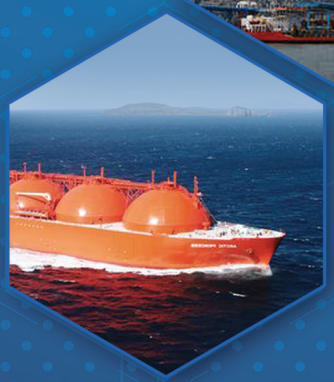










सत्यमेव जयते

पेट्रोलियम और प्राकृतिक गैस मंत्रालय
भारत सरकार
Ministry of Petroleum and Natural Gas
Government of India

ANNUAL REPORT 2020-21



Accelerating efforts to move towards a gas-based economy, Cleaner Use Of Fossil Fuels particularly Petroleum and Coal; Greater reliance on domestic sources to drive biofuels; Achieving renewables target of 450 GW by 2030; Increasing contribution of electricity to de-carbonize mobility; Moving into emerging fuels including hydrogen; and digital innovation across all energy systems are seven key drivers of New Energy Map of India

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CHAPTER 1

Introduction

Introduction

1.1 Shri Dharmendra Pradhan continues to hold the charge of Minister for Petroleum & Natural Gas with effect from 31st May, 2019.

1.2 Shri Tarun Kapoor, IAS (HP: 1987) assumed the charge of Secretary in the Ministry of Petroleum & Natural Gas with effect from 1st May, 2020.

1.3 Shri Rajesh Aggarwal, IAS (MH: 1989), continues to hold the charge of Additional Secretary & Financial Advisor in the Ministry of Petroleum & Natural Gas w.e.f. 18th December, 2019.

1.4 Ms. Usha Suresh, IES: 1986, assumed the charge of Senior Economic Adviser in the Ministry of Petroleum & Natural Gas with effect from 27th July, 2020.

1.5 Shri B.N. Reddy, IFS: 1993, continues to hold the charge of Joint Secretary in the Ministry of Petroleum & Natural Gas with effect from 27th February, 2019.

1.6 Shri Amar Nath, IAS (AGMUT: 1994) continues to hold the post of Joint Secretary in the Ministry of Petroleum & Natural Gas with effect from 1st June, 2016.

1.7 Shri Sunil Kumar, IRAS: 1995, continues to hold the charge of Joint Secretary in the Ministry of Petroleum & Natural Gas with effect from 1st May, 2019.

1.8 Shri Ashish Chatterjee, IAS (TN: 1999) continues to hold the post of Joint Secretary in the Ministry of Petroleum & Natural Gas with effect from 2nd November, 2016.

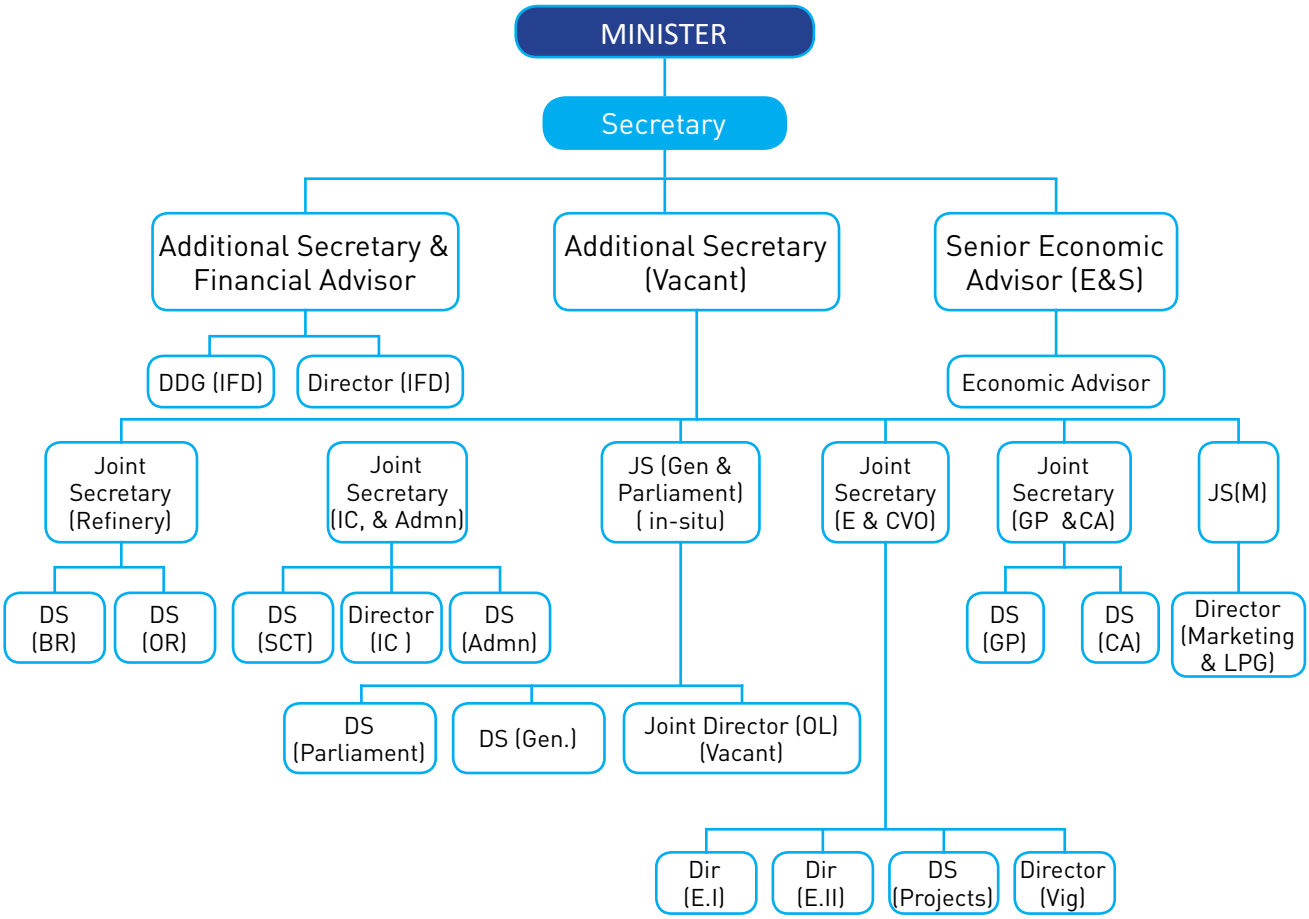
1.9 Shri Navneet Mohan Kothari, IAS (MP: 2001) assumed the charge of Joint Secretary in the Ministry of Petroleum & Natural Gas with effect from 12th March, 2020.

1.10 Shri Rohit Mathur, CSS, assumed the charge of Joint Secretary (in-situ) in the Ministry of Petroleum & Natural Gas with effect from 17th January, 2020.

1.11 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.

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

OrganizationAL Chart
of the Ministry of Petroleum & Natural Gas
AS ON 10.02.2021



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

1.13. Introduction

India is the third largest energy consumer in the world after China and USA. It is also the fastest growing energy consumer, consuming around 806.1 million tonne of oil equivalent (MTOE) in 2019. With a share of 5.8% of the World's primary energy consumption, India's energy requirement is fulfilled primarily by Coal, Crude Oil, Natural Gas and Renewable Energy. Oil and gas sector within the energy mix play a predominant role as over one third of the energy required is met by hydrocarbons. Notwithstanding the COVID pandemic, India's energy sector including Oil and Gas sector has bounced back with resilience. The Country's energy demand has almost recovered back to pre Covid level, particularly for petroleum products, on the back of rejuvenation of economic activities. Government has kept fuel supplies running across the country without interruption during the COVID-19 lockdown period. Taking note of the crucial nature of this sector in people's lives, the following key initiatives were announced in Budget 2021:

- Ujjwala Scheme which has benefited 8 crores households would be extended to cover 1 crores more beneficiaries.100 more districts in next 3 years to be added the City Gas Distribution network.
- 100 more districts in next 3 years to be added the City Gas Distribution network.
- A gas pipeline project will be taken up in Union Territory of Jammu & Kashmir.
- An independent Gas Transport System Operator will be set up for facilitation and coordination of booking of common carrier capacity in all-natural gas pipelines on a non-discriminatory open access

Government has spearheaded a number of policy reforms and initiatives for increasing production and exploitation of domestic petroleum resources to address the priorities like Energy Access, Energy Efficiency, Energy Sustainability and Energy Security. These are also expected to remove obstacles to infrastructure investment in oil and gas sector on the lines of ease of doing business, minimum government maximum governance and promote Make-in-India initiative.

1.14: Reforms in Exploration and Licensing Policy:

Government notified 'Reforms in Exploration and Licensing Policy for enhancing domestic exploration and production of oil and gas' on 28th February 2019 with the objective to intensify exploration activities, attract foreign and domestic investment and enhance domestic production. The major features of Policy Reforms are as under:

i. Shifting of focus from 'revenue' to 'production' Maximization.

ii. No Revenue Sharing with Government in Category- II & III sedimentary basins.

iii. Boost to exploration activities by assigning greater weightage to exploration work programme.

(a) For unexplored areas in Category I basins, 70% weightage to Minimum Work Programme and 30% weightage to Revenue Sharing with cap of 50% at Highest Revenue Sharing point (HRP) and

(b) For Category II and III sedimentary basins 100% weightage for Minimum Work Programme,

iv. Shorter exploration period for early development.

v. Fiscal concessions for early monetization and commercial production.

vi. Marketing and Pricing freedom for natural gas.

vii. The policy envisages bidding out of 66 small and marginal producing nomination fields operated by National Oil Companies (NOCs) to have collaboration with private E&P players for inducting new and innovative technology, infusing fresh investment and best management practices to enhance production of oil and gas by adopting Enhanced Oil Recovery/Improved Oil Recovery (EOR/IOR) methods. NIO for

bidding out 66 fields issued by ONGC and OIL in end June 2019. However, ONGC awarded 49 fields under 13 contract areas and OIL awarded 01 field in May'20.

viii. The MoU of ONGC and OIL were restructured with 50% weightage for physical production, other physical parameters 30%. Financial performance parameters 20%.

ix. Redefining the Role of DGH by delegation of additional powers and functions to DGH to strengthen the compliance/regulatory, developmental and coordination role of DGH.

x. Simplified and investor friendly Model Bid documents including increasing of bidding cycle frequency from twice to thrice in a year.

xi. Natural Gas Marketing Reforms.

xii. Guidelines for Early Monetization of Hydrocarbon Discoveries.

xiii. Promoting Ease of Doing Business:

(a) Simplified contractual terms with emphasis on cutting down approvals of Government/DGH /Management Committee and expeditious grant of approvals.

(b) Setting up of Empowered Coordination Committee (ECC) under the chairmanship of Cabinet Secretary for expediting process of approvals.

(c) New Dispute Resolution Mechanism for amicable and speedy redressal of contractual dispute.

(d) Electronic Single Window mechanism based on IT workflow and processes for processing of approvals. Standard Operating procedures for grant of approvals under PSC have also been finalized.

(e) Simplification of Processes and Procedures for submission of documents on self-certification basis.

1.15: Hydrocarbon Exploration Licensing Policy (HELP):

The new Hydrocarbon Exploration Licensing Policy (HELP) for award of Hydrocarbon Acreages in the Upstream Sector of India was notified on 30thMarch, 2016 and formally launched w.e.f 1stJuly, 2017. Open Acreage Licensing Policy (OALP) is one of the key features of HELP which has been notified on 30th June,2017. Till Dec 2020, under HELP/Open Acreage Licensing Policy (OALP), five OALP bidding rounds have been concluded in which 105 exploration blocks have been awarded covering an area of approx. 156,580 sq. km.

