venture: Natural gas pipeline from Duliajan to Numaligarh	43	26% equity participation at DNP Limited.

Sl	Project	Investment (₹ in crore)	Remark
10	Diesel Hydrotreater Unit (DHT)	1,031	Under implementation
11	Mounded Bullet Project	122	Under implementation
Total		3,100	

Contribution to Exchequer

Since start of commercial operations, NRL has contributed over ₹2,390 crores (Upto Nov'17) to the exchequer of the Assam Government apart from contribution to the other State Governments and the Central Government.

Showcase of Industrial Success

Over the years, NRL has emerged as the showcase of industrial success, in the North East, thereby acting as an enabler for drawing in further investments into the region.

14.3.5 ONGC Videsh Ltd. (OVL)

ONGC Videsh, is the wholly owned subsidiary and overseas arm of ONGC, the flagship national oil company of India. The primary business of ONGC Videsh is to prospect for oil and gas acreages outside India, including exploration, development and production of oil and gas. ONGC Videsh produced about 23.4% of oil and 18.9% of oil and natural gas of India's domestic production in 2016-17. In terms of reserves and production, ONGC Videsh is the second largest petroleum Company of India, next only to its parent ONGC.

ONGC Videsh presently has participation in 39 E&P projects in 18 countries namely Azerbaijan (2 projects), Vietnam (2 projects),Russia (3 projects), Sudan (2 projects) andSouth Sudan (2 projects), Iran (1 project),Iraq (1 project), Libya (1 project), Myanmar(4 projects), Syria (2 projects), Bangladesh(2 projects), Brazil (2 projects), Mozambique(1projects), Colombia (8 projects), Venezuela(2 projects), Kazakhstan (1 project), NewZealand (1 project) and Namibia (2 projects). OVL is further actively seekingmore opportunities across the world.

Currently, ONGC Videsh has oil and gas production from 14 Assets, 4 Assets where hydrocarbons have been discovered and are at various stages of development, 17 Assets are under Exploration and 4 projects are pipeline projects. Through geographical spread of overseas investment, ONGC Videsh has enhanced its annual equity production to the level of 12.8 MMToE during 2016-17 and is expected to produce more than 14 MMToE during 2017-18.

14.3.6 Bharat PetroResources Limited (BPRL)

Bharat PetroResources Limited (BPRL)is a wholly owned subsidiary and Exploration and Production (E&P) arm of Bharat Petroleum Corporation Limited (BPCL).Over the years, BPRL has built up a portfolio of assets that are presently in various stages of exploration/appraisal/pre-development/ production.

Presently, BPRL has participating interest (PI) in 22 blocks spread across 6 countries along with equity stake in 2 Russian entities holding the license to 4 producing assets. Of the 22 blocks, 12 blocks are in India, 6 in Brazil, and 1 each in Mozambique, Australia, Indonesia and East Timor. Consortia, of which BPRL is a part, have made a total of 25 exploration discoveries in 5 countries,

including world class discoveries in Mozambique and Brazil.

14.4 Other CPSEs

14.4.1 Biecco Lawrie Limited

Biecco Lawrie Limited (BLL), under the administrative control of the Ministry of Petroleum & Natural Gas (MoP&NG), was established in 1919 and became a Government Company in 1972. This is a medium sized Engineering Unit with diversified activities having two factories located at Kolkata.

BLL is a loss making Public Sector Unit under the administrative control of Ministry of Petroleum and Natural Gas, Government of India. The President of India directly holds 32.23% of the Company's shares while Oil Industry Development Board (OIDB) owns 67.33%.

BLL is making losses for the last several years. The accumulated losses have become more than the equity and the net worth has become negative. Hence, the company is registered in Board for Industrial and Financial Reconstruction (BIFR) under Sick Industrial Companies Act.

The major operations of the Company are as under:-

(i) Switchgear & Spare Parts

(ii) Electrical Repairs

(iii) Projects

(iv) Lube Oil Blending & Filling

14.4.2 Balmer Lawrie Investments Limited

Government of India, in view of its planned deregulation of oil and globalization of the economy, decided to disinvest 33.58%, of its total equity holding of 59.58%, in IBP Company Limited (IBP) to a strategic partner with management control. Consequently, the shareholding of IBP, in its erstwhile subsidiary Balmer Lawrie & Company Limited (BL), was de-merged in favour of Balmer Lawrie Investments Limited (BLIL), which was incorporated on 20th September 2001 under the Companies Act, 1956. The President of India holds 59.67%, of its total paid up equity capital. BLIL is under the administrative control of Ministry of Petroleum & Natural Gas having its Registered office at Kolkata.

BLIL is a non-banking financial Company as defined under section 45-I(f) of the Reserve Bank of India Act, 1934. BLIL does not carry on any business except to hold 1,00,64,700, equity shares of ₹10/- each of BL.

14.5 Other Organisations

14.5.1 Oil Industry Development Board (OIDB)

The Oil Industry Development Board was established on 13th January, 1975 under the Oil Industry (Development) Act, 1974 to provide financial and other assistance for development of Oil Industry. The functions of the Board, as defined in Section 6 of the Act, involve rendering financial assistance including loans and grants to the promotion of all such activities as are, in its opinion, conducive to the development of the Oil Industry.

Organisational Setup

Oil Industry Development Board comprises of Secretary, MOP&NG as Chairman and other members namely Secretary, Department of Chemical and Petrochemical, Additional Secretary and Financial

Adviser, MOPNG, Additional Secretary, Department of Expenditure, Joint Secretary (Exploration), MoPNG, Chairman IOCL, ONGC, GAIL, BPCL and HPCL, Director General of Hydrocarbons, Director(R&D) IOCL and Secretary, OIDB as Member Secretary.

Resources of the Board

The funds required for various activities as envisaged under the Act, are made available by the Central Government after due appropriation by Parliament from the proceeds of cess levied and collected on indigenous crude oil. So far OIDB has received an amount of ₹902.40 crore from the Central Govt. This amount together with internal receipts generated as interest income on loans given to various oil sector companies and short term investment of surplus funds has accumulated to ₹11,525 crore (provisional) as on 28th December 2017.

Deployment of Funds

During 2017-18 (upto 31st December 2017), OIDB has released grants to institutions viz. DGH, PCRA, CHT, OISD, PPAC and IOCL (for R&D activities) amounting to ₹2013.19 crore. Indian Strategic Petroleum Reserves Ltd. (ISRPL), a wholly owned subsidiary of OIDB has been entrusted with the construction of strategic storage for crude oil at three locations. During 2017-18 (upto 31st December 2017), an amount of ₹101.25 crore was released to ISPRL as advance against equity. Besides, an amount of ₹1.00 crore has also been released to Hydrocarbon Sector Skill Council (HSSC) for its corpus.

14.5.2 Oil Industry Safety Directorate (OISD)

Oil Industry Safety Directorate (OISD) is a technical directorate under the Ministry of Petroleum and Natural Gas and has been entrusted with the responsibility of formulating standards, overseeing its implementation through safety audits in petroleum industry to enhance safety levels and reduce risk inherent with this industry. OISD standards cover the entire activities pertaining to hydrocarbon sector i.e. exploration & production, refining, gas processing, storage, distribution, environment etc. which are implemented on self-regulatory basis by public sector oil companies.

Our goal is to enhance safety in Oil & Gas Installations in co-ordination with industry members both public and private sector.

The Safety Council

To ensure proper implementation of the various aspects of safety in the Oil & gas Industry in India, Government of India had set up a Safety Council at the apex under the administrative control of Ministry of Petroleum & Natural Gas. The Oil Industry Safety Directorate (OISD) assists the Safety Council, which is headed by Secretary, P&NG as Chairman and members represent the entire spectrum of stakeholders – PSU, Pvt. Sector & JVs – as well as relevant expert bodies. To review the safety performance, the Safety Council meets once a year.

The 34th Meeting of the Council was held on 14th September, 2017.

Key issues discussed & reviewed during the meeting are as under:

- Major activities undertaken in 2016-17 & Activity plan for 2017-18.
- Approval of eight numbers revised/amended OISD Standards/Guideline /Recommendatory practices.
- Analysis of OISD Safety Audits Compliance status (ESA/SSA).
- Analysis of Major Incidents in the Industry over the last three years.

Safety Audits by OISD (ESA/SSA)

OISD carries out periodic safety audits of all types of Oil & Gas installations to monitor their compliance with the OISD standards. OISD Safety Audit Performance for the year 2017 - 18 is as indicated below:

Actions	Unit	Plan	Actuals (as on 30.11.17ov 16)	Projection (Dec17 -Mar, 2018)	Total (2017-18)
Core Audits					
Refineries/Gas Processing plants/LNG Terminals (Including Construction Safety Audits)	Nos	17	06	11	17
Mktg. Installations	Nos	70	66	04	70
E&P Onshore Installations	Nos	50	51	0	51
E&P Offshore Installations	Nos	16	02	14	16
Cross Country Pipelines	Kms	7500	4227	3558	7815
Additional audits Pipelines Installations					
Central tank Farms	Nos	01	00	01	01
Jetty Pipelines for Hydrocarbon Transportation	Nos	01	00	01	01
Single Point Mooring (SPM) Installations	Nos	02	01	01	02

Pre-Commissioning Safety Audits (PCSA)

To ensure safe & productive capitalization thereby enabling uninterrupted distribution of petroleum products for the public at large, OISD carries out pre-commissioning safety audits of Greenfield projects across the Oil & Gas Industry. These audits are conducted where; green-field developments and also major additional facilities at existing locations are being done, to ensure ab initio compliance of these facilities to the OISD standards at the construction stage itself.

As on 30th November 2017, 22 nos. of such audits had been conducted on the request of the user Industry membe₹848 Kms of Pipeline covering eleven pipelines installations was also audited in this context.

Actions	Refinery & GPP	Cross-Country Pipelines	Marketing (POL+ LPG)
Pre-Commissioning Safety Audits (PCSA)	08	848	14

"Consent to Operate" for Offshore Installations

OISD, as the competent authority to oversee implementation of the Petroleum & Natural Gas (Safety in Offshore Operations) Rules, 2008 accords "consent to operate" to offshore installations including Drilling Rigs. 10 Well Head Platforms, 03 Drilling Rigs and 03 Single Point Mooring (SPM) Installations have been accorded "consent to operate" during the year 2017-18 (As on 30th November, 2017).

Technical Seminar / Conference / Workshops

Technical Seminars / Conferences / Workshops for the Oil industry are conducted by OISD to discuss the latest technological developments, sharing of incident experiences etc.

As of 06th December 2017, OISD has organised following workshops/seminars/conferences:

- Two day workshop on "Maintenance and Reliability of Equipment - a Tool for Enhancing Safety" at Indore on 15-16th June, 2017
- One day workshop for Auditors on "Audit of LPG Bottling Plant" at IOCL LPG Bottling Plant, Bhopal on 21st of Sep'2017.
- Two day Workshop on 'Asset Integrity & Safety in E&P Sector' at OISD Noida on 04th to 05Th December,2017.

World LPG Association (WLPGA) 2017 Asia LPG Summit

Sh. Ranjan Mehrotra, Director (MO) was invited to present paper on "Contribution of Oil Industry Safety Directorate in development of standards for Indian LPG industry" at WLPGA 2017 Asia LPG Summit on 6th Feb'2017.

Development of Safety Standards

OISD develops Standards / Guidelines / Recommended Practices for the oil and gas sector thru a participative process involving all the stakeholders (including the public at large), drawing inputs from international standards and adapting them to Indian conditions by leveraging the experience of the constituents. These standards cover inbuilt design safety, asset integrity and best operating practices in the field of production, processing, storage and transport of petroleum. OISD standards are reviewed periodically to ascertain needs of developing new standards, updating / amending existing standards to incorporate the latest technological developments as well as current experiences on the ground.

As on date, OISD has developed 120 technical safety standards for the Oil & Gas Industry. 09 of these standards are included in the statutory provisions of the Petroleum Rules, 2002, the Gas Cylinder Rules, 2016, the Static & Mobile Pressure Vessels (Unfired), Rules, 2016.

Further, 16 OISD standards (four of which are common to those included in other statutes as above), have also been included the recently notified the Oil Miners Regulations (OMR), 2017.

In this regard it may be pertinent to mention here that the Oil Mines Regulations, 1984 (Specific to E&P Sector Onshore) framed under provisions of The Mines Act, 1952, have been revised in August 2017. It may be pertinent to mention here that in the OMR 1984, no OISD standard was included.

During the year 2016-17, OISD has revised/ amended 08 Numbers of the existing standards. These standards, upon their approval in the 34th Safety Council Meeting held on 14th September, 2017, have been released for implementation by the Industry.

Incident Investigation & Analysis

OISD investigates as well as participates in investigation of major incidents (depending upon the severity/ damage) to analyze root cause of the incident. A databank of incidents of the oil industry is maintained and analyzed to assess trends, areas of concern and required corrective action. These are then disseminated to the industry through safety alerts, advisory notes, workshops, training programs, website links etc.

During 2017-18 (As on 30th November' 2017), 07 numbers of major incidents were investigated by OISD.