1.16: National Data Repository (NDR):

National Data Repository (NDR) set up at DGH and launched on 28thJune, 2017 to make the entire Exploration and Production (E&P) data available for commercial exploration, research and development and academic purposes. Total data uploaded in NDR till 31st December 2020 is 2.582 Million Line Kilometres of 2D Seismic Data, 0.872 Million Square KiloMetres of 3D Seismic data and 19,190 number of exploratory wells and 39,903 number of Reports.

1.17: Discovered Small Field Policy (DSF):

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. The first bidding round under the DSF Policy was launched on 25th May, 2016, in which 30 contracts for 43 discovered small fields were signed with 20 companies in March, 2017. Subsequently, Government in April, 2018 had notified extension of Discovered Small Field (DSF) Policy for fast tracking monetization of un-monetized small fields / discoveries of Oil & Natural Gas Corporation (ONGC) and Oil India Limited (OIL) under the nomination regime and relinquished discoveries under the Production Sharing Contracts (PSC) regime. Under DSF Bidding Round-II, 59 discovered small fields/ unmonetized discoveries were offered for bidding. Total 23 contracts comprising 57 discoveries were signed in March, 2019 and 1 Contract comprising 1 discovery was signed in January, 2021.

1.18: National Seismic Programme (NSP) of unappraised areas-Planned 2D Seismic Survey for

48,243 LKM API :

The Government has taken up programme of undertaking 2D seismic survey of entire unappraised 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). As on 31st December, 2020, Surface Coverage of 45,141 LKM, out of 48,243 LKM 2D Seismic data acquisitionh as been achieved under Seismic this Programme leading to 93.5 % achievement.

1.19: Natural Gas Grid and City Gas Distribution (CGD): Natural Gas Grid and City Gas Distribution (CGD):

The country has about 17,900 km of operational natural gas pipeline. In order to promote the usage of natural gas as a fuel/ feedstock across the country and move towards a gas based economy, the development of additional 17.000 Km long gas pipeline is under way to complete the Natural Gas Grid (NGG). At present, the NGG in the country predominantly connects the western. northern and south-eastern gas markets with major gas sources. As a commitment to provide clean energy in the eastern part of the country, the Government has also 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. Government has approved 60% Capital Grant (upto Rs. 5,555 Crore) to Indradhanush Gas Grid Ltd for development of North East Region Gas Grid to ensure the availability of natural gas to all north eastern States i.e. Assam. Sikkim. Mizoram, Manipur, Arunachal Pradesh. Tripura. Nagaland and Meghalaya.

To make available natural gas to public at large, Government has put strong emphasis on expansion of City Gas Distribution (CGD) network coverage across the country. CGD networks ensures the supply of cleaner fuel (PNG) to households. Industrial & commercial units as well as transportation fuel (CNG) to vehicles. Till May 2014, coverage of CGD networks could be expanded to about 34 Geographical Areas (GAs) spread over 66 districts (part/full) in different part of the country. In 2014-17. additional 58 GAs spread over 70 districts (part/full) were covered for CGD networks till 81h round of CGD biddings. In 2018, with the successful conclusion of 9th CGD bidding round, the coverage of CGDs had been extended to additional 86 new GAs covering 174 districts (part/full) spread over 22 states and UTs. Further, in February 2019, 10th bidding round has also expanded the coverage of CGDs to additional 50 new GAs covering 124 districts (part/full) in 14 States. This has resulted in expansion of CGD coverage from 34 Geographical Areas (GAS) spread over 66 districts (partial/full) in May 2014 to 232 GAs spread over 407 districts till February 2019 with a potential to cover about 53% of the country's area and 70% of country's population.

1.20: ImplementationofBS-IV&BS-VI:

In a bid to reduce carbon emission, BS-IV autofuels has already been introduced in the parts of the country and it will be implemented in entire country w.e.f. 1.4.2017 in phased manner. The Government has further decided that the country will leap frog directly from BS-IV to BS-VI fuel standards which will be implemented in the country w.e.f., 01.04.2020. As a proactive measure, and considering the recent rise in environmental pollution in Delhi and NCR, the implementation of supply of BS-VI has been preponed w.e.f. 01.04.2018 in NCT-Delhi, followed by major parts of NCR from 1st April, 2019. The nationwide supply of BS-VI quality fuels commenced from 1st April, 2020.

1.21: Pradhan Mantri Ujjwala Yojana:

Pradhan Mantri Ujjwala Yojana" was launched with an objective 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. The Hon'ble Prime Minister of India formally launched the scheme on 01.05.2016. Later, the Government had decided to increase the target from 5 crore to 8 crore to be achieved by FY 2019-20. The Government has further extended the benefit of PMUY to such poor families who have been left out on account of their names not appearing in either the SECC list or 7 identified categories to cover all poor families of the country. Under this 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 Rs.

1600/- for each new connection.

The target of releasing 8 crore LPG connections under PMUY scheme has been achieved on 7th September, 2019, 7 months in advance of the target date of 31st March, 2020. Ujjwala Scheme which has benefited 8 crores households will now be extended to cover 1 crore more beneficiaries as per Union Budget 2021 announcement.

1.22: PAHAL (DBTL Scheme):

The 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. Later the scheme has been extended to all over the country and as on 01.02.2021, 27.08 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.

As a part of subsidy management, the 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 1.08 crore consumers giving up their LPG subsidy voluntarily.

1.23: Pradhan Mantri Garib Kalyan Package (PMGKP):

The Scheme for providing free of cost LPG cylinders for three months to PMUY beneficiaries was started w.e.f. 01.04.2020 under Pradhan Mantri Garib Kalyan Package (PMGKP). The Scheme was initially valid for three months i.e. April to June, 2020 and subsequently, was extended upto December, 2020 for those PMUY beneficiaries who were credited with the advances for buying cylinder, but were not able to buy the free LPG cylinders in the stipulated time. Under this Scheme, Rs. 9670.41 Cr has been transferred into the bank accounts of the PMUY beneficiaries for buying LPG refills. As on 31.12.2020, 14.17 crore free refills have been taken by PMUY beneficiaries under the PMGK package.

1.24: Promotion of Digital Payments:

There has been a significant expansion of digital payment infrastructure at retail outlets. As on 01.01.2021, 192104 POS terminals and 92663 e-wallet facility have been provided at 57369 petrol pumps across the country, 58641 retail outlets have been enabled with BHIM UPI. All the LPG Distributors and City Gas distribution companies are enabled with BHIM UPI.

1.25: Direct Benefit Transfer Kerosene (DBTK):

In order to insulate the common man from the impact of rise in international oil prices, the Government was modulating the retail selling prices of PDS Kerosene. Effective 1st March, 2020 the retail selling price of PDS Kerosene is being maintained at NIL under-recovery level on pan India basis. 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. In the year 2018-19 there was an overall reduction of 12% in the PDS Kerosene allocation given to the States in comparison to the allocation of 2017-18 and similarly a reduction of 30% for the year 2019-20 in comparison to the allocation of 2018-19. The allocation for 2020-21 has been further reduced by 26% in comparison to the allocation for 2019-20. Over and above the above reduction in the PDS Kerosene allocations, till date, 13 State Governments/UTs (Karnataka, Haryana, Telangana, Nagaland, Chandigarh, Gujarat, Andhra Pradesh, Bihar, Goa, Puducherry, Rajasthan, Maharashtra and Uttar Pradesh) have availed 'Cash incentive for voluntary cut in kerosene allocation' scheme. As on date, 9 State Governments/UTs have already cut down their PDS Kerosene allocation to nil.

1.26: Compressed Bio Gas Plants:

Compressed Bio Gas (CBG) is purified and

compressed biogas. which is produced through a process of anaerobic decomposition from various waste/ biomass sources like agriculture residue. cattle dung. sugarcane press mud & spent wash of distilleries. sewage water, municipal solid waste (MSW), biodegradable fractions of industrial waste etc.

"Sustainable Alternative Towards Affordable Transportation (SATAT)" initiative was launched on 1st October 2018 wherein Oil and Gas Marketing Companies are inviting Expression of Interest (EoI) from potential entrepreneur to procure CBG. The produced CBG would be supplied to Oil and Gas marketing companies under long term agreements of CBG off-take at an assured price. Further. bio manures produced from CBG plants has been included under Fertilizer Control Order 1985 as Fermented Organic Manure to facilitate its marketing. To address the concern of Entrepreneurs regarding financial resource. Reserve Bank of India has included CBG projects under Priority Sector Lending. SBI and Bank of Baroda have approved policy for debt funding of CBG projects under SATAT. Possibilities are also being explored to arrange soft loans for CBG projects from multilateral financial institutions. MNRE has extended Central Financial Assistance (CFA) Scheme for FY 2020-21. Under this initiative 641 Letters of Intent (LoIs) have been issued till 31st December 2020 and supply of CBG initiated from 8 plants. Leading private companies Adani Gas Ltd. JBM Renewables Private Ltd, Petronet LNG Ltd and Torrent Gas Private Ltd have signed MoU with MoPNG for establishing 900 CBG plants.

1.27: Energy Diplomacy:

The diplomatic approach of government has paved the path for building energy bridges to strengthen energy security & several aspects of clean energy transition. India's energy diplomacy is focused on sustaining and promoting energy engagements with countries rich in hydrocarbons resources, with prominent international organizations dealing with energy matters and global major energy companies. India's energy diplomacy has been playing the key role in responsible pricing by producing countries, renegotiation of contract for LNG supply, diversification of the sources of crude and LNG imports, promoting investment by global major energy company in India's oil & gas sector as well as maintaining uninterrupted supply of crude oil and LPG even after the turmoil in oil & gas sector due to ongoing pandemic. Through India's energy diplomacy, the energy cooperation has been strengthened by elevating from mere buyer-seller to level of strategic partners. The major producers like Saudi Arabia, UAE, USA and Russia have elevated the bilateral relation from mere buyer seller to strategic partners.

1.28: Energy Diplomacy during Covid-19 Pandemic:

The ongoing pandemic had left the oil & gas sector in distress. During the pandemic, India engaged at Ministerial level with key oil & gas exporting countries, heads of OPEC and IEA, as well as participated in multilateral fora including G 20 Extraordinary Energy Ministers' meeting and its follow-ups, to articulate its view point on evolving global oil & gas market stability as well as in ensuing the interests of consuming countries such as India are taken on board. The various meetings attended by Hon'ble Minister for Petroleum and Natural Gas Shri Dharmendra Pradhan are as under: -

- India-US Strategic Energy Partnership Ministerial Meeting: 17th July 2020.
- 4th High-level meeting of the India-OPEC Energy Dialogue: 5th November 2020.
- India-UAE HLTFI Ministerial meeting: 3rd November 2020.
- ADIPEC 2020: 6th November 2020.
- 7th IEF-IGU Ministerial Gas Forum: 3rd December 2020.
- World Economic Forum (WEF) Davos 2021: 28th January 2021.
- USISPF Annual Leadership Summit: 2nd World Solar Technology Summit: 8th September,2020.

To maintain the livelihood of the citizens, Hon'ble Prime Minister Shri Narendra Modi had announced 3 free LPG PMUY beneficiary to combat the pandemic. LPG, Hon'ble Minister Shri Dharmendra Pradhan, interacted with traditional allies of India and successfully ensured uninterrupted supply quantity of LPG. Government of India is constantly working to elevate the energy security of the country. Under India-US Strategic Energy Partnership(SEP) India and United States are exploring cooperation in the area of Strategic Petroleum Reserves. In this context, a Memorandum of Understanding for cooperation on Strategic Petroleum Reserves was signed during the second SEP Ministerial meeting on 17th July 2020.