Other Major Activities

Development of Safety Standard for Liquefied Natural Gas (LNG) Bunkering

In view of the revised marine fuel specifications that will come in effect from year 2020, more and more ships are switching over to cleaner fuels and use of LNG as ship fuel. Therefore, Indian ports would have to be ready for LNG bunkering in near future. Similarly, with expected increase in Cargo movement through coastal shipping and using inland water transport, use of LNG as fuel in smaller ships, ferries, barges, OSV's, etc. is likely to grow on account of economic and environmental considerations in line with international trends.

With the above in view; and with an objective of ensuring the safety of the upcoming LNG Bunkering Terminals in the country, Ministry of Shipping, Government of India, in its right earnest, advised Oil Industry Safety Directorate to develop an OISD Standard for 'Safety for LNG Bunkering Facilities at Ports, for Large Ships, Coastal Shipping and Inland Water Transport (IWT) Terminals'.

'Draft 1' of the Standard as above, has been framed by the Functional Committee of experts constituted for the purpose by OISD. The standard is now under formulation as per the extant standardization process of OISD.

Implementation of MB Lal Committee Recommendations – Functionality checks enhanced for installed equipment

During the external safety audits of the Oil & Gas Installations, OISD has started laying more focus on the functionality checks of the critical firefighting equipment like HVLRMs, ROSOVs, RSFPS, MEFG etc. These state of the art firefighting equipment have been installed in the Industry as part of M B Lal Committee recommendations.

In this regard, a comprehensive check list for checking the performance of such equipment for any given installation has been developed and during audit of the installation detailed functionality checks of such fire critical equipment is ensured by OISD team.

Digitization of OISD documents.

The ongoing task of digitizing all the documents available at OISD has been completed. The digitized documents are being uploaded on cloud server (Meghdoot) of Govt. of India so as to ease access, store & recovery of information.

Further, weeding out hard copies of the documents as per the extant document retention policy of OISD is being carried out.

Cashless Transaction

OISD started Cashless Transaction since April '16 itself, and presently all financial transactions to employees/ vendors etc. are taking place through Banking System and Internet Banking (NEFT/ RTGS).

Optimization of Resources

Clubbing External Safety Audits with Surprise Safety Audits of nearby installations of OMCs resulted in increase in number of audits with same resource.

Swachh Bharat Pakhwada at OISD

As per the directive of MOP&NG, various activities related to Swachh Bharat Pakhwada were observed at OISD during 16th July to 31st July 2017. The major events like swachhta pledge by OISDians to keep their premises and surroundings clean, self-cleaning of their respective rooms by all the OISDians, collection and disposal of e-scrap, cleaning of entire premises by housekeeping staff speech competition on Swachata Abhiyan for the employees of OISD/ OIDB/ CHT & ISRPL etc. were organized during the Pakhwada.

Also, a joint tree plantation program was organized by OISD / OIDB / CHT / ISRPL outside the OIDB building. Plantation was followed by Walkathon to spread the awareness to the public on Swachata Abhiyan. Hoardings and banners on Swachata Abhiyan were displayed.

At the end of the programme on 31.07.2017, House-keeping employees were rewarded for their additional efforts during the fortnight for effective cleaning process in and around the premises of OIDB Building.

14.5.3 Directorate General of Hydrocarbons (DGH)

Directorate General of Hydrocarbons (DGH) was set up on 8th April, 1993 with an objective to promote sound management of the Indian petroleum and natural gas resources having a balanced regard for the environment, technological and economic aspects of the petroleum activity.

Role and Functions of DGH

- To review the exploration programmes of companies operating under Petroleum Exploration Licences granted under the Oilfields (Regulation and Development) Act, 1948 and the Petroleum and Natural Gas Rules, 1959 with a view to advising Government on the adequacy of these programmes.
- To evaluate the hydrocarbon reserves discovered and estimated by the operating companies.
- To advise the Government on the offering of acreages for exploration to companies as well as matters relating to relinquishment of acreage by companies.
- To review the development plans for commercial discoveries of hydrocarbon reserves proposed by the operating companies and advise Government on the adequacy of such plans and the exploitation rates proposed and matters relating thereto.
- To review and audit concurrently the management of petroleum reservoirs by operating companies and advise on any mid-course correction required to ensure sound reservoir management practices in line with the optimal exploitation of reserves and the conservation of petroleum resources.
- To regulate the preservation, upkeep and storage of data and samples pertaining to petroleum exploration, drilling, production of reservoirs etc. and to cause the preparation of data packages for acreage on offer to companies.
- Assist Govt. in Contract management functions.
- Exploration & Development of unconventional hydrocarbon resources like Gas Hydrate, Shale gas/oil and oil shale.
- All other matters incidental thereto and such other functions as may be assigned by Government from time to time.

DGH Achievements for the year 2017-18 upto December, 2017

DGH is monitoring the E&P activities & performance under Production Sharing Contracts (PSC), Revenue Sharing Contract and Coal Bed Methane (CBM) contracts regime. The brief achievements as a result of exploration development and production activities during 2017-18 upto December, 2017 in contractual regime are as under:

- One crude oil Discovery has been notified
- 444 LKM of 2D seismic Survey
- 131 SKM of 3D seismic Survey
- Drilling of 10 exploratory wells and 9 development wells have been completed
- Crude Oil Production: 7.537 MMT, Gas Production (including CBM): 4.839 BCM
- As on 01.04.2017, In-Place Hydrocarbon reserves of 2156 Million Metric Tonnes (MMT) of oil and oil equivalent of gas (O + OEG) has been established with estimated ultimate recovery of 938 MMT of O + OEG.

Other Related Activities

Following activities have been completed at DGH during 2017-18 upto December, 2017:

- 13 Field Development Plan (FDP) of 9 blocks/fields and 3 Revised Field Development Plan (RFDP) of two blocks have been approved.
- 6 Declaration of Commerciality (DOC) in 6 blocks have been examined by DGH and reviewed by the Management Committee.
- 9091 Essentiality Certificates of ₹15,550 crore value have been issued by DGH during the period April-December, 2017
- Notice Inviting Offer (NIO) and Model Revenue Sharing Contract (MRSC) of Hydrocarbon Exploration and Licensing Policy(HELP) preparedMethodology adopted for award of blocks under Open Acreage Licensing Policy (OALP) finalized
- Methodology adopted for award of blocks under Open Acreage Licensing Policy (OALP) finalized
- Web based application for submission of Expression of Interest against blocks under Open Acreage Licensing Policy launched
- E-bidding portal for HELP round finalized and launched
- An online PEL/PML Data Management System for submission of quarterly data related to PEL/PML by NOCs has been developed and currently under implementation
- DSF Interactive Portal for managing DSF contract data for DSF Blocks launched
- Web-based application to file application on-line for issuance of indigenous purchase certificate launched
- Web based application to collate details of remittance/payment made (towards Non-Tax Revenue) to Pay & Account office of MOP&NG/State Government for petroleum operation under the preview of DGH launched

1. **Implementation of National Seismic Programme-2D Seismic Survey in yet to be appraised onland Sedimentary Basinal Areas of India**

Out of total sedimentary area of 3.142 Million Sq. Km, an area of 1.502 Million Sq. Km is yet to be appraised. To appraise these areas, MoP&NG has formulated a plan to conduct 2D seismic surveys in all sedimentary basins of India where no/scanty data is available. ONGC and OIL have been entrusted with the task of surveying the yet to be appraised areas. OIL has been assigned to carry out 2D seismic API of 7408 LKM falling in North eastern part of India covering states of Assam, Arunachal Pradesh, Nagaland, Manipur, Tripura and Mizoram and ONGC has been assigned to carry out 2D seismic API of approx. 40835 LKM in onland part of 22 sedimentary basins of India viz; Cambay, Kutch, Saurashtra, Rajasthan, Pranhita-Godavari, Krishna-Godavari, Cuddapah, Bastar, Cauvery, Vindhyan, Narmada, South Rewa, Satpura-Damodar and Chattisgarh, Bengal, Mahanadi-NEC, Ganga, Deccan Synclise, Bhima-Kaladgi, Himalayan Foreland, Spiti-Zanskar, Karewa and Andaman-Nicobar basins.

2D Seismic survey work has started and 14,077 LKM (29.18%) of survey has already been completed upto 31.12.2017 after award of work to service providers by ONGC and OIL.

2. **Setting up of NDR (National Data Repository)**

National Data Repository (NDR) has been established to consolidate and store all the Geo-scientific data generated till date and in future. The objective of NDR policy is to assimilate, preserve and regulate the E&P data generated by various companies over the last several decades and held within the National Data Repository (NDR) in order to enable systematic disclosure, sharing and dissemination and to standardize the norms for accessibility within the overall provisions of the different Acts, Rules, Government policies and other guidelines as may be applicable. Data Sharing, Accessibility & Dissemination through NDR and augmentation of data in NDR is a continuous process as data is acquired on a perpetual basis from the Operators.

Shri Dharmendra Pradhan, Minister P&NG launches the supply of Compressed Natural Gas (CNG) and CNG-run scooters in Bhubaneswar.

NDR will facilitate the received data dissemination in the following manner:

- Data can be accessed through web portal on 10'x10' grid
- Users can view the data available in NDR user registering on NDR web portal
- Users can now preview processed seismic image file of 2D/3D data, log data, reports and raw seismic data
- End users can come onboard NDR to view the data in data rooms
- The geological prospectively can be accessed through scanning of data
- Field data/ raw data can be bought from NDR by user or investor for value addition including processing

NDR will support future offer and award of blocks through Open Acreage Licensing Program by allowing interested investors to access visualize and purchase E&P data. As on 31st December, 2017 details of data loaded/available in NDR is as under:

Sl. NO.	Data loading in NDR	Quantity
1	2D seismic Onshore (LKM)	2,81,320
2	2D seismic Offshore (LKM)	14,83,142
3	3D seismic Onshore (Sq. KM)	2,28,634
4	3D seismic Offshore (Sq.KM)	4,21,499
5	Well and log data (No.)	13,981
6	No. of Surveys 2D	440
7	No. of Surveys 3D	404
8	Well Reports (No.)	28,62
9	Seismic Reports (No.)	14,464
10	Scanned Logs (No.)	15,165
11	Other Reports (No.)	10,479
12	Production Data	On regular basis

Setting up of NDR is the key facilitator to provide a rapid jumpstart to E&P activities in India. The key beneficiaries of NDR are E&P Companies, Government Agencies, Universities, Research Institutes & Parties entitled by DGH.

3. **Re-assessment of Hydrocarbon Resources of India**

The last assessment of hydrocarbon resources in India was done for 15 sedimentary basins and deep water areas about twenty five years ago. A Multi Organization Team (MOT) was formed to carry out re-assessment of Hydrocarbon Resources of India in 26 sedimentary basins. The present project used large amount of geo-scientific data collected through exploration& development activities in the last twenty five years and re-estimated the hydrocarbon resources. Re-assessment of hydrocarbon resources of 26 sedimentary basins

including deep water areas has been completed in 27 months from the date of award of work by November, 2017.

As per the recently completed study, the prognosticated conventional hydrocarbon resources in the country, are estimated to be of the order of 41.87 billion tonnes of oil and oil equivalent of gas, which is about 49% more than the earlier estimates.

4. **National Gas Hydrate Program**

The NGHP (National Gas Hydrate Program) carried out Expedition-01 in the year 2006. The NGHP Expedition-01 established presence of gas hydrate in KG, Mahanadi and Andaman deep waters in numerous complex geologic settings.

The objective of the NGHP Expedition- 02 was to identify sand bearing depositional systems with the gas hydrate stability zone on the east coast of India within the Krishna Godavari and Mahanadi deepwater Basins. NGHP Expedition-02 commenced on the 3rd March 2015, where a Japanese drillship 'CHIKYU' was commissioned to collect Gas Hydrate samples and related information thereof in Deep waters of Krishna Godavari and Mahanadi basins. Total 42 wells has been drilled and cored in NGHP Expedition-02. NGHP Expedition-02 has been completed on the 28th July 2015. As the initial results of NGHP Expedition-02 are encouraging. The objective of interpretation of expedition-2 data is to identify pilot production testing sites.

5. **Shale Oil and Gas Policy for NOCs**

Under Shale Gas Programme, during the first assessment phase ONGC has to drill around 57 wells in all 50 blocks and Oil India has to drill around 6 wells in 5 blocks along with EIA (Environment Impact Assessment) study including sourcing of water and its subsequent disposal, G&G (Geological & Geophysical) studies, Coring, Hydro-fracturing, Geo-chemical studies, Geo-mechanical/Geo-Hazard/Geo-technical studies and Resource Assessment for Shale Gas and Oil.

Accordingly Phase-I of Shale gas assessment studies commenced in October, 2013 and ended in April, 2017. Additional six months time was given to NOCs on account of delay in identifying shale gas blocks. So far ONGC has drilled 22 wells in 18 blocks in four basins. So far OIL has drilled 3 wells in 3 blocks in two basins.

6. **Implementation of Discovered Small Field Bid Round- 2016**

Government of India launched the Discovered Small Field Bid Round- 2016 on 25th May 2016. Under the DSF Bid round, 67 fields clubbed under 46 contract areas were put on offer through International Competitive Bidding Round under Discovered Small Field policy. Twenty six (26) Contract Areas are located in Onland, eighteen (18) Contract Areas are located in Shallow water offshore and two (2) Contract areas are located in Deepwater Offshore.