1.29: Production of Oil, Gas and Petroleum Products:

The crude oil production during the year 2019-20 is at 32.17 Million Metric Tonnes (MMT) as against production of 34.20 MMT in 2018-19, showing a decline of 5.9%. Out of total crude oil & condensate production of 32.17 MMT in 2019-20, 64.1% (20.63 MMT) is from ONGC (nomination), 9.7% (3.11 MMT) from OIL (nomination) and 26.2% (8.44 MMT) from PSC regime. During April-December, 2020, oil production at 22.98 MMT registered a decline of 5.7% when compared with April-December, 2019 (24.34 MMT).

Natural Gas production during the year 2019-20 is at 31.18 Billion Cubic Meters (BCM) which is 5.1% lower than production of 32.87 BCM in 2018-19. Out of total natural gas production of 31.18 BCM in 2019-20, 76.1% (23.75 BCM) is from ONGC (nomination), 8.6% (2.67 BCM) from OIL (nomination) and 15.3% (4.77 BCM) from PSC regime. During April-December, 2020, gas production was 21.13 BCM which was 11.3% lower than production (23.82 BCM) during April-December, 2019.

The production of petroleum products is at 262.94 MMT in year 2019-20 as against 262.36 MMT achieved in 2018-19, showing marginally increase of about 0.2%. During 2019-20, Diesel (HSD+LDO) accounted for the highest production share (42.5%) followed by Petrol/Motor Spirit (14.7%), Naphtha (7.9%), Petcoke (5.9%), ATF (5.8%), LPG (4.9%), Fuel Oil (3.3%), Bitumen (2.0%), Kerosene (1.2%), Lubes (0.4%) and other petroleum product (11.5%). Production of petroleum products during April-December, 2020 were 169.07 MMT registered a decline of 13.5% when compared with April-December, 2019 (195.46 MMT) due to the erosion of demand due to COVID pandemic.

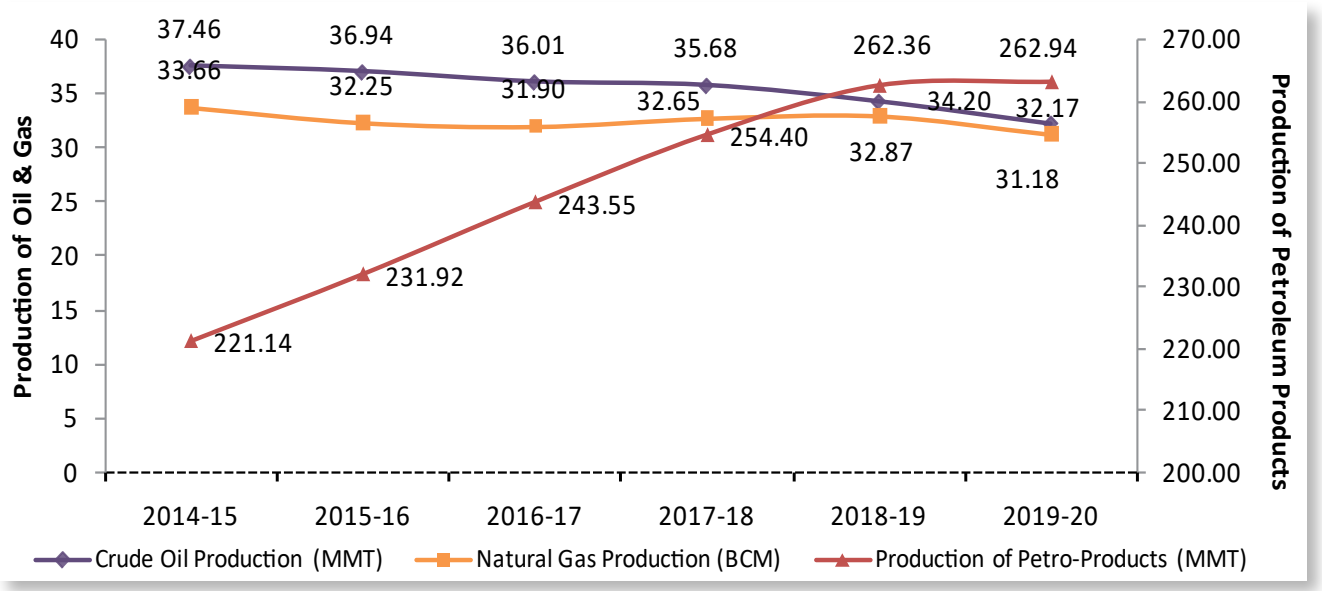
Shortfall in production of oil & gas was mainly due to declining production from old and marginal fields, delay in completion of some projects in western offshore, unplanned shutdown of wells, processing platform/plants, pipelines and bandh & blockade in Assam region, decline in demand due to lack of consumers due to Covid. Reasons of shortfall in Petroleum products mainly due to lower demand of petroleum product due to COVID-19 and plan shutdown.

The trend in the production of crude oil, natural gas is depicted below **(details in Annexure-I & III):**

Year	Crude Oil Production (MMT)	% Growth in Crude Oil Production	Natural Gas Production (BCM)	% Growth in Natural Gas Production	Production of Petro-Products (MMT)	% Growth in Production of Petro-Products
2014-15	37.46	-0.87	33.66	-4.94	221.14	0.17
2015-16	36.94	-1.39	32.25	-4.18	231.92	4.88
2016-17	36.01	-2.53	31.90	-1.09	243.55	5.01
2017-18	35.68	-0.90	32.65	2.36	254.40	4.46
2018-19	34.20	-4.15	32.87	0.69	262.36	3.13
2019-20	32.17	-5.95	31.18	-5.14	262.94	0.22
2019-20 (Apr-Dec)	24.38	-	23.82	-	195.46	-
2020-21 (Apr-Dec) (P)	22.98	-5.72	21.13	-11.30	169.07	-13.50

P: Provisional

Graph-1: Crude Oil & Natural Gas and Petroleum Products Production



1.30: Refining Capacity &Refinery Crude Throughput:

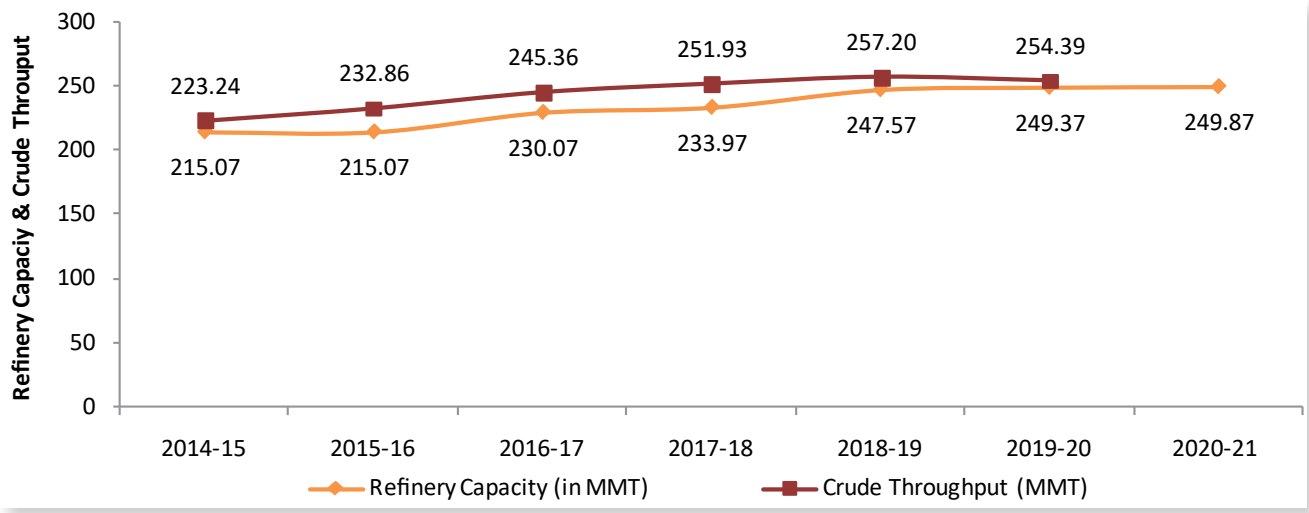
Indian refinery industry has done well in establishing itself as a major player globally. India, which is fourth largest refiner in the world and second largest refiner in Asia after China, is emerging as a refinery hub with refining capacity exceeding demand. The country's refinery capacity has increased to 249.87 MMTPA as on 01.04.2020. Refinery capacity utilisation is 102.01% for the year 2019-20. Crude Oil Processed for the year 2019-20 is 254.39 MMT as against 257.20 MMT in 2018-19, showing a decrease of about 1.1%. Crude processed during April-December, 2020was 160.36 MMT which is 15.77% lower than crude processed during Apr-December, 2019 (190.38 MMT). The trend in Refining Capacity and Crude throughput is depicted below **(details in Annexure -II).**

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

Year	Refinery Capacity @ (MMTPA)	% Growth in Refinery Capacity	Crude Throughput (MMT)	% Growth in Crude Throughput
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	251.93	2.68
2018-19	247.57	5.81	257.20	2.09
2019-20	249.37	0.73	254.39	-1.10
2019-20 (Apr-Dec)	249.37	-	190.38	-
2020-21 (Apr-Dec)	249.87	0.20	160.36 (P)	-15.77

P: Provisional @: As on 1st April of initial year

Graph-2: Refinery Capacity & Refinery Crude Throughput



1.31: Consumption of Natural Gas and Petroleum Products:

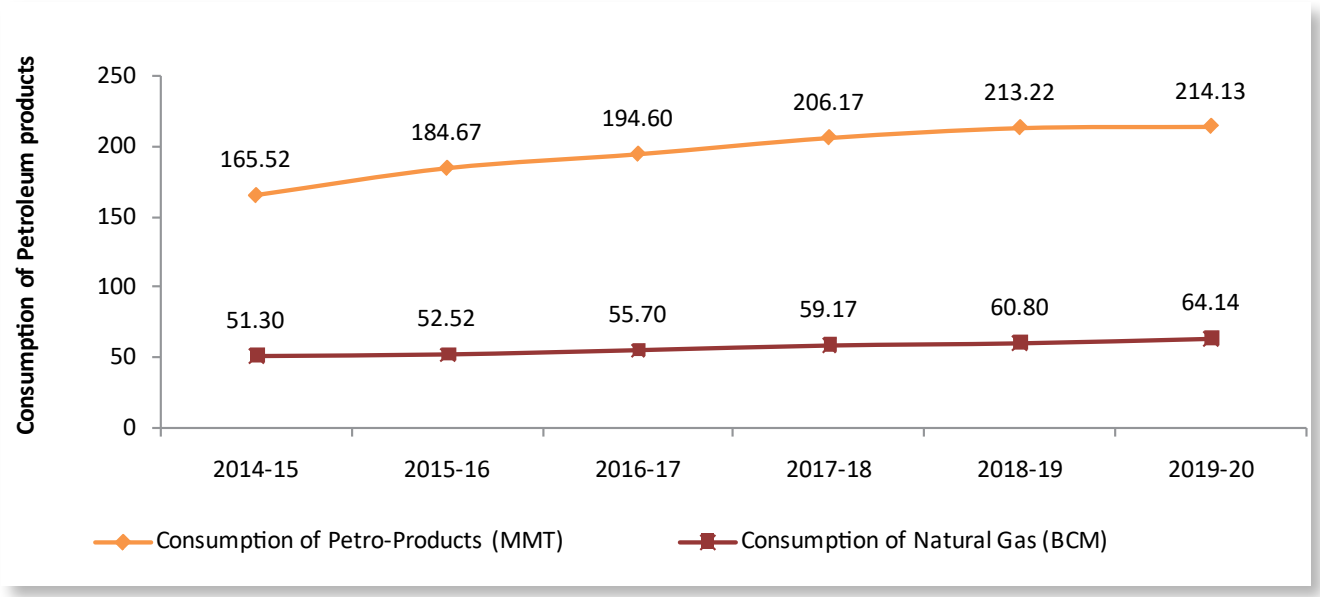
The consumption of gas was during the year 2019-20 is at 64.14 (BCM) which is 5.5% higher than consumption of 60.80 BCM in 2018-19. During April-December, 2020, gas consumption was 42.21 BCM which was 11.6% lower than consumption (47.73 BCM) during April-December, 2019.