Bids were invited on single stage, two envelope system through online e-bidding portal. Round-I of Discovered Small Fields (DSF) Bid Round was concluded in March 2017 wherein 30 Contract areas were awarded (23 Onland and 7 Offshore).

7. **Co-development agreement for simultaneous Coal Mining of SAIL & ONGC operations on overlapping areas of Parbatpur coal block with Jharia CBM block**

The overlapping of Coal and CBM blocks emerged as a challenging issue for the extraction of CBM in India. However, this issue was not unique, such overlapping of CBM and coal blocks were found common in countries like USA, Australia etc, where framework is available under which coal mining and recovery of CBM are carried out simultaneously from overlapping areas. In light of this, an expert committee was formed to design modalities for simultaneous operation of coal mining and CBM extraction in harmonious manner. Subsequently, the expert committee of GOI has finalized the Model Co-development agreement for simultaneous operation of coal mining & CBM operations.

This model co-development agreement has been notified so as to enable different operators in an overlapped area to continue with E&P of Coal and CBM.

8. **Work in Progress**

- Web-based application for entry & reporting of drilling data by E&P operators is under Final stage of testing
- An online E-bidding portal for HELP / OAL bidding rounds
- Launch of Round II of Discovered Field for bidding in 2018
- Award of Blocks under HELP bidding Round

14.5.4 Centre for High Technology (CHT)

1.0 Introduction

Established in 1987, Centre for High Technology (CHT) acts as the Technical Wing of MOP&NG for implementation of scientific and technological programmes of Govt. of India. Major functions of CHT include assessment of technology requirement, operational performance evaluation and improvement of the refineries. CHT acts as a focal point of oil industry for centralised technical assistance, knowledge dissemination, performance data base, exchange of information and experience sharing. CHT also coordinates funding of research work in downstream hydrocarbon sector and pursue the programmes of "Scientific Advisory Committee on Hydrocarbons" of MOP&NG.

2.0 Major activities undertaken by CHT during 2017-18

2.1 Performance Benchmarking of PSU Refineries

Performance Benchmarking of 15 PSU refineries, 4 lube units and 1 JV Refinery (BORL) for the Study Cycle 2016 through M/s Solomon Associates (SA), USA was completed in September 2017. The findings of the Study were presented by SA to all the participating refineries as well as MoP&NG.

The major findings of the Study are as under:

- Energy Cost continues to be a major component of Opex.: 74% in 2016
- 17.5% reduction in EII from 120 in 2010 to 99 in 2016
- PSU refineries have consistently achieved better than World's Best EII Peer Group performance in the Process Fired Furnace Efficiency category
- Reducing the Steam System Size is a large opportunity area for EII improvement
- Large reduction in Steam System Size since benchmarking : > 9.5 MMT per year reduction in steam usage

2.2 **21st Refinery Technology Meet (RTM)**

21st RTM organised by CHT in association with HPCL during 20-22 April, 2017 at Visakhapatnam was a grand success with participation of around 800 delegates/invitees from India and abroad. The Theme of the Meet was "Refining to Petrochemicals – The Way Ahead".

The Meet was inaugurated by Hon'ble Minister, Petroleum & Natural Gas, Government of India Shri Dharmendra Pradhan, in the presence of Secretary, P&NG; Joint Secretary(R),

MoP&NG; CMD, HPCL and Heads/Senior Executives from oil industry. A total of 74 oral papers spread over 16 Technical Sessions and 82 posters were presented during the 3 day Meet. 12 Exhibition Stalls were put up by leading technology/service providers showcasing their services. Apart from Indianoil companies, leading global consultants/technology providers like Shell, UOP, Chevron, ExxonMobil, Haldor Topsoe, Axens, KBR, DuPont, Solomon, Lyondell Basell, Grace, Univation, Mitsui Chemicals etc. participated in the Meet.

2.3 Indigenous Technology Development

CHT co-ordinates the activities of Scientific Advisory Committee (SAC) on Hydrocarbons of MOP&NG in identifying and funding of research projects for hydrocarbon sector. SAC approves and steers projects of national importance and refining operations. SAC is headed by Dr Anil Kakodkar, an eminent Scientist and DAE Chair Professor, BARC. SAC had its 80th meeting on 6th September, 2017 and reviewed the completed and 11 on-going R&D projects. The project on "Development and durability Testing of Ethanol-Diesel Blend Engine" of ARAI, Pune recommended by SAC was approved by the Executive Committee of CHT in its 22nd meeting held on 20th June, 2017.

In order to attract more participation from Academia and exploit the research expertise / capabilities available in Indian universities/Institutions and also to strengthen the interface between R&D establishments & Industry, CHT has been inviting research proposals through EOI.

EOI has been issued 3 times since July 2016. In all 31 projects, including 4 projects in hydrogen research area have been received. The proposals are screened and modifications are advised by Steering Committee nominated by Chairman SAC. The last 3rd meeting of the Steering Committee was held on 3rd October 2017.

2.4 Energy Efficiency Improvement Study and Performance Audit of PSU Refineries

The Energy Efficiency Improvement Study and Performance Audit of 15 PSU Refineries by EIL is in progress and will be completed by March 2018. An Umbrella Agreement with EIL for TSA has been finalised in consultation with refineries for detailing of energy saving schemes at + 30% cost for obtaining in-principle approval. The Agreement enables simplified and quick work order from refinery on single page format with only scheme specific details like objective, deliverable, time lines, etc. The Agreement was signed jointly by CHT & EIL on 15th September, 2017.

2.5 Mandatory Energy Audit (MEA)

CHT, on behalf of industry, had engaged PCRA for carrying out MEA of 12 PSU refineries (excluding IOCL-Guwahati, Digboi and Paradip, who are not part of PAT, and BPCL-Kochi who have already completed MEA) The Audit was completed in June 2017.

2.6 Performance Improvement of Refineries

The EOI and the Tender Document for Performance Improvement Programme for PSU refineries have been finalised along with refineries. It is planned to cover 9 refineries under the 2017-18 study cycle. Refinery-wise consultant shall be finalised by the Committee of CHT and Refineries by the first week of April 2018.

2.7 Performance Awards

CHT is actively associated with the following Annual Awards instituted by Ministry of

Petroleum & Natural Gas, Government of India:

- Refinery Performance Improvement Award
- Oil & Gas Conservation Fortnight (OGCF) Award
- Innovation Award

The Awardees for the first two categories are selected by the selection committee set up by MoP&NG. For the Innovation Award, the Awardees are selected by the committee constituted by Chairman, SAC, based on guidelines of Governing Council of CHT.

CHT was involved in co-ordination, data validation/compilation and providing necessary technical support to the Committees for finalising the awards.

Refinery Performance Improvement Awards for 2016-17, OGCF Award for 2017 and Innovation Awards for 2016-17 have been finalised by the Committee and will be presented to the winners during the Inaugural function of the 22nd Refining & Petrochemicals Technology (RPTM) on 13th January, 2018 at Bhubaneswar.

2.8 **Activity Committee Meetings**

With the aim of sharing of best operational practices & improvements and dissemination of information on latest developments, CHT organised various Activity Committee Meetings in critical areas/ technologies in refining sector and pipelines operations.

2.9 **Perform, Achieve and Trade (PAT) Scheme implementation in refineries**

BEE has already notified refinery-wise target for Specific Energy Consumption for achievement by 2018-19. The Technical Committee headed by CHT, has worked out the normalisation methodology and factors to be applied over the actuals for performance assessment for the year 2018-19.

2.10 **Swachhata Ranking 2017 for PSU Refineries**

Swachhata Ranking of PSU Refineries is a new initiative of the Ministry of Petroleum & Natural Gas. The inter-refinery survey of 17 Public and 2 Joint Sector Refineries has been conducted and these refineries have been ranked based on the Swachhata Index developed by Centre for High Technology. The Swachhata Index is based on infrastructure available at Refineries not only for its own Employees but also for its Contract Laborers, Cleanliness, Systems and Processes including waste generation and disposals, initiatives taken for Swachhata awareness and its campaign, waste paper recycle and reuse, processing municipal waste in Refineries, etc.

14.5.5 Rajiv Gandhi Institute of Petroleum Technology

1. Introduction:

Rajiv Gandhi Institute of Petroleum Technology (RGIPT) has been set up by Government of India, as an Institute of National Importance under an Act of Parliament. The objective of the Institute is to offer technical and management educational programmes in the domain of petroleum sector with a vision to create aspirations in the youth of the country towards the petroleum sector and to serve as the fountainhead for the nurturing world class human capital capable of being the future leaders of technology and innovations in the entire hydrocarbon value chain with a view to serve both domestic and global needs in the sector. The institute is co-promoted by six oil PSUs and the Oil India Development Board (OIDB) under the aegis of Ministry of Petroleum and Natural Gas.

RGIPT has commenced its academic operations from 2008-09 onwards with introduction of the following educational programmes:

1. B. Tech. in Petroleum Engineering
2. B. Tech. in Chemical Engineering
3. MBA in Petroleum & Energy Management.
4. M.Tech in Petroleum Engineering
5. M.Tech in Chemical Engineering
6. PhD - Doctoral programs

2. Performance

Academic Activities:

In 2017-18, RGIPT has successfully entered 10th year of academic activities with 375 students. The performance highlights are as follows:-

- The sixth batch of B.Tech degree (Chemical Engineering and Petroleum Engineering) students will pass out this year in the month of May, 2018
- Students of M.Tech degree in Petroleum Engineering and MBAs in Petroleum and Energy Management will also graduate this year.
- With moderate campus placement, the industry, both public and private, has recruited the RGIPT students.
- Annual Convocation of the institute was held on 11th November 2017 and the Chairman of AICTE was the Chief Guest.

3. Jais (District-Amethi, UP)

RGIPT is smoothly functioning from its new campus at Jais, District Amethi, UP which is spread over 47 acres of land and constructed with an overall capital cost of ₹519.10 crore, out of which ₹369.10 crore was sourced from Government Budgetary Outlay and balance ₹150.00 crore was contributed by OIDB. The campus is self-sufficient with faculty and staff residence, student hostels, playgrounds, mess etc. Presently there are 35 nos. faculty and 30 regular support staff.

4. Sivasagar (Assam)

Assam Center of RGIPT is set up at Sivasagar with the objective of offering programmes of education and training of skilled technical manpower at the certificate, diploma and post diploma level in various areas in the domain of oil and gas and its allied sector for the North Eastern Region.

Academic session has commenced from September 2017 from temporary campus facility at Sivasagar offering 3 diploma courses in disciplines of Petroleum Engineering, Chemical Engineering and Piping Engineering.

The work of RGIPT's campus construction is in progress. The revised DPR of Assam Center has been submitted to Ministry for allocation of revised capital outlay.

5. Energy Institute, Bengaluru

The foundation stone for Energy Institute, Bengaluru was laid by Hon'ble Minister P&NG on 5th March 2014. The key activities of the institute will be Research and Education, Technology development and Entrepreneurship and participating in Policy Advocacy in the field of Energy.

The State Govt. of Karnataka has allotted 150 acres of land at Hoskote Taluk which is in the possession of RGIPT. A revised DPR with total project cost of ₹1656.30 crore (Capital Expenditure: ₹906.30 Crore and Recurring Expenditure: ₹750.00 crore) has been submitted. Meanwhile steps are being taken to commence the academic session soon from a temporary campus at Bangalore.

14.5.6 Indian Institute of Petroleum and Energy (IIPE), Visakhapatnam

1. As mandated under 13th Schedule of Andhra Pradesh Reorganization Act, 2014, Ministry of Petroleum and Natural Gas has set up Indian Institute of Petroleum and Energy (IIPE) at Visakhapatnam in Andhra Pradesh with the objective to meet the quantitative and qualitative gap in the supply of skilled man power for the petroleum sector and to promote research activities needed for the growth of the sector.

   The Government of Andhra Pradesh made available land admeasuring Ac 201.82 Cts at Vangali Village, Sabbavaram Mandal, Visakhapatnam District for the Institute free of cost.

   Foundation stone of the Institute at the permanent campus was laid by the MoS(I/C) MoPNG on 20.10.2016 in the presence of the Minister of Urban development, Housing & Urban poverty alleviation and information & Broad casting Minister, Minister of Civil Aviation, Chief Minister of Andhra Pradesh and other dignitaries;

2. IIT Kharagpur had been roped in as the mentor institute to IIPE for a period of three years from 2016-17;

3. Temporary campus had been set up at a space provided by the College of Engineering (Autonomous) in Andhra University to start the academic sessions from 2016-17 with two undergraduate programs viz. B.Tech(Petroleum Engineering) and B.Tech(Chemical Engineering) with 50 students'intake each.

An area of 16000 sft. was constructed with the help of HPCL for IIPE in the temporary campus for meeting immediate space requirement.

1) Full Time Director has been appointed from 1st May, 2017 onwards for a tenure of 5 years and has taken over the reigns;

   As on date 9 faculty members have been taken on contract basis for a period of two years and one more faculty in Chemical Engineering is to join shortly. IIT Kharagpur professors have also been engaged for teaching the students;

2) From the rank list obtained from JEE(Advanced) 93 students had been admitted in these two courses in the academic year 2016-17 and 83 students in 2017-18; thus there are total 176 students as of now.