Total consumption of petroleum products in the country during FY 2019-20 was 214.13 million metric tonnes (MMT) marking a growth of 0.4% over the consumption of 213.22 MMT during 2018-19. The Growth was observed in LPG (5.7%), Petrol (6.0%), Naphtha (1.0%), LDO (5.0%), LSHS (5.5%), Lubes (4.5%), Bitumen (0.2%) and Petroleum Coke (1.7%) in 2019-20 vis-a-vis 2018-19. The negative growth in consumption was observed for Kerosene (30.7%), Aviation Turbine Fuel (3.6%), HSD (1.1%), Fuel Oil (4.0%), Furnace Oil (4.6%) and Waxes (2.8%) in 2019-20 vis-a-vis 2018-19. During FY 2019-20, Diesel (HSD+LDO) accounted for the highest consumption share (38.9%) followed by Petrol/Motor Spirit (14.0%), LPG (12.3%), Petroleum Coke (10.1%), Naphtha (6.7%), ATF (3.7%), Bitumen (3.1%), Fuel Oil (2.9%), Lubes (1.8%) and Kerosene (1.1%). Consumption of petroleum products during April-December, 2020 were 140.62 MMT registered a decline of 12.8% when compared with April-December, 2019 (161.34 MMT). Lower demand of gas and petroleum products during the current year due to impact of Covid-19. Year-wise consumption of petroleum products and natural gas is depicted below **(details in Annexure IV).**

Table-3: Production and Consumption of Petroleum Products

Year	Consumption of Petro-Products (MMT)	% Growth in Consumption of Petro-Products	Consumption of Natural Gas (BCM)	% Growth in Consumption of Natural Gas
2014-15	165.52	4.49	51.30	-2.05
2015-16	184.67	11.57	52.52	2.37
2016-17	194.60	5.37	55.70	6.05
2017-18	206.17	5.95	59.17	6.24
2018-19	213.22	3.42	60.80	2.75
2019-20	214.13	0.43	64.14	5.50
2019-20 (Apr-Dec)	161.35	-	47.73	-
2020-21 (Apr-Dec)	140.62	-12.85	42.21	-11.57

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



1.32: Import & Price of Crude Oil:

Import of crude oil during 2019-20 was 226.95 MMT valued at ₹ 717001 crore as against import of 226.50 MMT valued at ₹ 783183 crore in 2018-19 which marked an increase of 0.2% in quantity terms but 8.4% decrease in value terms as compared to the import of crude oil during 2018-19. Imports of crude oil was 143.23 MMT valued at ₹ 293752 crore during April-December, 2020 which is lower by 15.1% & 46.63% lower in quantity and value terms respectively when compare to corresponding period of last year.

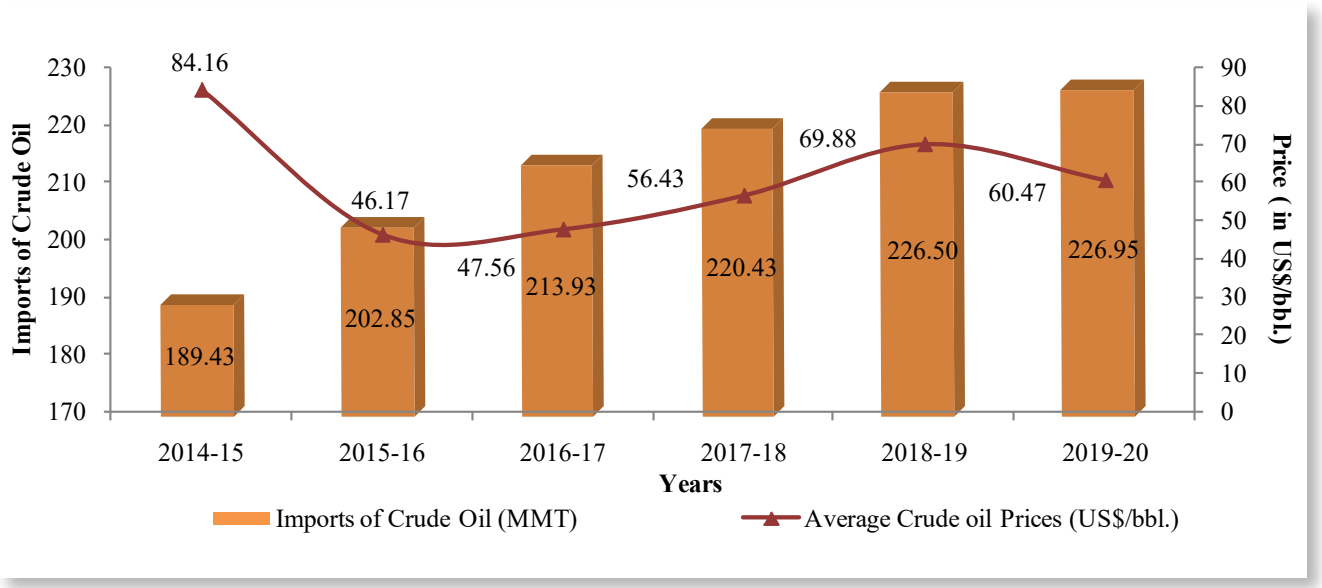
Due to India's reliance on imports to meet the domestic demand, the prices of crude oil and petroleum products in the international markets have a decisive influence on the domestic prices of petroleum products. The prices of crude oil, after continuously being at the level of more than $100/bbl for 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, 2016-17 and 2017-18 was recorded at $46.17/bbl, $47.56/bbl and $56.43/bbl respectively. The price increased to $ 69.88/ bbl during 2018-19 and fell to $60.47/bbl in 2019-20 . The prices increased from a low of $19.90 /bbl during April 2020 to a high of $56.26/ bbl during Jan 2021. The trend in growth of crude oil imports and crude oil international (Indian Basket) prices is shown in Table-4 & Graph- 4.

Table -4: Imports of Crude Oil and Average Crude Oil Prices (Indian Basket)

Year	Imports of Crude Oil (MMT)	% Growth in Imports of Crude Oil	Imports of Crude Oil (Rs. Crore)	% Growth in Value of Imports of Crude Oil	Average Crude oil Prices (US$/ bbl.)	% Growth in Average Crude oil Prices
2014-15	189.43	0.10	687416	-20.52	84.16	-20.25
2015-16	202.85	7.08	416579	-39.40	46.17	-45.14
2016-17	213.93	5.46	470159	12.86	47.56	3.02
2017-18	220.43	3.04	566450	20.48	56.43	18.65
2018-19	226.50	2.75	783183	38.26	69.88	23.84
2019-20	226.95	0.20	717001	-8.45	60.47	-13.47
2019-20 (Apr-Dec)	168.66	-	550368	-	63.98	-
2020-21 (Apr-Dec)	143.23	-15.07	293752	-46.63	39.32	-38.54

P: Provisional

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



1.33: Imports & Exports of Petroleum Products:

The import of petroleum products were 43.79 MMT valued at ₹125742 crore which shows is 31.3% increase in quantity terms and 10.6% increase in value terms against 33.35 MMT imports of petroleum products valued at ₹113665 crore during 2018-19, Exports of petroleum products were 65.69 MMT valued at ₹254018 crore during 2019-20 which shows an increase of 7.51% in quantity terms but 5.11% decrease in value terms against the exports of 61.10 MMT valued at ₹267697 crore during 2018-19.The quantity of petroleum products imported during April-December, 2020 was 32.05 MMT valued at ₹70793 crore and 42.11 MMT of petroleum products, valued at ₹ 101429 crore were exported.

Import of LNG during 2019-20 was 25.57 MMT valued at ₹ 67383 crore as against import of 21.69 MMT valued at ₹ 71867 crore in 2018-19 which marked an increase of 17.90% in quantity terms but 6.2% decrease in value terms as compared to the import of LNG during 2018-19. The quantity of LNG imported during April-December, 2020 was 18.62 MMT valued at ₹ 38475 crore.

The trend in quantity of petroleum products and LNG imports & exports is depicted in Table-5 &

Graph-5 **(details in Annexure -V).**

Table-5(A): Imports & Exports of Petroleum Products& LNG:

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
2014-15	21.30	27.57	63.93	-5.79	14.04	0.00
2015-16	29.46	38.28	60.54	-5.31	16.14	14.95
2016-17	36.29	23.19	65.51	8.22	18.75	16.18
2017-18	35.46	-2.28	66.83	2.01	20.71	10.42
2018-19	33.35	-5.96	61.10	-8.58	21.69	4.74
2019-20	43.79	31.30	65.69	7.51	25.57	17.90
2019-20 (Apr-Dec)	31.69	-	50.07	-	18.56	-
2020-21 (Apr-Dec)	32.05	1.15	42.11	-15.91	18.62	0.32

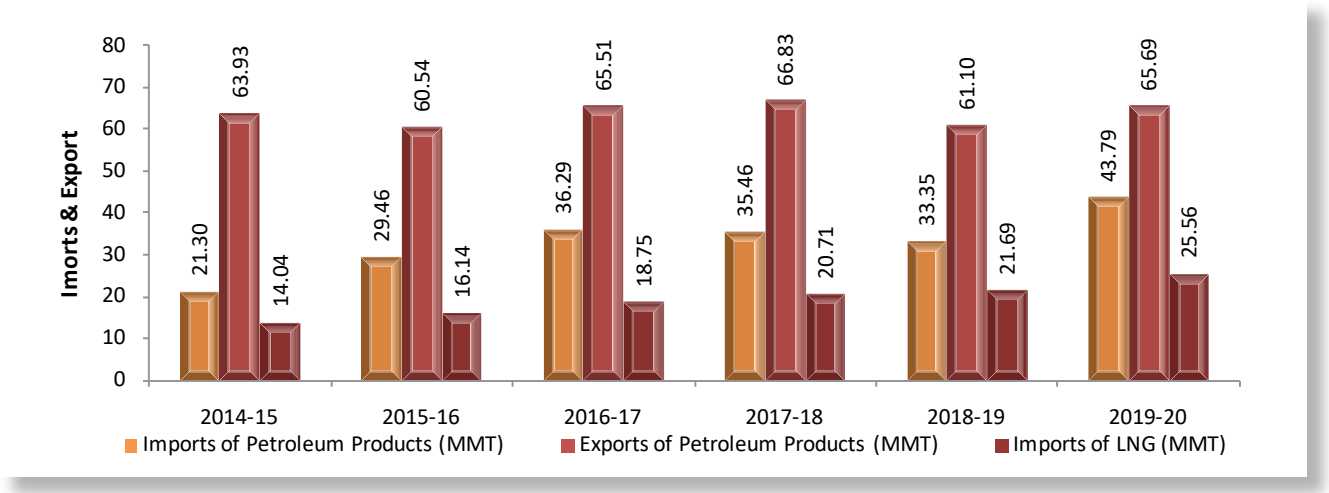
*: Estimated P: Provisional

Table-5(B): Value of Imports & Exports of Petroleum Products & LNG:

Year	Imports of Petroleum Products (Rs. Crore)	% Growth in Imports of Petroleum Products	Exports of Petroleum Products (Rs. Crore)	% Growth in Export of Petroleum Products	Imports of LNG (Rs. Crore)	% Growth in Imports of LNG
2014-15	74644	-1.65	288580	-21.64	58359	9.17
2015-16	65361	-12.44	176780	-38.74	45038	-22.83
2016-17	71566	9.49	194893	10.25	41084	-8.78
2017-18	88374	23.49	225388	15.65	52122	26.87
2018-19	113665	28.62	267697	18.77	71867	37.88
2019-20	125742	10.62	254018	-5.11	67383	-6.24
2019-20 (Apr-Dec)	90097	-	202368	-	50136	-
2020-21 (Apr-Dec)	70793	-21.43	101429	-49.88	38475	-23.26

P: Provisional

Graph-5:Imports & Exports of Petroleum Products & LNG



1.34: Equity Oil and Gas from Abroad:

Government is persistently driving Indian oil & gas companies to make investments in other countries to create a mutually beneficial relationship. Indian oil & gas PSUs have made a very balanced portfolio by investing in overseas to acquire quality producing oil and gas assets which not only brings equity oil to India, but also gives our companies the opportunity to work with global majors in the sector. Today, Indian oil and gas companies (OVL, BPRL, GAIL, IOCL, OIL & PPCL) have investment in a balanced portfolio ranging from exploratory block to producing blocks and pipeline projects. The companies have invested in 55 overseas assets under 25 countries with investments worth approximately US$ 36.55 billion till 31st March 2020. During last 3 years, Indian companies have acquired strategic stakes in overseas assets in UAE, Oman, Israel and Russia. For FY 2019-20, the share of equity oil and gas for Indian PSUs from these assets was approx. 24.5 MMTOE.

1.35: Atma Nirbhar in the Energy Sector:

Ministry of Petroleum and Natural Gas (MoPNG) is working in collaboration with various Central Government Ministries/stakeholders to make efforts to achieve reduction in import dependency on oil. The import reduction strategy broadly includes increasing domestic production of oil and gas, improving energy efficiency and productivity, giving thrust on demand substitution, promoting biofuels and alternate fuels/ renewables.

Some of the recent transformative policy measures/initiatives related to oil and gas production and promoting green and clean fuels are

- Categorization of Indian Sedimentary Basins based on prospectivity. Govt. Revenue share exemption in Category-II & III Basins. More weight age to Work Program in Category-I Basins.
- Royalty concessions for early monetization
- Bidding out of Marginal fields of National Oil Companies (ONGC & OIL).
- Moving towards Gas based economy, Natural Gas Marketing Reforms has been approved wherein standard procedure has been prescribed to discover market price of gas to be sold in the market by gas producers, through a transparent and competitive process, affiliates has been permitted to participate in bidding process for sale of gas and allowing marketing freedom to certain field development plans where Production Sharing Contracts already provide pricing freedom has been undertaken.
- To facilitate ease of doing businesses, approval for 37 PSC Processes under Self-Certification basis and launch of Electronic Single Window Clearance System at DGH.
- Long term procurement agreement for ethanol supply with potential suppliers for ease of doing business
- Maize and surplus stocks of rice with FCI to be utilized for ethanol production.
- Gas Exchange launched for transparency & to help local gas price discovery.
- Regulations notified by PNGRB to facilitate 3rd party access in CGD networks after the end of marketing exclusivity period.
- Inclusion of CBG under Priority Sector Lending, Inclusion of Bio manure in Fertilizer Control Order 1985.
-

1.36: Foreign Direct Investment Inflows:

The Government of India permits Foreign Direct Investment (FDI) across the hydrocarbon value chain covering the upstream, downstream and midstream sectors. The present FDI policy for petroleum & natural gas sector allows 100% automatic route for exploration and production, refining by the private companies (for public sector companies 49% on automatic route without any disinvestment or dilution of domestic equity in the existing PSUs), marketing of petroleum products, pipelines, storage and LNG regasification infrastructure and all related services, subject to existing sectoral policy and regulatory framework in the oil and gas sector. Exploration and Production of oil and gas are capital intensive and high risk activities requiring

use of expensive state-of-the-art technologies and best management practices. Accordingly, the Government is encouraging participation of the private sector, including foreign companies in exploration, production and transportation network for petroleum and natural gas, in order to supplement the domestic investment as well as the efforts of the national oil companies in meeting the rising demand of oil and gas and reducing import dependence. 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 investments in the sector. During the year 2019-20, FDI inflow received was 59654 ₹ Million in the P& NG Sector contributing 1.7% of total FDI inflow (35,35,584 ₹ Million) in the economy. The trend in FDI inflows under Oil & Gas Sector are depicted in Table I.6.

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

Years	FDI Inflow in (in ₹ Million)				
	All Sector	% Growth	P&NG Sector	% Growth	% share of P&NG in All sector's FDI
2014-15	1816821	23.16	64956	857.52	3.6
2015-16	2623216	44.38	6770	-89.58	0.3
2016-17	2916963	11.20	11971	76.81	0.4
2017-18	2888885	-0.96	1561	-86.96	0.1
2018-19	3098667	7.26	9402	502.35	0.3
2019-20	3535584	14.10	59654	534.46	1.7
2020-21 (Apr-Sept)	2246127	-	3161	-	0.1

P: Provisional

1.37: Outlay for Ministry of Petroleum & Natural Gas:

Actual expenditure of Internal & Extra Budgetary Resources (IEBR) of oil and gas CPSEs in 2019-20 was ₹ 105603 crore against Budget Estimate (BE) of ₹ 93639 crore. CPSEs have achieved an actual expenditure of ₹ 105603 which is 112.78% of Actual to total BE 2019-20. Budget Estimates (BE) of IEBR of oil and gas CPSEs under Ministry of Petroleum & Natural Gas in 2020-21 is ₹ 98522 crore. The trend in Sector-wise IEBR of under Petroleum & Gas Sector is depicted in **Annexure-VI.**

1.38: Strategic oil Reserves:

Taking advantage of low crude oil prices in April and May 2020, MoPNG took rapid action in filling up the Petroleum Reserves completely which led ex to saving of around INR 5000 Crore for the Government. India's, traditional suppliers like UAE and Saudi Arabia extended support in providing additional quantities of crude oil for filling in the SPRs.

1.39: Start up India & Skill Development:

Under the Start-Up initiative of Oil and Gas sector, proposals/applications were invited through open advertisement by the individual PSUs for funding and mentoring. The themes for the proposals included leveraging Internet of Things (IoT) in Upstream/ Midstream/ Downstream operation of Oil and Gas PSUs, Digitization of business processes, Green fuels, Alternative Energy, Improved technologies for Hydrocarbon industry besides topics of societal relevance.

The PSUs under the Ministry of Petroleum and Natural Gas have created a corpus fund of Rs.320 Crores. At present, a total no. of 167 Startups are being funded by the PSUs with a committed fund value of approximately Rs.195 Crores.

Skill Development Institutes (SDIs) for hydrocarbon sector have been set up at six cities viz Bhubaneswar, Vizag, Kochi, Ahmedabad, Guwahati and Raebareli. Till December 2020,

more than 16000 trainees have been trained in these SDIs.

Under the Pradhan Mantri Kaushal Vikas Yojna (PMKVY) Recognition of prior learning (RPL) Type-4 project, Hydrocarbon Sector Skill Council (HSSC) is in process of certifying the large uncertified workforce engaged with the Dealers, Distributors and Contractors of IOCL, HPCL and BPCL in Retail Outlet Attendant (Oil & Gas), LPG Delivery Personnel and Tank Lorry Driver (Petroleum Products) Trades. Till December 2020, assessment of more than 85000 personnel has been completed.

1.40: Make in India:

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 CPSEs under MoPNG had been approved by the Government on 12th April, 2017. The policy aims to incentivize growth of local content in goods and services by providing purchase preference to the manufacturers/ service providers who meet the local content targets in Oil and Gas business activities. Ministry of Petroleum and Natural Gas has recently revised the policy on 17th November, 2020 in line with DPIIT's Public Procurement (Preference to Make in India) Order, 2017.

1.41: National Policy on Biofuels-2018:

The Government has notified National Policy on Biofuels 2018 on 8th June, 2018 which envisages an indicative target of 20% blending of ethanol in petrol by 2030. The policy has widened the scope of raw material for ethanol procurement and thereby is expected to give boost to the Biofuel programme of the country. The major features of the Policy are as below:

i) Categorization of biofuels as "Basic Biofuels" viz. First Generation (1G) bio ethanol & biodiesel and "Advanced Biofuels" – Second Generation (2G) ethanol, bio-CNG etc. to enable extension of appropriate financial and fiscal incentives under each category.

ii) Expanding the scope of raw material for ethanol production by allowing use of sugarcane Juice, sugar containing materials like sugar beet, sweet sorghum, starch containing materials like corn, cassava, damaged food grains like wheat, broken rice, rotten potatoes, unfit for human consumption for ethanol production.

iii) The Policy allows use of surplus food grains for production of ethanol for blending with petrol with the approval of National Biofuel Coordination Committee.

iv) With a thrust on Advanced Biofuels, the Policy indicates a viability gap funding scheme for 2G ethanol Bio refineries of Rs.1969.50 crore in 6 years

1.42: NON CONVENTIONAL ENERGY

1.42.1 EBP Programme:

Ethanol Blended Petrol (EBP) Programme aims at achieving multiple outcomes such as addressing environmental concerns, reducing import dependency and providing boost to agriculture sector.

To boost the indigenous production of ethanol, the Government has taken number of steps since 2014. These include re-introduction of administered price mechanism, permitting additional feedstock sources for ethanol production, amending Industries (Development & Regulation) Act, 1951 for bringing exclusive control of the central government over denatured ethanol, reduction in Goods & Service Tax (GST) rates from 18% to 5% on ethanol utilized under EBP Programme, notifying National Policy on Biofuels – 2018 with an indicativetarget of 20% ethanol blending by 2030 and an Interest Subvention Scheme for augmentation of ethanol production capacity. Presently, 14 States have already implemented the IDR Act amendment.

From ethanol supply year (ESY) 2018-19, additional sources like B-heavy molasses, sugarcane juice, damaged food grains like wheat and rice unfit for human consumption were allowed as feedstock for production of ethanol. Further, from ESY 2020-21 surplus rice available with Food Corporation of India (FCI) & maize have also been allowed as a feedstock to produce ethanol. Different prices of ethanol have been fixed depending upon the raw material used. The Ethanol Supply Year (ESY) is taken from 1st December of a year to 30thNovember of the following year so as to align it with the sugarcane crushing season. For the ESY: 2019-20, OMCs have procured 173.03 crore litres of ethanol for blending purpose and have

maintained a blending percentage of 5% despite the disruptions on account of Covid.