   First batch of 93 students of 2016-17 have successfully completed their third semester in December, 2017.Second batch of 83 students of 2017-18 have successfully completed their first semester;

3) About 20 eminent personalities have been invited to deliver guest lectures to inspire the students;

   Sports activities, Social awareness activities like Prime Minister's Swacch Bharat, Blood Donation camps, Vigilance awareness week, work shop, technical models display, industrial tours etc., have been organized with the active participation of the students.

   Teachers' day, Independence day, Republic day have been celebrated with the active

participation of students in order to create among them the spirit of patriotism;

First of its kind, the Innovation lab has been created in order to inspire the students with their innovative brain storming ideas and this is part of curricula;

To create the spirit of journalism in the students in house newsletter 'The Fourth Estate' has been released;

4) Parliament has approved the bill for recognizing IIPE as an Institute of National Importance at par with IITs and IIMs(Lok

Sabha approved in Aug.2017 and Rajya Sabha in Dec. 2017). The Indian Institute of Petroleum and Energy Act, 2017 (No. 3 of 2018) has been notified in the Gazatte of India on 8th January, 2018.

14.5.7 Petroleum Planning & Analysis Cell (PPAC)

1. Introduction

The Petroleum Planning & Analysis Cell (PPAC) was created as an attached office of MOP&NG w.e.f. 1st April 2002 after dismantling of the Administered Pricing Mechanism (APM) in the petroleum sector and abolition of the erstwhile Oil Coordination Committee (OCC). The mandate of PPAC as stated in the Government resolution dated 30.03.2002 is to assist the Government, inter alia, in discharge of the following functions:

i. Administration of subsidy on PDS Kerosene and domestic LPG and freight subsidy for far-flung areas;

ii. Maintenance of an information data bank and communication system to deal with emergencies and unforeseen situations;

iii. Analyzing the trends in the international oil market and domestic prices;

iv. Forecasting and evaluation of petroleum import and export trends;

v. Operationalizing the sector specific surcharge schemes, if any.

2. Important Database

PPAC maintains data related to production, consumption, import and export of crude and petroleum products. It also maintains data related to production of natural gas, import of LNG and consumption of natural gas.

3. Price Trends of Petroleum products and impact of subsidy/under-recoveries

Crude oil:

Due to India's over reliance on imports to meet the domestic oil demand, the prices of crude oil and petroleum products in the international markets have a decisive influence on the domestic prices of petroleum products. The prices of crude oil, after continuously being at the level of more than $100/bbl for over three years, started falling sharply during the second half of 2014. As a result, the average price of Indian crude oil basket during 2015-16 and 2016-17 was recorded at $46.17/bbl and $47.56/bbl respectively whereas the same is at $ 52.55/ bbl during the current financial year 2017-18 (up to 30th November, 2017).

Petrol and Diesel:

a) The Government has made the prices of petrol and diesel market determined effective 26th

June, 2010 and 19th October, 2014 respectively. Since then, the OMCs take decision on prices of petrol and diesel in line with changes in international market and domestic conditions. The OMCs have not only increased but also decreased the prices of petrol and diesel in line with changes in international prices and rupee dollar exchange rate.

b) Effective 16th June, 2017, daily pricing of petrol and diesel has been implemented in the entire country resulting in closer alignment with the international prices.

Domestic LPG (Subsidised):

a) Effective 1st January 2015, the PAHAL (DBTL) scheme, 2014 has been implemented in the entire country wherein the subsidy on Domestic LPG is being transferred to the eligible consumers directly to their bank accounts.

b) PMUY scheme was launched on 1st May, 2016 for providing free LPG connections by Oil Marketing Companies (OMCs) to women belonging to the below poverty line (BPL) households. Under the scheme, 5 crore BPL households would be covered over a period of 3 years. The objective of the scheme is to provide clean fuel to all poor households. Till December 31, 2017, a total of 3.26 crore connections have already been released under the scheme.

c) Effective September 1, 2016, the Government authorized CPSE Oil Marketing Companies (OMCs) to increase the effective price of subsidized Domestic LPG by ₹2 per cylinder (excluding state taxes), retrospectively from 1st July, 2016 till the end of financial year 2016-17. Further, effective 1st April, 2017 the Government authorized PSU OMCs to increase the effective price of subsidized Domestic LPG by ₹2 per cylinder (excluding state taxes) till the reduction of Government subsidy to "NIL", or till March 2018, or until further orders, whichever is earliest, which has been further revised to ₹4 per cylinder (excluding state taxes) effective 1st June, 2017.

PDS Kerosene:

a) During the period 1st July, 2016 to 1st February, 2017, there was an increase of ₹3.23/Litre in the issue price of PDS SKO. Further effective 1st April, 2017 Government had authorized PSU OMCs to increase the RSP of PDS Kerosene by ₹0.25 per litre (excluding state taxes) per fortnight during the period from 1st April, 2017 to 31st July, 2017. Thereafter, effective 1st August, 2017 Government authorized PSU OMCs to increase the RSP of PDS kerosene by ₹0.25 per litre (excluding GST) per fortnight till the reduction of Government subsidy to "NIL", or until further orders, whichever is earlier.

b) Effective 1st Oct, 2016, Direct Benefit Transfer in PDS Kerosene Scheme 2016 (DBTK) was implemented in 4 districts in Jharkhand State. This scheme was extended to another 6 districts effective 1st April, 2017 and the entire state of Jharkhand was covered under DBTK effective 1st July, 2017.

Subsidy/ Under-recovery:

The total subsidy/under-recovery on petroleum products (including DBTL subsidy, PMUY subsidy and DBTK subsidy) for the year 2016-17 was ₹27,629 crore in comparison to ₹34,186 crore in 2015-16. The same is ₹11,394 crores for the period April-September, 2017-18.

4. Important Activities:

Some of the important activities undertaken by PPAC, were as follows:

a) Domestic Natural gas pricing determination and issuance under the provisions of the New Domestic Natural Gas Pricing Guidelines, 2014.

Domestic Natural gas prices were notified for the periods 01.04.2017 to 30.09.2017 and from 01.10.2017 to 31.03.2018 in line with the New Domestic Natural Gas Pricing Guidelines, 2014.

b) Domestic Natural gas price ceiling in accordance with MoP&NG notification dated 21.03.2016 for gas produced from discoveries in deepwater, ultra deepwater and high pressure-high temperature areas.

Domestic Natural gas price ceiling were notified for the periods 01.04.2017 to 30.09.2017 and from 01.10.2017 to 31.03.2018 in line with the notification issued by MoP&NG.

c) Report of the Committee on roadmap to reduce import dependency in energy by 10% by 2021-22:

In response to the target set by the Hon'ble Prime Minister, a Committee was constituted by MoP&NG to prepare a roadmap to reduce import dependency in energy by 10% by 2021-22. PPAC in consultation with a number of stakeholders and in-house research examined various options and prepared a roadmap to reduce oil dependency by 10% by 2021-22. The roadmap proposed a five-pronged strategy which broadly comprises of increasing domestic production of oil and gas, promoting energy efficiency and conservation measures, giving thrust on demand substitution, capitalizing untapped potential in biofuels and other alternate fuels/ renewables and implementing measures for refinery process improvements.

d) Report on energy mix and demand projection of petroleum products:

A Committee was constituted by MoP&NG for preparing an approach paper on enhancing refining capacity by 2040. The subgroup headed by PPAC was formed to assess projected energy mix and demand for petroleum products. PPAC in coordination with stakeholders developed an energy demand projection model. The model has simulated three scenarios which has broadly considered the possibilities of fuel switching, technological developments, business models, Government policies, etc. Under these scenarios, the report broadly addresses the prospective demand in terms of primary energy, final energy and petroleum products.

e) Largest exclusive survey by PPAC on usage of LPG:

PPAC has featured in Limca Book of Records 2017 for carrying out the largest exclusive survey on usage of Liquefied Petroleum Gas (LPG) and energy access in the country. The survey captured primary data from 1.03 lakh unconnected LPG households (i.e. households not covered by LPG) and around 1400 gram panchayats across 120 districts in 13 selected states. The survey covered various aspects including inter alia current usage of different fuels, amount spent on various fuels, perceptions and expectations regarding issues of affordability, availability, accessibility in respect of using LPG as a clean cooking fuel etc.

f) Study on port infrastructure for handling of crude oil, LPG, MS and HSD:

PPAC carried out a study on assessment of current infrastructure at Indian ports for handling crude oil, LPG, MS and HSD. In the study, bottlenecks leading to detention of vessels at ports and consequent supply disruptions were identified with a view to debottleneck the existing constraints and optimize performance of current infrastructure. Further, the study dwelt on assessment of preparedness of country's port infrastructure in terms of meeting demand forecasts of crude oil, LPG, MS and HSD till 2029-30.

g) Development of PPAC mobile app:

As part of Digital India initiative and also to provide faster and convenient access to the users of PPAC website, a mobile app (PPACE) has been developed and is available on play stores of both Android and Apple iOS. The mobile app draws on the full range of information available on PPAC website, which displays up-to-date data of the country's oil and gas sector in downstream and mid-stream verticals.

14.5.8 Petroleum Conservation Research Association (PCRA)

Petroleum Conservation Research Association (PCRA) is a registered society set up under the aegis of Ministry of Petroleum & Natural Gas, Government of India. As a non-profit organization, PCRA is a national government agency engaged in promoting energy efficiency in various sectors of economy. It helps the government in proposing policies and strategies for petroleum conservation, aimed at reducing excessive dependence of the country on oil requirement. Over the years, PCRA has enlarged its role in improving productivity in use of various sources of energy.

PCRA undertake studies to identify the potential and to make recommendations for achieving conservation of petroleum products in various sectors of the economy. It sponsors R&D activities for the development of fuel-efficient equipment / devices and organizes multi-media campaigns for creating mass awareness for the conservation of petroleum products. Fuel oil utilization studies, energy audits, introduction of equipment bank concept, use of energy vans, development of oil consumption norms, model depot projects, driver training programs, workshops/ exhibitions, consumer meets, education films/TV spots, hoarding/ electronic display, distribution of printed literature, R&D projects are other activities.

PCRA aims at making oil conservation a national movement. As part of its mandate, PCRA is entrusted with the task of creating awareness amongst the masses about the importance, methods and benefits of conserving petroleum products & emission reduction.

To take the message to the people, PCRA uses all possible and effective media for mass communication. These include electronic and press media e.g. TV, Radio, Electronic displays; Press at the National and State level printed literature for specific target groups; outdoor publicity through Hoarding, Bus panels, Kiosks, Balloons, Banners Tran-sliders etc.

14.5.9 Petroleum and Natural Gas regulatory Board (PNGRB)

The Petroleum and Natural Gas RegulatoryBoard (PNGRB) was constituted under thePNGRB Act, 2006 (NO. 19 of 2006) notified viaGazette Notification dated 31st March, 2006.The Act provides for the establishment of PNGRB to protect the interests of consumers andentities engaged in specified activities relatingto petroleum, petroleum products and naturalgas and to promote competitive markets andfor matters connected therewith or incidentalthereto. The Board under the Act has to regulate the refining, processing, storage,transportation, distribution, marketing andsale of petroleum, petroleum products andnatural gas excluding production of crude oiland natural gas so as to ensure uninterruptedand adequate supply of petroleum, petroleumproducts and natural gas in all parts of thecountry. The vision of PNGRB is as under:

"To create a vibrant energy market with rapidand orderly growth through facilitation of flowof investments into the basic infrastructurefor efficient transportation and distribution ofpetroleum, petroleum products and natural gasat minimum cost and high level of protection ofconsumer interests through fair trade practicesand competition amongst the entities so as toensure the enhanced competitiveness of Indianeconomy and customer satisfaction."

In year 2017-18 (till 5th Jan. 2018), the Board has granted authorization to lay, build, operate or expand Kakinada-Vijayawada-Nellore Natural Gas pipeline on common carrier or contract carrier basis. Further, the Board has approved the authorization of Jagdishpur- Haldia -Bokaro-Dhamra

Natural Gas Pipeline as well as six (06) City Gas Distribution (CGD) networks namely Varanasi, Patna, Ranchi, Jamshedpur, Bhubaneshwar and Cuttacken-route JHBDPLas per the Central Government Policy directive under section 42 of the PNGRB Act, 2006. Other CGD projects viz. Karnal (Haryana), Ambala &Kurukshetra (Haryana), South Goa (Goa), Yanam (Puducherry), Bagpat (Utttar Pradesh) and Kolhapur (Maharashtra) have been approved under 8th round of CGD bidding. Board has approved various amendments in the regulations related to technical and safety standards for Petroleum, Petroleum Products and Natural Gas Pipelines.