The prices of ethanol produced from the different feedstock for ESY: 2020-21 are as under:

Raw Material	Ethanol Ex-mill price in Rs / litre
C heavy molasses	45.69
B heavy molasses	57.61
Sugarcane juice / sugar / sugar syrup	62.65
Damaged Food Grains	51.55
Surplus rice issued by FCI	56.87
Maize	51.55

The Oil Marketing Companies (OMCs) have issued tenders for a requirement of 457.64 crore litres of ethanol in ESY 2020-21. The OMCs have also been enhancing their ethanol storage capacity, which has increased from 5.39 crore litres in November, 2017 to 27.7 crore litres as on 31.12.2020.

MoPNG has also issued a 'Long Term Ethanol Procurement Policy' under EBP Programme on 11.10.2019.Towards promoting ease of doing business, the OMCs have incorporated many changes in the Expression of Interest (EOI) for ethanol procurement released by them for ESY 2020-21.

- For the first time the requirement of ethanol for the next five years has been released and EOI has been invited for enrolling / registering bidders only once for a period of five years.
- The Security Deposit amount payable by the suppliers has been reduced from earlier 5% to 1% thereby translating to a benefit of around Rs. 400 crores to the suppliers.
- The applicable penalty levied on the suppliers on non-supplied quantity of ethanol has been reduced from earlier 5% to 1% thereby translating to a benefit of around Rs. 35 crores to the suppliers.
- Rates and slabs for transportation of ethanol payable to the ethanol suppliers have been increased.

OMCs are providing comfort letters giving offtake guarantee to new entrepreneurs and have also agreed to lend support by signing tripartite agreement with bankers and ethanol suppliers, thereby, providing much needed confidence to the bankers and sugar mills so that the ethanol capacity expansion proposals become bankable.

1.42.2 2G Ethanol Programme:

With an objective to augment ethanol supplies from sugarcane (known as 1st generation ethanol), the Government has allowed procurement of ethanol produced from other non-food feedstock like cellulosic and lignocellulosic materials, including petrochemical route (known as 2nd generation ethanol).

9. In line with this decision, oil PSUs are establishing 2G Ethanol bio-refineries in different parts of the country. Projects in Bathinda (Punjab), Panipat (Haryana), Bargarh (Odisha) and Numaligarh (Assam) are in advance stage of construction.

In order to improve the financial viability of the 2G ethanol projects, Government has launched "Pradhan Mantri JI-VAN (Jaiv Indhan- Vatavaran Anukool fasal awashesh Nivaran) Yojana" for providing financial assistance to provide initial thrust to create 2G Ethanol capacity in the country and attract investments in this sector. In this scheme, financial support to twelve Integrated Bio ethanol Projects using lignocellulosic biomass & other renewable feedstock with total financial outlay of Rs 1969.50 crore for the period 2018-19 to 2023-24 will be provided along with support to ten demo projects for 2G technology. Financial assistance to commercial projects at Bathinda, Panipat, Bargarh, Numaligarh and a Demonstration plant at Panipat has been approved under the scheme.

1.42.3 Biodiesel Programme:

During the period April to March, 2020, 10.55 crore litres of biodiesel has been procured by OMCs for blending with biodiesel. In order to encourage production of biodiesel from Used Cooking Oil (UCO), Oil Marketing Companies have floated Expression of Interest for supply of biodiesel produced from UCO at 300 locations across the country. The ex-factory UCO based biodiesel price has been fixed for three years. The price for the first year has been fixed at Rs 51/litre, for the second year at Rs 52.7/litre and for the third year at Rs 54.5/litre. GST and transportation shall be payable in addition to this price. OMCs have

received offers for setting up 65 Biodiesel Plants with a production capacity of approx 1300 MT/day (48 Crore litre/annum).

1.42.4: Bio-Jet (ATF):

The first flight using 25% Biojet Fuel between Dehradun to Delhi operated by Spicejet was received by Minister, Petroleum and Natural Gas on 27.8.2018.Bio jet Fuel used in the aforesaid flight had been developed by CSIR laboratory in IIP, Dehradun, using Jatropha seeds. In order to provide a roadmap to the Bio-Jet Fuel (Bio ATF) program in the country, two committees had been formed on 02.08.2019 by MoP&NG. Based on the report of the Committees and further discussions in the matter, MRPL has been asked to setup a Bio-ATF manufacturing facility integrated with MRPL refinery.

1.42.5: World Biofuel Day:

World Biofuel Day 2020 was organised by Ministry of Petroleum & Natural Gas on 10th August, 2020. The theme for World Biofuel Day 2020 was *"Biofuels towards Atmanirbhar Bharat"*. In view of the Corona/ Covid-19 pandemic, the function was held through a webinar this year which was telecast live. The same was attended by more than 1000 persons.

1.43: Swachh Bharat Mission:

MoPNG has allocated a budget of ₹166.8 crore for 2020-21 under Swachhta Action Plan (SAP), but with the help of continuous monitoring through various meetings including apex level review meetings, MoPNG including Oil & Gas CPSEs, has already achieved an expenditure figure of around Rs 131.01 crore till December'20.

MoPNG, its attached offices and Oil & Gas CPSEs under the administrative control of MoPNG, celebrated Swachhta Pakhwada from 1st July 2020 - 15th July, 2020. On 14th December, 2020; Minister of Petroleum & Natural Gas and Steel distributed the Awards to all the winners of the Swachhta Pakhwada 2020, and also to the winners of Swachhta Hi Sewa 2019.

The petroleum industry has been contributing to this Jan Andolan, and is giving a boost to its momentum.


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CHAPTER 2

Exploration & Production

Exploration and Production

2.1 Context/Background

2.1.1 The energy demand will rise with social and economic development of the country. The country is dependent on imports for about 85% of its crude oil requirement and to the extent of about 52.74% in case of natural gas. In order to bridge the gap between energy supply and demand, it is imperative to accelerate the exploration and production activities in the county.

2.1.2 The reforms in Exploration and Production (E & P) sector were initiated through participation of private and foreign companies in oil and gas sector in 1991 when 28 discovered fields (Pre-NELP Discovered Field) were auctioned during 1991-93. Further, 28 Exploration Blocks were awarded during 1990-1997 known as Pre-NELP exploration Blocks. Subsequently, after implementation of New Exploration Licencing Policy (NELP) and Coal Bed Methane (CBM) Policy in 1997-99, the level playing field was provided 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 the hydrocarbon sector are based on the guiding principles of enhancing domestic oil and gas production, increasing investment, generating sizable employment, enhancing transparency and reducing administrative discretion. Government has formulated path breaking polices 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 Licencing Policy (HELP) coupled with operationalization of Open Acreage Licencing Programme (OALP)
- Monetization of the Ratna Offshore field
- Policy Framework for Extraction of CBM by Coal India Limited (CIL) and its subsidiaries in Coal Mining area
- Policy for the Grant of extensions to Pre-NELP Discovered fields and Exploration blocks
- Hydrocarbon Vision 2030 for North East
- National Seismic Programme of Un-appraised areas
- National Data Repository (NDR)
- Policy framework to permit exploration and exploitation of unconventional hydrocarbons in existing acreage of Production sharing Contracts (PSCs), CBM contracts and Nomination fields.
- Policy framework for streamlining the working of PSCs
- Policy framework to incentivise Enhanced Recovery methods for oil and gas
- Policy Reforms in Exploration and Licencing Policy for enhancing domestic exploration and production of oil and gas.
- Guidelines on Early Monetisation of Hydrocarbon Discoveries
- Natural Gas Marketing Reforms, Oct'20 including standard procedure to discover market price, participation of Affiliates in bidding process and guidelines for Discovery of Market Price through e-bidding.

2.1.4 In the upstream sector, the two Upstream National Oil Companies (NOCs) viz. Oil and Natural Gas Corporation Limited (ONGC) and Oil India Limited (OIL) play a dominant role with a total share of about 74% oil and 85% in gas production (excluding JV share) in the country in the year 2019-20. ONGC

produces nearly 64% of indigenous crude oil and 76% of country's gas production (excluding JV share), while OIL's share is about 10% of indigenous crude oil and 9% of gas production (excluding JV share). The share of Private/JV companies in oil and gas production is 26% and 13% (excluding CBM) respectively. CBM share in total gas produced is around 2%.

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 Indian oil and natural gas resources having a balanced regard for environment, safety, technological and economic aspects of petroleum activity. In addition, DGH has been strengthened with certain responsibilities concerning the Production Sharing Contracts for Discovered fields/Exploration blocks, promotion of investment through implementation of policies including Discovered Small Field Policy, Hydrocarbon Exploration & Production Policy (HELP) and monitoring of E&P activities.

2.2 Sedimentary Basins in India

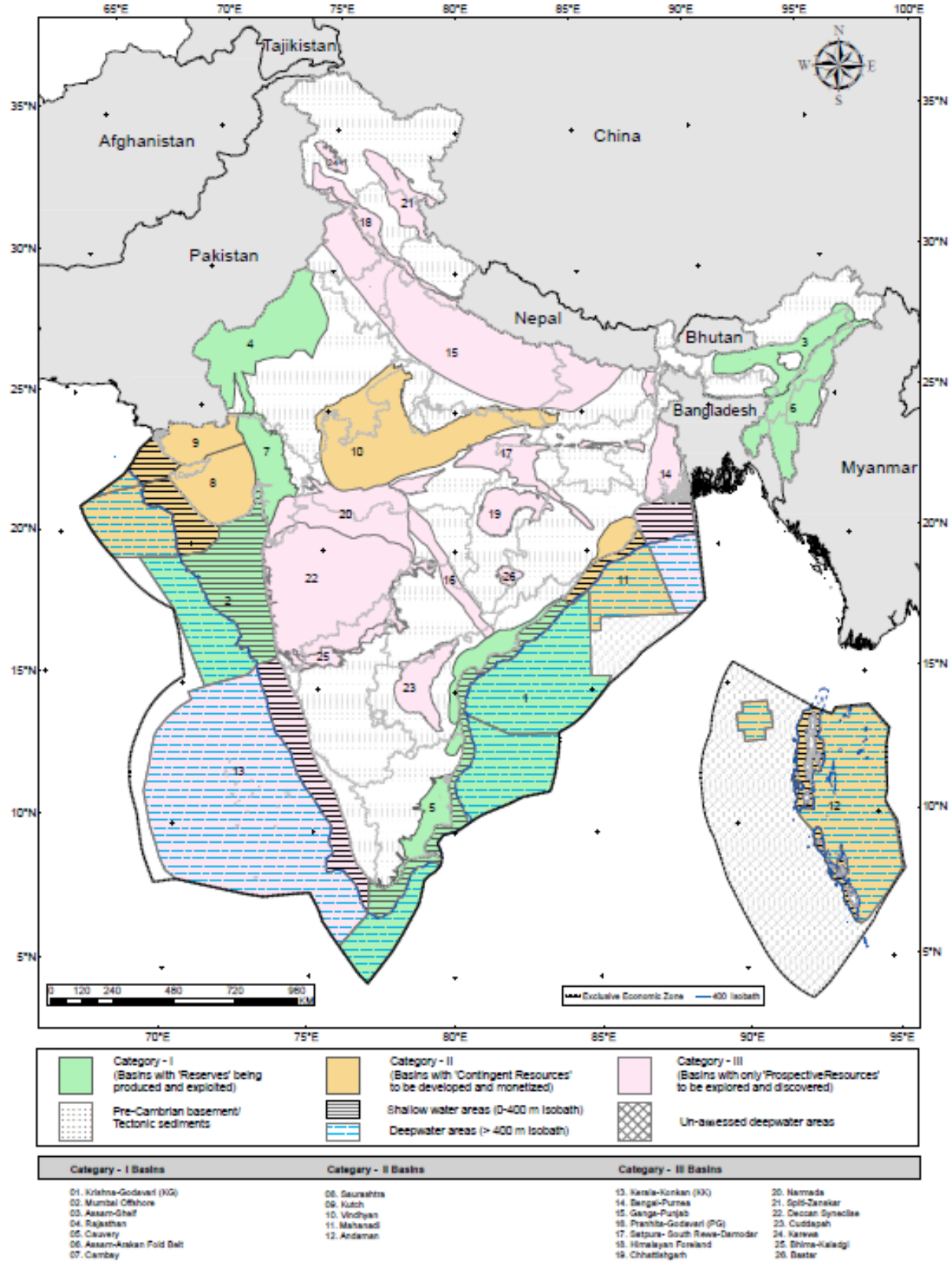
2.2.1 India has 26 sedimentary basins covering an area of 3.36 millionSquare KiloMetres. The onland sedimentary basins of India have an aerial extent of about 1.63 million Square KiloMetres; offshore sedimentary basins, upto the 400 meters isobath have an aerial extent of about 0.41 million Square KiloMetres and in the deepwater beyond 400 meters isobath, the sedimentary area has been estimated to be about 1.32 million Square KiloMetres.

2.2.2 The Indian sedimentary basins have been broadly divided into three 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)	9,98,325	Established commercial production	Cambay, Assam Shelf, Mumbai offshore, Krishna Godavari, Cauvery, Assam Arakan Fold Belt and Rajasthan
Category II (5 Basins)	7,80,974	Known accumulation of hydrocarbons but no commercial production as yet	Kutch, Mahanadi-NEC & Andaman-Nicobar, Vindhyan, Saurashtra
Category III (14 Basins)	15,86,150	Indicated hydrocarbon shows that are considered geologically prospectivity.	Himalayan Foreland, Ganga, Kerala-Konkan-Lakshadweep, Bengal, Karewa, Spiti-Zanskar, Satpura-South Rewa Damodar, Narmada, Decan Syneclise, Bhima-Kaladgi, Cuddapah, Pranhita-Godavari, Bastar, Chhattisgarh
Total	**33,65,449**		

Indian Sedimentary Basins

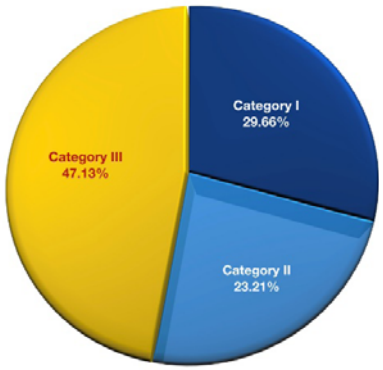


INDIAN SEDIMENTARY MAP

2.2.3Crude oil and Natural Gas production in the country is mainly confined to Category-I sedimentary basins. In addition, significant quantity of petroleum resources has been established in five category -II basins, however production is yet to commence from these basins.

The distribution of total Indian sedimentary area of 3.36 million square kilometre under different categories is presented as under:

INDIAN SEDIMENTARY AREA



2.3 Estimated Resources of Crude Oil and Natural Gas Conventional Hydrocarbon Resources

2.3.1 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 O+OEG), 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

Basin Category	No.	Basin Name	Prognosticated Resource (MMTOE)	
			Estimate 1995-96	Estimate (2017)
Category I (Basins with reserves being produced and Exploited)	1	Assam Arakan Fold Belt	1860	1632.8
	2	Assam Shelf	3180	6001.2
	3	Cambay	2050	2585.6
	4	Cauvery	700	1964.4
	5	Krishna Godavari	1130	9554.5
	6	Mumbai Offshore	9190	9646
	7	Rajasthan	380	4126
Category I Total			18490	35510.5
Category II (Basins with contingent resources to be developed and monetized)	8	Andaman	180	371.4
	9	Kutch	760	898.4
	10	Mahanadi	145	650.6
	11	Saurashtra	280	1325.2
	12	Vindhyan	Not Studied	632.5
Category II Total			1365	3878.1
Category III (Basins with only prospective resources to be explored and discovered)	13	Bastar	Not Studied	1.3
	14	Bengal	190	828.3
	15	Bhima-Kaladgi	Not Studied	3.2
	16	Chhattisgarh	Not Studied	25
	17	Cuddapah	Not Studied	5.1
	18	Deccan	Not Studied	11
	19	Ganga	230	128.4
	20	Himalayan Foreland	150	44.4
	21	Karewa	Not Studied	4
	22	Kerala Konakan	660	1244.6

	23	Narmada	Not Studied	18
	24	Pranhita Godavari	Not Studied	95.4
	25	Satpura-S.Rewa-Damodar	Not Studied	63
	26	Spiti-Zanskar	Not Studied	11.1
Category III Total			1230	2482.8
Deep Water Areas			7000	Deep water area estimated basin-wise & resources added to respective basins
Total (MMTOE)			**28085**	**41871.4**

* MMTOE : Million Metric Tonne of oil and oil equivalent of gas

2.3.2 As on 1st April 2020 in-place hydrocarbon volume of 10898.5 Million Tonnes (MMT) of oil and oil equivalent gas (O+OEG) has been established through exploration by ONGC, OIL and Private/JV companies. Out of 10898.5 MMT of oil and oil equivalent gas of in-place volumes, the ultimate reserves which can be produced are about 4237 MMT (O+OEG). The balance Recoverable Reserves are of the order of 1,557 MMT. The break-up of hydrocarbon reserves explored by ONGC, OIL and private/JV companies in the country as on 1st April 2020 are as under:

Table 2.3: Crude Oil and Natural Gas Reserve (2P) Position as on 01.04.2020

S. No.	Subject	Parameter	ONGC (Nomination)*	OIL (Nomination)*	PSC/RSC/ DSF regime	Total
1	**Initial In-place volume**	Oil + Cond. (MMT)	5329.2	798.6	846.1	6973.9
		Gas (BCM)	2331.8	385.2	1257.4	3974.4
		O+OEG (MMT)	**7661.1**	**1134.0****	**2103.5**	**10898.5**
2	**Ultimate Reserves**	Oil + Cond. (MMT)	1474.8	254.8	237.8	1967.3
		Gas (BCM)	1296.9	226.3	776.5	2299.7
		O+OEG (MMT)	**2771.6**	**451.2****	**1014.3**	**4237.1**
3	**Balance Recoverable Reserves**	Oil + Cond. (MMT)	318.1	74.6	100.6	493.3
		Gas (BCM)	336.5	129.2	614.7	1080.4
		O+OEG (MMT)	**654.7**	**187.0****	**715.3**	**1557.0**

*As provided by ONGC & OIL

Conversion Factor (for Oil India Nomination Data)

For Assam: 1 BCM of Gas = 0.8868 MMToE

For Rajasthan: 1 BCM of Gas = 0.3846 MMToE

For ONGC, PSC/RSC/CBM: 1 BCM of Gas =1 MMToE

2.3.3 Unconventional Hydrocarbon Resources Coal Bed Methane (CBM)

The estimated CBM resources are of the order of 2,600 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: STATE WISE DISTRIBUTION OF COAL BED METHANE RESOURCES IN INDIA

No.	STATE	Estimated CBM resources (IN BCM)	Estimated CBM resources (IN TCF)	GIIP (in TCF)
1	Jharkhand	722.08	25.5	1.99
2	Rajasthan	359.62	12.7	0
3	Gujarat	351.13	12.4	0
4	Odisha	243.52	8.6	0
5	Chhattisgarh	240.69	8.5	0
6	Madhya Pradesh	218.04	7.7	3.64
7	West Bengal	218.04	7.7	4.85
8	Tamil Nadu	104.77	3.7	0
9	Telangana & Andhra Pradesh	99.11	3.5	0
10	Maharashtra	33.98	1.2	0
11	North east	8.50	0.3	0
Total CBM Resource		**2599.48**	**91.8**	**10.48**

*Conversion factor: 1 cubic metre = 35.3147 cubic feet

2.3.4 Recoverable CBM Reserves

In order to harness CBM 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 2001. Subsequently, there were 3 other bidding rounds in the years 2003, 2005 and 2008, respectively. 30 CBM blocks were awarded under these rounds, 2 blocks were awarded on nomination basis and 1 under Foreign Investment Promotion Board Route. Around 16,613 sq. km. of the total prospective area has been awarded till date. These CBM blocks are in the states of Andhra Pradesh, Assam, Chhattisgarh, Gujarat, Jharkhand, Madhya Pradesh, Maharashtra, Odisha, Rajasthan, Tamil Nadu and West Bengal.

The total prognosticated CBM resource for the awarded 33 CBM blocks, is about 62.4 TCF (1767 BCM), of which, 10.48 TCF (296.9 BCM) has been established as Gas-in-Place (GIP).

State-wise and block-wise CBM reserves position is given below:

TABLE 2.5: RECOVERABLE COAL BED METHANE RESERVES AS ON 01.04.2020

State	BLOCKS	OPERATOR	GIIP (BCM)	Recoverable Reserves (BCM)
Jharkhand	Bokaro	ONGC	30.18	3.68
	Jharia	ONGC	16.70	2.73
	North Karanpura	ONGC	9.53	1.46
Madhya Pradesh	Sohagpur East	RIL	47.70	16.70
	Sohagpur West	RIL	55.50	15.44
West Bengal	Raniganj East	ESSAR	60.77	28.12
	Raniganj North	ONGC	7.43	1.86
	Raniganj South	GEECL	69.09	5.29
Total			**296.9**	**75.28**

2.3.5 Shale Gas / Oil Resource

It is estimated that a number of sedimentary basins (Gangetic plain, Gujarat, Rajasthan, Andhra Pradesh and other coastal areas) in India, including the hydrocarbon bearing ones- cambay, Assam-Arakan and Damodar estimates of Shale gas and oil are prospective from shale oil and gas point of view in the Indian sedimentary basins carried out by some agencies are as under:

i. United States Geological Survey (USGS) in resource assessment of all sedimentary basins of January, 2011 estimated Technical Recoverable Shale Gas of 6.1 TCF in three basins namely Cambay, Krishna Godavari and Cauvery.

ii. ONGC in August, 2013 has estimated ShaleGas Resources of 187.5 TCF forfrom 5 basins namely pre-NELP and NELP rounds and other exploration Cambay, Krishna Godavari, Cauvery, Ganga and Assam.

iii. Central Mine Planning and Design Institute geological understanding and new technology. With (CMPDI): in July, 2013 has estimated Shale Gas the increase in exploration spread and quantum jump resources of 45.8 TCF for one basin, namely Gondwana.

2.3.6 Re-assessment of Hydrocarbon Resources

The last hydrocarbon resources assessment exercise was carried out approximately two decades ago (1995-96). During the course of implementation of Pre-NELP 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 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 sedimentary basins in the country was 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 estimate of 28.08 billion tonnes.

2.4 Crude oil and Natural Gas Production

2.4.1 Crude oil production in FY 2020-21 (April to December, 2020) is about 22.98 Million Metric Tonne (MMT). About 76% of crude oil is by ONGC and OIL from nomination regime ((excluding JV share) and remaining 24% of crude oil production is by Private/JV companies from PSC regime.