14.5.10 Indian Strategic Petroleum Reserves Limited (ISPRL):

Keeping in view India's high import dependence for oil and gas and in the interest of meeting the objective of country's energy security, Ministry of Petroleum and Natural Gas (MoPNG), in pursuance to the decision of the Union Cabinet on 7th January 2004 took up construction of crude oil reserve facilities as a buffer to deal with any situation of supply chain disruption due to external reasons.A Special Purpose Vehicle (SPV) called Indian Strategic Petroleum Reserve Limited (ISPRL) was created on 16th June 2004. ISPRL has been mandated to build and operate strategic crude oil reserves. Subsequently, on 9th May 2006, ISPRL became a fully owned subsidiary of Oil Industry Development Board (OIDB).

ISPRL Phase - I

Under Phase I of Strategic Petroleum Reserve (SPR) programme, Government, through the Special Purpose Vehicle i.e. ISPRL, has built SPR facilities with a total capacity of 5.33 MMT at three locations viz. visakhapatnam (1.33 MMT), Mangaluru (1.5 MMT) and Padur (2.5 MMT). The total reserve of Phase-I of SPR is currently estimated to supply approximately 10 days of India's crude requirement according to the consumption during 2016-17 (194 MMT).

A Definitive Agreement was signed on 25th January 2017 on Oil Storage and Management between Indian Strategic Petroleum Reserves Ltd (ISPRL) and Abu Dhabi National Oil Company (ADNOC) of UAE. Under the Agreement, ADNOC would store 5.86 million barrels of crude oil in one of the caverns of the Mangalore Strategic Petroleum Reserve (SPR) facility created by ISPRL. A part of the stored crude is to be used by ADNOC for commercial purposes while the rest will be for strategic purposes of Government of India (GoI).

ISPRL Phase - II

During the budget statement 2017-18 Government announced to construct SPRs under Phase II at two new locations and the Ministry is working towards obtaining required approvals to set up these SPRs at Chandikhol in Odisha and Padur in Karnataka.

14.5.11 Society for Petroleum Laboratory (SFPL)

Society for Petroleum Laboratory (SFPL) is an independent laboratory registered under the Societies Registration Act. It was set up and made operational under the guidance and direction of MoPNG in 2000 in compliance with Hon'ble Supreme Court directive of July 1998. The basic objective of setting up of this laboratory at NOIDA is to monitor the quality of transportation fuels independently, which acts as a deterrent to malpractices of fuel adulteration and/or prevention of selling substandard quality fuels to the consumers. Funding to the Society for meeting annual expenses for operation and management of FTL is granted by MoPNG from the Budget under "Grants-in-Aid".

Society for Petroleum Laboratory (SFPL) has been allocated an amount of ₹269.00 lakhs under Grant-in-aid for financial year 2017-18 (₹257.00 lakhs under General Head and ₹12.00 lakhs under Salary Head), out of which, after deducting previous FYs unspent balance of ₹35,53,480/- under non-salary head, the grant-in-aid released to them for first and second quater is ₹131.4652 lakhs.

Chapter 15

General

15.1 Progressive use of Hindi in Official Work

With a view to promote official language Hindi in the official work in the Ministry and its undertakings, the Ministry of Petroleum & Natural Gas took a number of steps so as to increase its usage. These steps include organizing of Hindi Workshops, on the spot inspections of the sections of the Ministry and its undertakings, organizing of Hindi fortnight, organizing meetings of Hindi Advisory Committee, Official Language Implementation Committee etc.

There is a Hindi Advisory Committee functioning in the Ministry under the Chairmanship of Hon'ble Minister for Petroleum and Natural Gas. The Committee consists of Six Members of Parliament, Nine non-official members as its members, besides senior officers of the Ministry and PSUs of the Ministry as its official members. The function of the committee is to render advice to the Ministry for promotion of official language in official work.

During the year under review, two meetings of the committee were held on 22nd April, 2017 and 21st December, 2017 in Srinagar (J & K) and New Delhi respectively under the chairmanship of Minister for Petroleum and Natural Gas. Seniors officers of the Ministry and its undertakings also participated in the meetings. During the deliberations, a number of suggestions were given by the Hon'ble members of the Committee for promotion of Hindi. The Hon'ble Minister also assured the Committee that the Ministry would make all efforts to promote Hindi in the official work. The minutes of the meeting have been circulated and the concerned officers have been requested to take follow up action on the suggestions given by the members of the committee in the meeting.

Shri Dharmendra Pradhan, Minister P&NG chairing the Hindi Advisory Committee Meeting

Similarly, an Official Language Implementation Committee is also functioning in the Ministry under the Chairmanship of Joint Secretary (G). The function of this committee is to review the progress of official language in the Ministry and its undertakings and give suggestions for the promotion of the same. Regular meetings of the committee were organized during the year under review and follow up action was taken on the suggestions of the committee.

The Committee of Parliament on Official Language visited 26 offices of our PSUs which includes offices of ONGC, IOC, BPCL, HPCL, GAIL, etc and reviewed the progress of official language in these offices. A number of times, the Committee appreciated the efforts taken by these offices for the promotion of

General

Hindi. Follow up action has been taken on the assurances given to the Committee by these offices. Senior officers of the Ministry also took part in these meetings.

During the year under review, the Ministry notified 237 Offices of our PSUs under Rule 10(4) of Official Language Rules, 1976. With a view to assessing the progress of official language in our PSUs and in pursuance of the targets fixed in the Annual Programme 2017-18 issued by the Department of Official Language, senior officers of the Ministry inspected more than 100 offices of our PSUs and reviewed the progress of Hindi in these offices. On the spot suggestions were given to the officers concerned for removing the deficiencies.

CMD, HPCL receives Rajbhasha Award from Hon'ble President of India

With a view to assist the officials to do their maximum work in Hindi and to remove their hesitation to do the same, regular Hindi workshops were conducted in the Ministry. Large number of official attended these workshops and benefitted from the suggestions given in these workshops. As a result of this, percentage of Hindi correspondence in the Ministry has increased considerably.

In pursuance of the directions of the Department of Official Language, Hindi Fortnight was organized in the Ministry from 01st September, 2017 to 15th September, 2017. During this occasion, a Message from the Hon`ble Minister was issued to all our officers as well as to all the PSUs. Various activities

including different Hindi Competitions were conducted during this fortnight. Large number of officials of the Ministry participated in these competitions and successful candidates were given awards. Secretary, PNG distributed the prizes to the successful candidates of Hindi Fortnight in a prize distribution ceremony held on 15th september, 2017 in, New Delhi.

The Ministry had introduced a Rajbhasha Shield Scheme for our PSUs to enable them to compete with each other for the use of Hindi in official work in their respective organizations. Under this scheme, suitable awards were given to the successful PSUs by the Secretary, MOP&NG in a prize distribution ceremony held on on 15th september, 2017 in New Delhi.

15.2 Public Grievances

In accordance with guidelines of the Cabinet Secretariat, Government of India, the Public Grievance Cell has been functioning in the Ministry of Petroleum & Natural Gas (MoPNG). The Cell has been attending to the grievances of members of the public against the Public Sector Oil & Gas Companies and other organizations under the administrative control of this Ministry.

All possible efforts are being taken to ensure the regular monitoring of the public grievances received through Department of Public Grievances (DPG), Department of Administrative Reforms and Public Grievances (DARPG) and other Departments of the Government as well as the members of the public.

An online system called "Centralized Public Grievance Redressal and Monitoring System (CPGRAMS) has been introduced in the month of June, 2008. With the aid of CPGRAMS, public grievances from the public and others are received speedily, analysed promptly according to its subject and forwarded to the concerned for faster resolution.

In addition, a systematic mechanism in MoPNG has also been evolved so as to ensure speedy and expeditious redressal of the public grievances. The review of pendency of PGs in the MoPNG and Oil & Gas PSUs is undertaken regularly by Senior Officers.

During the year 2017-18, out of total number of 16088 PGs received, 94.06% stands disposed of as on 31st December, 2017.

15.3 Right to Information

Right to Information (RTI) Act-2005 has been implemented in the Ministry of Petroleum & Natural Gas as per Gazette Notification of Government of India dated 15th June, 2005. RTI Act is inter-alia designed to promote transparency and accountability in the functioning of public authorities.

As per provision of the Right to Information Act-2005, the Under Secretary / Assistant Director /DDO in the Ministry of Petroleum & Natural Gas have been designated as Central Public Information Officers (CPIO) in respect of their work allocations. Accordingly, the Director/Deputy Secretary/Economic Adviser in the Ministry of Petroleum & Natural Gas have been designated as First Appellate Authority (FAA). The list of CPIO/FAA of this Ministry is being updated regularly in view of change in allocation of work.

Information under Section 4(2) of RTI Act 2005 i.e. to provide information Suo Motu to the public at regular interval is being regularly updated on the Ministry's website.

An on-line system called RTIMIS has been introduced by DoP&T. With the aid of this online system,

applications and appeals received from public are being speedily disposed of within the stipulated time frame. To provide information to people in timely and trouble free manner and to promote transparency, all Oil & Gas PSUs and other organisations under the administrative control of this Ministry are now on DoP&T's online RTIMIS portal.

In order to ensure digitalization of records, RTI applications and appeals received in physical form are being scanned, uploaded and forwarded to concerned CPIO and FAA of the Ministry for speedy and timely disposal.

During January to December 2017, 2701 applications/receipts and 204 appeals have been received under RTI Act, 2005 in the Ministry. The Ministry has been awarded "Certificate of Excellence" by DoPT for the period from 01.04.2016 to 31.12.2016 under category "Average Time taken for giving final Reply to RTI requests".

For smooth processing of RTI applications and appeals through RTI MIS portal, several training sessions/ workshops for CPIOs and FAAs of the Ministry as well as Oil & Gas PSUs have been conducted, in coordination with DoP&T.

15.4 Flagship Schemes

15.4.1 Start-Up India

'Start-Up India' initiative was launched by the Prime Minister of India on January 16, 2016. The initiative aims at fostering entrepreneurship and promotes innovation by creating an ecosystem that is conducive for growth of Start-ups.

Facilitating an innovation ecosystem and promoting Start-Ups by CPSEs. Shri Dharmendra Pradhan, Minister P&NG releasing the booklet on the occassion.

CPSEs under the MoP&NG are facilitating an innovation ecosystem and promoting Start-Ups in their respective fields. The CPSEs have set up a Start-Up fund aggregating to ₹320 Crore for 3 years. The participating CPSE's are ONGC, OIL, IOCL, BPCL, HPCL, GAIL, EIL, MRPL, NRL and Balmer Lawrie. The CPSE's have also launched their Start-Up websites and have launched Innovation Challenges. Apart from the internal expertise of companies, they have also tied up with various academic institutes like IITs and IIMs for mentoring and incubation support.

A program on Start-Up initiative "STARTUP Sangam" was organized on 25th October, 2017 at New Delhi. The event was chaired by the Hon'ble Minister, P&NG and SDE, and attended by CEO, NITI Aayog, Secretary, MoP&NG, and other senior officials of MoP&NG; CEOs, Directors and Senior Officials of Oil & Gas PSUs; Professor in-charges of IIT Delhi & IIT Mumbai incubators and a number of Start-Up Companies. The aim was to put all stakeholders on the same platform to understand what was the ecosystem required for proliferation of a Start-Up ecosystem.

15.4.2 Skill Development

Skill India initiative was launched by the Prime Minister of India on 15th July, 2015. The Mission creates convergence across sectors and states in terms of skill training activities.

Hydrocarbon Sector Skill Council (HSSC) has been set up under Societies Registration Act, 1860 on 26-04-2016 which has a projected training plan for certification based skill development programmes. An MoU for collaboration in the area of skill development was also signed between Ministry of Petroleum & Natural Gas and Ministry of Skill Development & Entrepreneurship on 28th November, 2016.

In line with National Skill Development Mission of the Govt. of India, Ministry of Petroleum & Natural Gas (MoP&NG) has taken an unique initiative of setting up Skill Development Institutes (SDIs) that will focus on imparting skill training of Hydrocarbon sector, sub-sector to cater the sector need in different part of the country. Six Skill Development Institutes (SDIs) at Bhubaneswar, Vizag, Kochi, Ahmedabad, Guwahati and Rae Bareli have been started by IOCL, HPCL, BPCL, ONGC, OIL and GAIL respectively.

- IOCL as lead has set up a Skill Development Institute (SDI) at Bhubaneswar, Odisha which was inaugurated on 09th May, 2016. It is imparting training in three trades i.e. Industrial Welding, Industrial Electrician, Computer Data Application.
- HPCL as lead has set up a Skill Development Institute (SDI) at Vishakhapatnam, which was inaugurated on 20th October, 2016. It is imparting training in trades viz. Welding, Electrician, Fitter Fabrication, Instrumentation, Pipe Fitter, Plumbing, Heat Venting Air Conditioning, Inventory Clerk, Ware House Packer/Picker, Solar PV Installer etc.
- SDI, Ahmedabad has been started with ONGC as lead and it is presently equipped to impart training in three trades i.e. Fitter Fabrication, Welding and Production Technician, through a six months residential program.
- SDI, Guwahati has started functioning with OIL as lead since August, 2017. Initially, it will be imparting training on two trades, namely Industrial Welder and Industrial Electrician.
- BPCL as lead has started a SDI at Kochi, Kerala with two courses viz. Industrial Electrician and Industrial Welding.
- SDI at Raebareli has been started with GAIL as lead. Pipe Fitter (CGD) program classes have been started since November, 2017. Arrangements for boarding and lodging of students have also become functional.

Ministry of Petroleum & Natural Gas in consultation with the Industry members have identified high priority

12 trades for National Occupational Standard (NOS)/ Qualification Pack (QP) development. All 12 QPs have been approved by National Skill Qualification Committee (NSQC) and NSDC's Qualification Registration Committee (QRC).

15.4.3 Make in India

The Make in India initiative was launched by Prime Minister in September 2014 as part of a wider set of nation-building initiatives devised to transform India into a global design and manufacturing hub.

To roll out Make in India campaign in Oil and Gas Sector, a Policy to provide Purchase Preference (linked with Local Content (PP-LC)) in all Public Sector Undertakings under Ministry of Petroleum & Natural Gas has been approved by the Government on 12.04.2017. The policy aims to incentivize growth of local content in goods and services by implementing Oil and gas projects in India by providing purchase preference to the manufacturers/ service providers who meet the local content targets in Oil and Gas business activities.

Under the policy, progressively increasing targets of Local Content are stipulated for procurement of goods, services and EPC contracts for oil and gas business activities. To give fillip to 'Make in India' campaign in the complex and high technology deep water operations, deep water operations with 5% of Local Content target has been included by this Ministry on 14.09.2017.

Upstream, Midstream and Downstream companies of Oil and Gas sector have formed Indigenous Development Group (INDEG) to promote indigenization and are working towards import substitution.

15.4.4 Ease of Doing Business

Transparency and efficiency in Procurement of Goods, services or works is extremely important for any Organization. Public Sector Enterprises are not only required to follow the various policies and guidelines issued by the Government and Statutory bodies. To ensure transparency and fairness, they must also carry out their procurement in most efficient manner so that they remain competitive.

The Oil and Gas PSUs under MoP&NG have been directed to consider incorporation of relaxation of Past Track Record (PTR) norms subject to meeting the quality and technical specifications (except procurement of items related to public safety, health, critical security operations and equipments etc.) to all Startups (whether MSEs or otherwise) in their procurement manuals.

Oil and Gas PSUs have also been advised to adopt Combined Quality and Cost Based Selection (QCBS) system in services where quality is critical and/ or where services are of specialized nature and specification/ scope of services cannot be drawn objectively to eliminate sub-standard services. Some services have also been identified by the OPSUs where QCBS is proposed.

15.4.5 Engagement of Apprentices

As per the Apprentices Act, 1961, the Oil and Gas PSUs under MoP&NG have to engage apprentices in a band of 2.5% to 10% of the total strength of establishment including contractual staff. The minimum requisite figure of 2.5% of the total strength of workers in the PSUs under MoP&NG is maintained. PSUs have been directed by MoP&NG for increasing engagement of apprentices upto the level of 10% of the total workforce.

National Apprenticeship Promotion Scheme (NAPS) is a new scheme of Government of India to promote apprenticeship training and incentivize employers who wish to engage apprentices. In respect of this, this Ministry has directed CPSEs under its administrative control for enrolment of apprentices under their organization on the apprentices portal hosted by the Directorate General of Training to avail benefits under NAPS.

Chapter 16

Appendices

Appendices

Appendix- I

Ministry of petroleum & Natural Gas

(Petroleum Aur Prakritik Gas Mantralaya)

1. Exploration for, and exploitation of petroleum resources, including natural gas and Coal Bed Methane, gas hydrates and shale gas.
2. Production, supply, distribution, marketing and pricing of petroleum, including natural gas, Coal Bed Methane and petroleum products.
3. Oil refineries, including Lube Plants.
4. Additives for petroleum and petroleum products.
5. Blending and blending prescriptions for bio-fuels including laying down the standards for such blending.
6. Marketing, distribution and retailing of bio-fuels and its blended products.
7. Overall coordination concerning bio-fuels, National Policy on Bio-fuels, policy/scheme for supporting manufacturing of bio-fuels, setting up of a National Bio-fuel Development Board and strengthening the existing institutional mechanism and research, development and demonstration on transport, stationary and other applications of bio-fuels.
8. Tube Blending and greases.
9. Conservation of Petroleum products.
10. Planning, development, control and assistance to all industries dealt with by the Ministry.
11. Strengthening energy security by acquiring oil and gas equity abroad and participation in transnational oil and gas pipeline projects.
12. Creation and administration of strategic petroleum reserve through Indian Strategic Petroleum Reserves Limited (ISPRL).
13. Petroleum Planning and Analysis Cell (PPAC).
14. All attached or subordinate offices or other organization concerned with any of the subjects specified in the list, including Directorate General of Hydrocarbons (DGH), Centre for High Technology (CHT), Oil Industry Development Board (OIDB), Petroleum Conservation Research Association (PCRA), etc.
15. Planning, development and regulation of oilfield services.
16. Administration of Engineers India Limited, including their subsidiaries and joint ventures.
17. Public sector project falling under the subject included in this list except such projects which are specifically allotted to any other Ministry / Department.
18. The Oil Fields (Regulation and Development) Act, 1948 (53 of 1948).
19. The Oil and Natural Gas Commission (Transfer of undertaking and Repeal) Act, 1993 (65 of 1993).
20. The Petroleum Pipelines (Acquisition of right of User in Land) Act, 1962 (50 of 1962).

21. The ESSSO (Acquisition of Undertaking in India) Act, 1974 (4 of 1974).
22. The Oil Industry (Development) Act, 1974 (47 of 1974).
23. The Burmah – Shell (Acquisition of Undertaking in India) Act., 1976 (2 of 1976).
24. The Caltex (Acquisition of Shares of Caltex Oil Refining (India) Limited and of the Undertaking in India of Caltex (India) Limited Act, 1977.
25. Administration of the Petroleum Act, 1934 (30 of 1934) and the rules made thereunder.
26. Administration of Balmer Lawrie Investment Limited and Balmer Lawrie and Company Limited.
27. Petroleum & Natural Gas Regulatory Act, 2006.
28. Matter pertaining to M/s Biecco Lawrie Limited
29. Matters pertaining to Gas Authority of India Limited (GAIL).
30. Matter pertaining to natural gas pipelines.
31. Matter pertaining to LNG terminals.
32. The Rajiv Gandhi Institute of Petroleum Technology (RGIPT) Act, 2007
33. Matter pertaining to Indian Institute of Petroleum & Energy (IIPE), Act 2017 (3 of 2018)
34. Liquefied Petroleum Gas (Regulation of Supply and Distribution) Order, 2000.
35. Matter pertaining to Direct Benefit Transfer of LPG (DBTL) PAHAL.
36. Matter pertaining to Direct Benefit Transfer in Kerosene (DBTK).
37. Matter pertaining to Pradhan Mantri Ujjwala Yojana (PMUY).

Appendix- II

List of Public Sector Undertakings and other organizations under the administrative control of the Ministry of Petroleum & Natural Gas

I Oil Companies in which Government of India has shareholding as on 31.03.2017

1.	Oil & Natural Gas Corporation Limited	68.07%
2.	IndianOil Corporation Limited	57.34%
3.	Hindustan Petroleum Corporation Limited	51.11%
4.	Bharat Petroleum Corporation Limited	54.93%
5.	Gail (India) Limited	54.43%
6.	Engineers India Limited	57.02%
7.	Oil India Limited	66.60%
8.	Biecco Lowrie & Co Limited	99.56%
9.	Balmer Lawrie & Co Limited	59.67%

II Subsidiaries and other Companies

1.	ONGC Videsh Limited	-Wholly owned by ONGC
2.	Mangalore Refinery & Petrochemicals Limited	- Subsidiary of ONGC
3.	Bharat Petro Resources Limited	-Subsidiary of BPCL
4.	Chennai Petroleum Corporation Limited	-Subsidiary of IOCL
5.	Numaligarh Refineries Limited	-Subsidiary of BPCL
6.	Certification Engineers International Limited	-wholly owned by EIL
7.	EIL Asia Pacific Sdn BHD	-wholly owned by EIL
8.	GAIL Gas Limited	-wholly owned by GAIL

III Other Organisations

1. Oil Industry Development Board
2. Petroleum Conservation Research Association
3. Oil Industry Safety Directorate
4. Centre for High Technology
5. Petroleum Planning & Analysis Cell
6. Directorate General of Hydrocarbons
7. Rajiv Gandhi Institute of Petroleum & Technology
8. Petroleum and Natural Gas Regulatory Board
9. Indian Strategic Petroleum Reserves Limited
10. Indian Institute of Petroleum Energy
11. Society for Petroleum Laboratory

Appendix-III

Production of Crude Oil and Natural Gas

State/Region	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17 (P)	2017-18 (Apr-Nov) (P)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
I. Production of Crude oil (TMT)							
(a) Crude Oil-Onshore:							
Andhra Pradesh	305	295	297	254	295	276	222
Arunachal Pradesh	118	121	111	76	57	55	34
Assam	5025	4863	4710	4466	4185	4203	2907
Gujarat	5780	5331	5061	4653	4459	4605	3058
Rajasthan	6553	8593	9180	8848	8602	8165	5234
Tamil Nadu	247	238	226	240	255	284	232
Total (a)	**18027**	**19441**	**19585**	**18537**	**17853**	**17588**	**11687**
of which							
OIL	3847	3661	3466	3412	3226	3258	2260
ONGC	7386	6944	6705	6069	5817	5934	4016
PSC Regime	6794	8836	9414	9056	8810	8396	5411
(b) Crude Oil-Offshore:							
ONGC	16330	15617	15541	16195	16543	16284	10971
PSC Regime	3733	2804	2663	2729	2546	2137	1285
Total (b)	**20063**	**18421**	**18203**	**18924**	**19089**	**18421**	**12256**
Grand Total (a+b+c)	**38090**	**37862**	**37788**	**37461**	**36942**	**36009**	**23943**
II. Production of Natural Gas (MMSCM)							
(a) Natural Gas-Onshore:							
Andhra Pradesh	1364	1249	1171	541	619	868	607
Arunachal Pradesh	40	41	41	34	30	28	18
Assam	2905	2910	2868	2958	3025	3128	2172
Gujarat	2173	2032	1657	1527	1490	1580	1107
Rajasthan	590	685	982	1178	1338	1277	952
Tamil Nadu	1285	1206	1304	1192	1011	983	803
Tripura	644	647	822	1140	1332	1430	954
Jharkhand (CBM)	4	3	3	2	2	3	3
Madhya Pradesh (CBM)	2	3	6	2	1	6	98
West Bengal (CBM)	79	101	156	224	389	555	370
Total (a)	**9084**	**8877**	**9012**	**8797**	**9237**	**9858**	**7083**

State/Region	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17 (P)	2017-18 (Apr-Nov) (P)
(1)							(8)
of which							
OIL	2633	2639	2626	2722	2838	2937	1960
ONGC	5751	5447	5316	4752	4770	5205	3754
PSC Regime	699	791	1069	1323	1629	1717	1369
(b) Offshore:							
ONGC	17565	18102	17968	17272	16406	16883	11896
PSC Regime	20910	13700	8428	7589	6605	5155	2957
Total (b)	**38475**	**31802**	**26395**	**24861**	**23012**	**22038**	**14853**
Grand Total (a+b)	**47559**	**40679**	**35407**	**33657**	**32249**	**31897**	**21936**

P: Provisional

CBM: Coal Bed Methane

Note: 1. Production of Crude oil includes Condensate
2.Figures may not tally due to rounding off

Source: ONGC, OIL & DGH

Appendix IV

Installed Capacity and Refinery Crude Throughput (in TMT)

Refinery / Location	Installed Capacity	Refinery Crude Throughput						
	01.12.2017	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17 (P)	2017-18 (Apr-Nov) (P)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(a) PUBLIC SECTOR	**142066**	**120895**	**120303**	**119547**	**121183**	**127087**	**137388**	**95266**
IOCL, Guwahati, Assam	1000	1058	956	1019	1006	904	864	681
IOCL, Barauni, Bihar	6000	5730	6344	6478	5944	6545	6526	3559
IOCL, Koyali, Gujarat	13700	14253	13155	12960	13285	13820	13994	8827
IOCL, Haldia, West Bengal	7500	8072	7490	7952	7650	7776	7689	5418
IOCL, Mathura, Uttar Pradesh	8000	8202	8561	6641	8515	8860	9230	5919
IOCL, Digboi, Assam	650	622	660	651	591	562	533	446
IOCL, Panipat, Haryana	15000	15496	15126	15098	14191	15282	15638	10254
IOCL, Bongaigaon, Assam	2350	2188	2356	2328	2403	2442	2486	1514
IOCL, Paradip, Odisha	15000	-	-	-	-	1817	8230	9244
Total IOC	**69200**	**55621**	**54649**	**53126**	**53586**	**58007**	**65191**	**45863**
BPCL, Mumbai, Maharashtra	12000	13355	13077	12684	12821	13371	13541	8960
BPCL, Kochi, Kerala	15500	9472	10105	10285	10356	10712	11820	8953
Total BPCL	**27500**	**22828**	**23183**	**22969**	**23177**	**24083**	**25362**	**17913**
HPCL, Mumbai, Maharashtra	7500	7506	7748	7785	7408	8013	8510	5709
HPCL, Visakh, Andhra Pradesh	8300	8682	8028	7776	8770	9220	9335	6369

Refinery / Location	Installed Capacity	Refinery Crude Throughput						
	01.12.2017	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17 (P)	2017-18 (Apr-Nov) (P)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Total HPCL	**15800**	**16189**	**15777**	**15561**	**16179**	**17234**	**17846**	**12078**
CPCL, Manali, Tamil Nadu	10500	9953	9105	10065	10251	9100	9725	6718
CPCL, Narimanam, Tamil Nadu	1000	611	640	559	531	544	531	313
Total CPCL	**11500**	**10565**	**9745**	**10624**	**10782**	**9644**	**10256**	**7031**
NRL, Numaligarh, Assam	3000	2825	2478	2613	2777	2520	2683	1894
ONGC, Tatipaka, Andhra Pradesh	66	69	57	65	51	67	86	53
MRPL, Mangalore, Karnataka	15000	12798	14415	14589	14632	15532	15965	10434
(b) PRIVATE SECTOR	**88200**	**81179**	**88273**	**88229**	**88533**	**88662**	**91093**	**61252**
RIL, Jamnagar, Gujarat	33000	32497	32613	30307	30867	32428	32823	22061
RIL, SEZ-Jamnagar, Gujarat	35200	35186	35892	37720	37174	37133	37351	25417
ESSAR Oil Ltd. Vadinar	20000	13496	19769	20202	20491	19101	20919	13774
(c) JOINT VENTURE	**17300**	**2048**	**10636**	**14721**	**13526**	**17116**	**16882**	**9313**
BORL, Bina, M.P.	6000	2048	5732	5450	6209	6402	6360	4414
HMEL, GGS, Bathinda, Punjab	11300	-	4904	9271	7318	10713	10521	4899
Total (a+b+c)	**247566**	**204121**	**219212**	**222497**	**223242**	**232865**	**245362**	**165831**

Note: Figures may not tally due to rounding off
Source: Oil Companies

P: Provisional

Appendix- V

Production of Petroleum Products (in TMT)

Products	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17 (P)	2017-18 (Apr-Nov) (P)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
LPG	9547	9825	10030	9840	10568	11326	7976
Motor Spirit	27186	30118	30275	32325	35321	36593	24812
Naphtha	18825	19018	18505	17391	17861	19946	13333
Kerosene	7861	7971	7418	7559	7503	6041	3012
ATF	10065	10088	11220	11103	11789	13831	9318
HSD	82880	91103	93759	94428	98588	102484	70603
LDO	502	400	423	358	429	629	306
Fuel Oil (FO+LSHS)	18433	15054	13405	11919	9727	9962	6722
Lube Oils	1028	896	941	946	1037	1029	627
Bitumen	4610	4670	4785	4632	5157	5185	3090
Petroleum Coke	7837	10943	12068	12448	13322	13936	9635
Others	14429	17650	17927	18188	20622	22589	16969
Total Production of Petroleum Products	**203202**	**217736**	**220756**	**221136**	**231923**	**243551**	**166402**
of which							
Refineries	**198561**	**213219**	**216456**	**217141**	**227907**	**239256**	**163373**
Fractionators	**4640**	**4518**	**4300**	**3994**	**4016**	**4294**	**3029**

Note: Figures may not tally due to rounding off
P: Provisional
Source: Oil Companies

Appendix- VI

Consumption of Petroleum Products (in TMT)

Products	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17 (P)	2017-18 (Apr-Nov) (P)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
LPG	15350	15601	16294	18000	19623	21608	15224
Motor Spirit	14992	15744	17128	19075	21847	23765	17370
Naphtha	11222	12289	11305	11082	13271	13241	8091
SKO	8229	7502	7165	7087	6826	5397	2609
ATF	5536	5271	5505	5723	6262	6998	4933
HSDO	64750	69080	68364	69416	74647	76027	53383
LDO	415	399	386	365	407	449	307
Fuel Oil (FO+LSHS)	9307	7656	6236	5961	6632	7150	4497
Lubes/Greases	2633	3196	3305	3310	3571	3470	2364
Bitumen	4638	4676	5007	5073	5938	5935	3427
Petroleum Coke	6138	10135	11756	14558	19297	23964	17589
Others	4924	5509	5956	5870	6352	6593	4805
Total Consumption	**148132**	**157057**	**158407**	**165520**	**184674**	**194597**	**134599**

Note: Consumption includes sales by oil companies, own consumption & direct private imports.
P: Provisional
Source: PPAC

Appendix -VII

Annexure-V

Imports / Exports of Crude Oil and Petroleum Products

(Figures of Qty in TMT & Value in ₹ Crore and Million USD)

ITEM	2011-12			2012-13			2013-14			2014-15			2015-16			2016-17			2017-18 (Apr-Nov) (P)		
	TMT	Crore	Million USD	TMT	Crore	Million USD	TMT	Crore	Million USD	TMT	Crore	Million USD	TMT	Crore	Million USD	TMT	Crore	Million USD	TMT	Crore	Million USD
Imports																					
Crude Oil	171,729	672,220	139,690	184,795	784,652	144,293	189,238	864,875	142,962	189,435	687,416	112,744	202,850	416,579	63,972	213,932	470,159	70,196	144,721	342,673	53,104
Product																					
LPG	5,790	27,019	5,584	6,301	31,674	5,803	6,567	37,213	6,144	8,313	36,571	5,955	8,959	25,778	3,922	11,097	32,124	4,775	7,641	24,418	3,765
MS	654	3,311	716	147	891	160	235	1,481	248	372	2,301	375	1,012	4,207	648	476	1,617	239	174	581	91
Naphtha	2,091	9,827	2,022	1,762	9,272	1,691	1,020	6,044	982	1,034	4,592	744	2,931	9,581	1,463	2,777	8,374	1,240	1,172	3,665	565
ATF	0	0	0	0	0	0	0	0	0	140	706	114	286	889	135	338	1,109	163	183	621	96
SKO	564	2,710	597	0	0	0	0	0	0	30	172	29	41	158	25	0	0	0	0	0	0
HSD	1,059	5,039	1,096	528	2,771	507	77	452	74	124	670	108	177	605	92	1,008	2,959	438	1,250	3,800	588
LDO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LOBS/ Lube oil	1,434	8,314	1,708	1,977	11,339	2,068	2,090	12,985	2,122	2,148	12,702	2,067	2,264	9,478	1,439	2,131	8,625	1,276	1,530	6,287	968
Fuel Oil	1,203	4,392	912	1,038	4,218	778	1,331	5,759	942	902	3,659	599	1,170	2,380	363	925	1,848	273	676	1,619	249
Bitumen	78	197	40	102	272	50	246	801	132	517	1,623	262	879	1,832	279	951	1,638	242	538	982	151
Petcoke	1,814	2,616	542	3,339	3,414	623	3,571	4,082	664	6,165	5,383	870	10,041	5,633	853	14,416	7,929	1,174	8,966	6,878	1,058
Others	1,163	4,666	972	1,162	5,001	911	1,559	7,080	1,158	1,557	6,266	1,015	1,694	4,821	733	2,169	5,342	793	1,630	4,405	679
Total Product Import	15,849	68,091	14,189	16,354	68,852	12,590	16,697	75,896	12,466	21,301	74,644	12,138	29,456	65,361	9,952	36,287	71,566	10,614	23,761	53,258	8,211
Total Import	187,579	740,311	153,879	201,149	853,504	156,883	205,935	940,771	155,427	210,736	762,060	124,882	232,306	481,940	73,924	250,219	541,725	80,810	168,482	395,931	61,315
Exports																					
LPG	174	947	195	200	1,294	236	227	1,589	260	254	1,455	236	195	785	120	317	1,168	173	231	911	140
Petrol	14,524	73,982	15,478	16,657	95,346	17,528	15,247	92,977	15,397	16,048	81,971	13,454	16,817	59,575	9,120	15,417	52,920	7,895	9,297	34,093	5,282
Naphtha	10,139	45,620	9,482	8,647	43,533	7,992	8,322	46,059	7,584	7,008	31,619	5,176	7,116	20,057	3,071	8,727	24,616	3,666	5,999	18,175	2,812

ITEM	2011-12			2012-13			2013-14			2014-15			2015-16			2016-17			2017-18 (Apr-Nov) (P)		
	TMT	Crore	Million USD	TMT	Crore	Million USD	TMT	Crore	Million USD	TMT	Crore	Million USD	TMT	Crore	Million USD	TMT	Crore	Million USD	TMT	Crore	Million USD
Aviation Turbine Fuel	4,561	21,857	4,568	4,664	25,223	4,645	5,745	33,246	5,487	5,520	25,413	4,155	5,686	16,007	2,440	7,271	22,294	3,324	4,511	14,679	2,273
Kerosene	34	191	39	23	140	25	15	98	16	15	81	13	10	35	5	15	54	8	12	44	7
Diesel	20,407	104,572	21,746	22,464	115,554	21,253	26,469	148,138	24,336	25,559	115,149	18,865	24,037	66,492	10,180	27,302	79,857	11,905	19,680	61,872	9,576
LDO	84	331	69	9	42	8	30	135	22	6	28	5	0	0	0	151	399	59	18	37	6
Lubes	27	181	36	59	381	65	20	138	27	11	100	16	17	127	20	13	104	15	10	77	12
Fuel Oil	7,895	25,576	5,312	5,922	20,415	3,757	6,159	22,407	3,671	4,762	14,251	2,321	2,806	4,471	688	2,248	3,930	583	1,913	3,827	591
Bitumen	5	27	6	87	281	52	95	321	52	94	245	40	101	176	27	38	37	6	55	92	14
Petcoke/ CBFS	726	1,584	330	1,317	2,636	483	1,698	3,980	645	613	1,806	295	840	750	115	673	804	121	294	336	52
Others	2,262	9,777	2,057	3,358	15,244	2,805	3,838	19,189	3,169	4,041	16,462	2,700	2,914	8,304	1,275	3,344	8,710	1,294	2,290	6,360	984
Total Export	60,837	284,644	59,319	63,408	320,090	58,848	67,864	368,279	60,664	63,932	288,580	47,277	60,539	176,780	27,059	65,513	194,893	29,049	44,310	140,503	21,748
Net Import	126,741	455,667	94,560	137,742	533,415	98,035	138,071	572,492	94,763	146,804	473,481	77,605	171,768	305,160	46,865	184,706	346,832	51,760	124,172	255,428	39,567
Net Product Export	44,988	216,553	45,130	47,054	251,238	46,258	51,167	292,383	48,199	42,631	213,936	35,139	31,083	111,419	17,107	29,226	123,327	18,436	20,549	87,245	13,537
Source: Oil companies and DGCI&S																				(P): Provisional	

Appendix VIII

Plan Outlay & Actual Expenditure

Annexure-VI A

Actual Expenditure during 2013-14 to 2016-17

(Figures in ₹ Crore)

Sl. No.	CPSE	2013-14	2014-15	[illegible]	2016-17 *
		Actual	Actual	Actual	Actual
A. Plan Outlay of Oil & Gas CPSEs					
1	OVL	35357.00	7171.55	6470.24	17616.99
2	ONGC	32469.54	29997.46	30110.43	28006.41
3	OIL	9350.97	3773.76	3622.65	11083.24
4	GAIL	4069.78	1632.18	1511.00	1814.05
5	IOCL	16660.61	14313.68	11484.74	20736.93
6	HPCL	2641.87	2669.61	1427.86	5757.26
7	BPCL	4373.58	6874.75	8287.00	16948.55
8	MRPL	1448.74	2747.36	1502.03	616.40
9	CPCL	228.60	465.90	1272.02	1269.11
10	NRL	372.14	102.77	70.27	503.35
11	BALMER LAWRIE	119.55	79.79	45.37	73.75
	Total	107092.38	69828.81	65803.61	104426.04
B. Gross Budgetary Support (GBS) of MoPNG					
1	Scheme for LPG connection to Poor Households- PMUY (Ujjwala)	0.00	0.00	0.00	2500.00
2	Rajeev Gandhi Institute of Petroleum Technology (RGIPT)	0.00	0.00	48.00	100.00
3	Payment to Indian Strategic Petroleum Reserve Ltd. (ISPRL) for strategic Crude Oil Reserve	0.00	0.00	1153.00	2001.00
4	Setting up Petroleum University in Andhra Pradesh (Indian Instt. of Petroleum Energy)	0.00	0.00	0.00	32.00
5	Financial Aid for Phulpur-Dhamra-Haldia Pipeline Project of GAIL	0.00	0.00	0.00	450.00
	Total GBS	0.00	0.00	1201.00	5083.00

* = Provisional

Annexure-VI-B

BE for 2017-18 and Actual Expenditure (April-Dec 2017)

(Figures in ₹ Crore)

Sl. No.		2017-18 ***	
		BE	Actual (Apr-Dec.17) *
A. IEBR of Oil & Gas CPSEs			
1	OVL	7088.00	4042.45
2	ONGC	29967.82	26497.76
3	OIL	9252.34	7213.78
4	GAIL	2053.00	2039.51
5	IOCL	20161.79	12569.30
6	HPCL	7110.00	3959.44
7	BPCL	7100.64 **	4371.58 **
8	MRPL	1137.75	594.29
9	CPCL	845.00	648.25
10	NRL	1260.95	230.19
11	BALMER LAWRIE	50.00	65.77
	Total (A)	**86027.29**	**62232.32**
B.Central Expenditure of MoPNG ***			
1	Scheme for LPG connection to Poor Households- PMUY (Ujjwala)	2500.00	2251.81
2	Rajeev Gandhi Institute of Petroleum Technology (RGIPT)	135.10	121.75

Sl. No.		2017-18 ***	
		BE	Actual (Apr-Dec.17) *
3	Payment to Indian Strategic Petroleum Reserve Ltd. (ISPRL) for strategic Crude Oil Reserve	2499.00	1121.28
4	ISPRL Phase-II (Construction of Caverns)	1.00	0.00
5	Setting up Petroleum University in Andhra Pradesh (Indian Instt. of Petroleum Energy)	145.20	0.00
6	Centre of Excellence for Energy Assam & Bangalore	2.00	0.00
7	Financial Aid for Phulpur-Dhamra-Haldia Pipeline Project of GAIL	1200.00	400.00
8	Direct Benefit Transfer for LPG (DBTL)	13097.13	13097.13
9	Other Subsidy for LPG payable including NE Region	454.00	282.39
10	Project Management	25.00	25.00
11	Direct Benefit Transfer for Kerosene (DBTK)	150.00	34.25
12	Other Subsidy for Kerosene payable including NE Region	8661.87	8661.87
13	ISPRL :O&M Expenses	79.00	19.93
14	Petroleum and Natural Gas Regulatory Board (PNGRB)	18.34	12.29
15	Society for Petroleum Laboratory (SFPL)	2.69	1.31
16	Secretariat Economic Services	30.99	24.18
	Total (B)	**29001.32**	**26053.19**

* Provisional

** In case of BPCL, due to printing error ₹ 700 crore proposed for petrochemicals has not been accounted for in BE 2017-18, and it is being taken up in RE for 2017-18.

*** With effect from Financial Year, 2017-18, distiction between Plan & Non-Plan has ceased; Central Expenditure comprises Revenue and Capital. This excludes transfers to States.

Appendix IX

PSU-Wise write-up on variation in Profit Before Tax (PBT) and Profit After Tax (PAT) 2017-18 vis-a-vis 2016-17 (₹ in Crore)

Proforma

(₹ in Crore)

Sl.No.	Name of PSUs	Profit Before Tax (PBT		Profit After Tax (PAT)		% of GoI holdings as on 31.03-17
		2016-17 Actual	2017-18 (Expected)	2016-17 (Actual)	2017-18 (Expected)	
1.	ONGC	25,216.00	25,606.00	17,900.00	17,519.00	68.07%
2.	OVL *	1,306.87	1555.45	700.99	746.73	-
3	IOCL	26,321.24	23,000.00	19,106.40	15,000.00	57.34%
4.	GAIL	5,411.00	4,957.00	3,503.00	3,301.00	54.43%
5.	HPCL	9021.00	7340.00	6209.00	4800.00	51.11%
6.	OIL **	2146.32	2453.56	1548.68	1604.43	66.60%
7.	BPCL	11,042.79	9,786.84	8,039.30	6,504.34	54.93%
8.	MRPL	5,531.42	1,683.59	3,643.69	1,100.93	Nil
9.	CPCL ***	1365.00	673.00	1030.00	440.00	Nil#
10.	NRL ****	3,147.57	2,581.77	2,100.57	1,674.09	Nil
11.	EIL	500.00	335.00	325.00	219.00	57.02%
12.	BALMER LAWRIE	40.88	55.30	38.80	53.53	59.67%
13.	BieccoLawrie	-13.05	-14.07	-13.02	-14.07	99.56%
	Total :	**91037.04**	**80013.40**	**64132.41**	**52948.98**	

* RE 2017-18 is yet to be finalized/approved by ONGC VideshLtd's Board of Directors, hence MoU 2017-18 figures are being provided.

** expected PBT and PAT for 2017-18 are as per Annual Plan projection for 2017-18(RE).

*** CPCL is a subsidiary of IndianOil Corporation Ltd. (GOI Transferred its entire Shareholding of 7,72,65,200 equity shares of ₹10/- each (51.89%) in favour of IndianOil Corporation Ltd. effective 29.03.2001) and Govt of India share holding is Nil.

**** GOI does not holding any shares in NRL directly. The company is a subsidiary of Bharat Petroleum Corporation Ltd. (BPCL), which holds 61.65% equity. The other shareholders are Oil India Ltd. (26.00%) and Government of Assam (12.35%).

Appendix X

(1) (i) **Paras contained in Inspection Reports:** A total of 44 Inspection Reports/Paras were outstanding against this Ministry as on 03.03.2017. As on date, 26 paras have been settled in the latest audit held during 03.03.2017 to 19.05.2017 and 17 new paras have been added for the Financial Year 2015-16. Hence, as per the latest intimation by the Audit on 28.07.2017, a total of 35 IR Paras have been shown pending including new paras for the year 2015-16.

Summary of Report No. 9 of 2017- General Purpose Financial Reports on CPSEs

This Report includes important audit findings noticed as a result of test check of accounts and records of Central Government Companies and Corporations conducted by the officers of the Comptroller and Auditor General of India under Section 143 (6) of the Companies Act, 2013 or the statutes governing the particular Corporations.

Failure in submitting Operational Safety Documents by ONGC Campos Limitada (subsidiary of ONGC Videsh Limited) prior to 90 days of starting of drilling, as required, led to idling of rig for 118 days and consequently a wasteful expenditure of ₹134.73 crore was incurred during June to October 2011.

(Para 10.10)

Ministry of Petroleum and Natural Gas (MoPNG) directed (October 2009), Oil & Natural Gas Corporation (ONGC) to procure 23 Immediate Support Vessels (ISVs) from its own funds for operations by Indian Navy for security of offshore assets. The cost of this was to be shared by all companies engaged in Exploration and Production (E&P) of oil, having a foot print in offshore areas. Though ONGC purchased all 23 ISVs at a total cost of ₹ 349 crore and delivered them to the Navy in July 2015, MoPNG had not finalised the cost sharing mechanism of the ISVs by other private and public sector E&P Operators. This resulted in blocking of funds of ONGC to the tune of ₹ 136.84 crore relating to share of capital expenditure pertaining to other Operators and loss of interest thereon to the tune of ₹ 15.39 crore.(Para 10.9)

Bharat Petroleum Corporation Limited and Hindustan Petroleum Corporation Limited did not exclude the delivery charges while communicating Retail Selling Price of Liquefied Petroleum Gas (LPG) to distributors of Rajiv Gandhi Grameen LPG Vitraks (RGGLV). This resulted in additional burden on the RGGLV consumers and undue financial benefits to the RGGLV distributors to the tune of ₹ 168.04 crorefor the period October 2012 to March 2016.

(Para 10.3)

Summary of Report No. 33 of 2017- Performance Audit "Planning and Implementation of Phase III Expansion Projects of Mangalore Refinery & Petrochemicals Limited"

Mangalore Refinery and Petrochemicals Limited, in the year 2006, decided to undertake a refinery upgradation project with an estimated cost of ₹ 7,943 crore. The objective of the Project was to increase the refinery capacity from 11.82 MMTPA to 15 MMTPA and to enhance the production of value added products. In June 2010, the estimated cost stood revised to ₹ 15,008 crore due to change in the scope of the Project. The project, which was initially proposed to be completed in June 2010, was actually completed in June 2015.

The planning, execution and commissioning of units under the project and its impact on refinery operations during 2011-16, were reviewed during the course of Performance Audit. Significant audit findings are detailed below:

- Deficiency in planning, due to lack of clarity regarding revamping of existing units and commissioning of additional units, led to time over run of more than two years and cost overrun of ₹ 2,509 crore.

(Paragraph 2.1.1)

- The Company availed External Commercial Borrowings without hedging the associated currency fluctuation risk. The Company lost approximately ₹ 13.70 crore (net of currency hedging cost) due to exchange rate variation on loan repayments (up to September 2016) and may incur further losses in case of non-strengthening of the rupee against USD.

(Para 2.2.1)

- The Company drew funds for the project in excess of its requirements due to which ₹ 768.46 crore was lying idling in non-interest bearing current account.

(Paragraph 2.2.2)

- Out of 87 major contracts reviewed in Audit, there were delays in execution of formal contract in 84 cases after issuance of Letter of Acceptance.

(Paragraph 2.3.2)

- Delayed commissioning of Captive Power Plant resulted in idling of various processing units for a period ranging from 11 to 26 months, even though the same had been mechanically completed.

(Paragraph 2.4.1)

- Savings in freight, avoidance of demurrage and improvement in Gross Refinery Margin as envisaged while the decision for setting up of Single Point Mooring facility was taken, were actually not achieved.

(Paragraph 2.5.5)

- Non synchronisation of revamped Hydrocracker units with Petrochemical Fluidized Catalytic Cracking unit led to production of low value products in place of high value products during the period from 2011-12 to 2014-15 which resulted in loss of revenue of ₹ 6328.76 crore.

(Paragraph 3.3)

- Non production of Propylene as per the designed yield and its non conversion to Poly Propylene, a high value product, in the Poly Propylene Unit during the period from August 2014 to May 2015 resulted in a loss of margin of ₹ 382.83 crore.

(Paragraph 3.6.2)

- The processing units consumed Steam in excess of norms and incurred extra expenditure of ₹ 231.94 crore.

(Paragraphs 4.1)

- There were delays in complying with environmental directives.

(Paragraphs 5.1, 5.2 and 5.3)

Decrease in estimated profitability for RE 2017-18 vs. FY 16-17 is mainly due to decrease in profit from marketing of Natural Gas and decrease in average price realization from sale of Petrochemical products by 4%.

IOCL

Variation in estimated profit before tax in 2017-18 vis-à-vis 2016-17 is mainly on account of estimated inventory losses during FY 2017-18 as against inventory gains in FY 2016-17.

HPCL

Profit Before Tax of Rs.9021 crore for FY 2016-17 includes Marketing Inventory gain of about Rs.2400 crore. Whereas in Q1 of FY 2017-18, HPCL incurred Marketing Inventory loss of about Rs.900 crores. Normal Corporate tax rate of 34.608% considered for calculation of Profit After Tax for FY 2017-18.

BPCL

Because of price fluctuation of crude and other products in FY 2017-18 vis-à-vis FY 2016-17, profits of FY 2017-18 will be lower as compared with FY 2016-17.

Balmer Lawrie

Reason for increase in PBT and PAT for the year 2017-18 as compared to 2016-17 is mainly due to higher dividend received from its subsidiary Company (Balmer Lawrie & Co. Ltd.) and reduction in tax rates.

MRPL

1. The difference between PBT of 2016-17 & estimated PBT of 2017-18 is mainly on account of the following reasons.

a. Exceptional item of Income of Rs.1,597.29 Crore in FY 2016-17 on account of exchange rate variation arising out of settlement of overdue trade payable to NIOC which got accumulated on account of non finalization of remittance channel. Such income is not to arise in FY 2017-18.

b. Reduction in Interest Income in FY 2017-18 compared to FY 2016-17 is due to non availability of surplus money on account of overdue payments. On the contrary, interest expense would arise in FY 2017-18 due to gap in working capital.

2. The reduction in estimated PBT in FY 2017-18 as compared to PBT of FY 2016-17 results in consequential reduction in PAT in FY 2017-18 compared to FY 2016-17.

3. Income tax provision for the FY 2016-17 & 2017-18 is under Minimum Alternate tax (MAT). Further provision for deferred tax assets / (liabilities)(net) has also been provided.

Biecco Lawrie

The company suffered losses in 2016-17 due to operational difficulties caused by continuous non availability of working capital. Company is expected to return higher loss in 2017-18 based on the current trend of diminishing operating activity due to lack of working capital.

APPENDIX- XI

Position of ATN in respect of Audit Observations included in the Annual Report as well as those included in earlier Annual Reports

Sl. No.	Year	No. of Paras/PA reports on which ATNs have been submitted to PAC/ COPU after vetting by Audit	Details of the Paras/PA reports on which ATNs are pending		
			No. of ATNs not sent by the Ministry even for the first time	No. of ATNs sent but returned with observations and Audit is awaiting their re-submission by the Ministry	No. of ATNs which have been finally vetted by Audit but have not been submitted by the Ministry to PAC/COPU
1	2003	3	-	-	-
2	2004	21	-	1	-
3	2005	49	-	1	-
4	2006	31	-	-	-
5	2007	27	-	-	-
6	2008	23	-	3	-
7	2009-10	14	-	3	-
8	2010-11	5	-	2	-
9	2011-12	4	-	4	-
10	2012-13	4	-	3	-
11	2013	-	1	4	-
12	2014	-	2	5	-
13	2015	-	9	-	-
14	2016	3	12	-	-
15	2017	3	3	18	6

सत्यमेव जयते

Ministry of Petroleum & Natural Gas
Government of India
Shastri Bhawan, Dr. Rajendra Prasad Road, New Delhi - 110001
Website : www.petroleum.nic.in
Phone : 91-11-23383692, Fax : 91-11-23383585
Facilitation Counter : 91-11-23388624