2.4.2 In FY 2020-21 (up to December, 2020), the share of offshore crude oil production is about 50.7%. The remaining crude oil production was from 6 States viz., Andhra Pradesh (0.6%), Arunachal Pradesh (0.2%),



Assam (12.8%), Gujarat (15.2%), Rajasthan (19.2%) and Tamil Nadu (1.3%). The details of crude oil production in FY 2020-21 (up to December 2020) and last 5 years are as under:

Table 2.6 : State-wise Crude Oil Production Trends (MMT)

Location Type	State/ Location	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21 (P) (Apr - Dec 2020)
Offshore	Eastern Offshore	1.26	0.98	0.83	0.65	0.56	0.59
	GUJARAT OFFSHORE	0.41	0.38	0.40	0.74	0.59	0.31
	Western Offshore	17.42	17.06	16.92	15.48	14.85	10.74
Offshore Total		**19.09**	**18.42**	**18.14**	**16.87**	**16.00**	**11.64**
Share of PSUs		**16.54**	**16.28**	**16.24**	**14.97**	**14.54**	**10.74**
Share of Private/JVs		**2.55**	**2.14**	**1.91**	**1.90**	**1.47**	**0.90**
Onland	Andhra Pradesh	0.29	0.28	0.30	0.30	0.24	0.15
	Arunachal Pradesh	0.06	0.06	0.05	0.04	0.06	0.04
	Assam	4.18	4.20	4.34	4.31	4.09	2.95
	Gujarat	4.46	4.60	4.59	4.63	4.71	3.49
	Rajasthan	8.60	8.16	7.89	7.67	6.65	4.41
	Tamil Nadu	0.25	0.28	0.35	0.40	0.42	0.31
	Tripura	0.003	0.003	0.003	0.003	0.003	0.00
Onland Total		**17.85**	**17.59**	**17.52**	**17.34**	**16.17**	**11.34**
Share of PSUs		**9.04**	**9.19**	**9.36**	**9.37**	**9.20**	**6.68**
Share of Private/JVs		**8.81**	**8.40**	**8.15**	**7.97**	**6.97**	**4.66**
Grand Total		**36.94**	**36.01**	**35.66**	**34.20**	**32.17**	**22.98**
Share of PSUs		**25.58**	**25.48**	**25.60**	**24.34**	**23.73**	**17.43**
Share of Private/JVs		**11.36**	**10.53**	**10.06**	**9.87**	**8.44**	**5.56**

2.4.3 Natural Gas production in 2020-21(up to December, 2020) is about 21.1 Billion Cubic Metre (BCM). About 87% of natural gas production is by ONGC and OIL from nomination regime (excluding JV share) and remaining 13% of natural gas production was by Private/JV companies from PSC regime.

2.4.4 The share of offshore natural gas production in FY 2020-21 (up to December, 2020) is about 63.7%. The remaining natural gas production including CBM was from 10 States viz., Andhra Pradesh (2.9%), Arunachal Pradesh (0.2%), Assam (10.7%), Gujarat (4.0%), Rajasthan (6.9%), Tamil Nadu (3.3%), Tripura (5.8%), Jharkhand, Madhya Pradesh and West Bengal (2.3%). The details of Natural gas production in 2020-21 (up to December, 2020) and last 5 years are as under:

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

Location Type	State/ Location	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21 (P) (Apr - Dec 2020)
Offshore	Eastern Offshore	4568.4	3670.4	2816.7	2458.9	1823.1	770.3
	GUJARAT OFFSHORE	68.4	80.7	97.7	122.2	128.7	100.9
	Western Offshore	18374.9	18287.1	19096.2	19535.9	18683.6	12607.7
Offshore Total		**23011.7**	**22038.2**	**22010.6**	**22117.1**	**20635.4**	**13478.9**
Share of PSUs		**16406.3**	**16882.9**	**17791.2**	**19041.8**	**18576.0**	**12938.1**
Share of Private/JVs		**6605.4**	**5155.4**	**4219.5**	**3075.3**	**2059.4**	**540.8**
Onland	Andhra Pradesh	618.3	865.0	955.9	1076.5	906.1	623.5
	Arunachal Pradesh	29.6	27.5	29.5	27.8	45.6	41.3
	Assam	3024.3	3127.9	3219.0	3289.1	3141.2	2269.5
	Gujarat	1488.5	1581.3	1606.7	1402.2	1347.7	853.3
	Rajasthan	1333.0	1272.6	1436.4	1483.2	1882.5	1468.3
	Tamil Nadu	1010.9	983.2	1207.2	1207.9	1096.7	695.6
	Tripura	1332.0	1429.9	1440.4	1554.3	1472.8	1221.1
Onland CBM	Jharkhand	**2.0**	**3.1**	**4.0**	**3.6**	**4.6**	**1.1**
	Madhya Pradesh	**1.4**	**6.4**	**199.8**	**356.7**	**344.9**	**255.8**
	West Bengal	**389.4**	**555.1**	**531.1**	**350.2**	**305.9**	**220.6**
Onland Total		**9229.4**	**9852.0**	**10629.9**	**10751.5**	**10547.9**	**7650.0**
Share of PSUs		**7600.2**	**8135.3**	**8511.0**	**8350.0**	**7837.5**	**5476.1**
Share of Private/JVs		**1629.2**	**1716.8**	**2118.9**	**2401.5**	**2710.4**	**2173.9**
Grand Total		32241.1	31890.3	32640.5	32868.6	31183.3	21128.9
Share of PSUs		**24006.5**	25018.1	26302.2	27391.8	26413.6	18414.1
Share of Private/JVs		**8234.6**	6872.1	6338.3	5476.8	4769.8	2714.8

2.4.5 Commercial production of Coal Bed Methane (CBM) in India has commenced w.e.f July,2007 in Raniganj (South) block in West Bengal. CBM production in the Raniganj (South) blocks about 0.33 MMSCMD in December, 2020. Another three blocks, Raniganj (East) block operated by ESSAR is producing at the rate of 0.59 MMSCMD and Jharia and Bokaro operated by ONGC is producing at the rate of 0.004 MMSCMD. CBM production of Sohagpur (West) and Sohagpur (East) operated by RIL is about 0.90 MMSCMD. Thus CBM production from 6 blocks in the country is about 1.82 MMSCMD in December, 2020 which includes test gas from 2 CBM blocks and commercial production from 4 CBM blocks.

2.5 Indian Sedimentary Area

As per India Hydrocarbon Vision 2025, 100% Indian sedimentary area is to be appraised. Onland area covers 1.63 Million Sq. Km. (48.5%) and Offshore area covers 1.73 Million Sq. Km. As of now, onlyabout 49% 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 44% of the Indian sedimentary basins have the undiscovered potential of hydrocarbons.

2.6 Blocks Awarded for Exploration and Production

2.6.1 Government of India signed 310 production sharing contracts including 29 discovered fields (One PSC signed for Panna & Mukta Fields), 28 exploration blocks under pre-NELP Exploration Blocks and 254 blocks under NELP regime with National Oil Companies and Private (both Indian and Foreign)/ Joint Venture companies as licensee /lessee for blocks. Also 53 Revenue Sharing Contracts (RSCs) have been signed under two DSF Bidding Rounds (Discovered Small Field) involving 53 Contract Areas. Under HELP (Hydrocarbon Exploration and Licencing Policy), in Open Acreage Licencing Programme (OLAP), Bid Round I,II,III & IV 94 RSCs have been signed. At present, out of 310 PSCs & 147 RSCs signed so far under various bidding rounds (Discovered Field, PreNELP, NELP,HELP and DSF), 78 PSCs and 104 RSCs (DSF-28, OALP-76) are operational.

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

a). 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.

b). Pre-NELP Discovered Field: Government offered Petroleum Mining Lease (PML) of small/ medium sized discovered fields (proven reserves were discovered by ONGC and OIL) to the private sector in August 1992. Production Sharing Contracts (PSCs) awarded during 1991-1993 had the distinctive feature of operators as private companies with ONGC/OIL as having participating interest. Government of India signed 28 contracts (One PSC for Panna Mukta– PM) for 29 discovered fields under Pre-NELP Discovered (Small and Medium size Fields) regime.

c). 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.

d). 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 also competed on equal footing.

e). Discovered Small Field (DSF) Policy: Under Discovered Small Field Policy, Government has awarded 53 Contract area, DSF-I & DSF-II Bid Rounds, based on Revenue Sharing Model.

f). **Hydrocarbon Exploration & Licencing Policy:** Under Hydrocarbon Exploration & Licencing Policy (HELP), Government has awarded 105 Exploratory Blocks on Revenue Sharing basis, in five bidding rounds covering an area of around 156,580 sq.km till February, 2021.

2.6.3 Under PSC Regime as on 1st April, 2020, an investment of about US$ ~45 billion on exploration and development was made. Out of this, investment of US$6.3 billion on Pre NELP discovered fields, US$ 9.6 billion on Pre-NELP exploration Blocks and US$ 29.3 billion on NELP Blocks were made for exploration

and development activities. In addition an investment of US$ 0.04 billion on DSF, US$ 0.075 billion on OALP also made under RSC regime

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

2.7.1 Under Nomination regime, ONGC is operating 7 PEL and 353 PML fields covering an area of about 57976 Sq. Km. In addition, OIL is operating 3 PEL and 25 PML fields under nomination regime covering an area of 5132 Sq. Km. The basin-wise details of PEL/PML operated by ONGC and OIL are as under:

Table 2.8: Basin-wise PEL & PML under Nomination Regime as on 31.12.2020

Company / Operator	Basin		PEL		PML		Total	
			No.	Area (Km2)	No.	Area (Km2)	No.	Area (Km2)
ONGC - Nomination	Assam-Arakan		3	1590	64	5961.85	67	7551.85
	Cambay		-	-	169	5888.92	169	5888.92
	Cauvery	Onland	-	-	28	3324.13	28	3324.13
		Offshore	-	-	2	85.83	2	85.83
	Himalayan Foreland		1	1828	-	-	1	1828
	Krishna Godavari	Onland	-	-	40	4771.84	40	4771.84
		Offshore	1	283.05	13	1073.68	14	1356.73
	Kutch	Offshore	1	420	2	1242.5	3	1662.5
	Mumbai	Offshore	1	985	30	28504.18	31	29489.18
	Jaisalmer - Rajasthan		-	-	4	882.01	4	882.01
	Vindhyan		-	-	1	1135	1	1135
Total - ONGC			**7**	**5106.05**	**353**	**52869.94**	**360**	**57975.99**
OIL - Nomination	Rajasthan		-	-	2	460	2	460
	Assam-Arakan		3	331.75	23	4340.22	26	4671.97
Total - OIL			**3**	**331.75**	**25**	**4800.22**	**28**	**5131.97**
G. Total			**10**	**5437.8**	**378**	**57670.16**	**388**	**63107.96**

2.7.2 Private/JV companies are operating 38 PEL and 64 PML fields/blocks covering an area of 51941 Sq.Km. The basin-wise details of PEL/PML fields/blocks operated by private/JV companies are as under:

Table 2.9: Basin-wise PEL & PML with Private /Joint Venture Companies under PSC regime as on 31.12.2020

BASIN	PEL		PML	
	PEL (No.)	Area (Sq.Km)	PML (No.)	Area (Sq.Km)
Assam-Arakan Fold Belt	1	3213		
Assam-Arakan Shelf	7	7051	3	139
Bengal	2	7941		
Cambay	7	1236	44	1254
Cauvery	3	1126	2	156
Krishna Godavari	5	4399	10	2368
Kutch	2	1594		
Mahanadi	1	832		
Mumbai	3	3650	1	56
Rajasthan	2	3151	4	3287
Satpura-South Rewa-Damodar	1	789		
Saurashtra	1	552		
Vindhyan	3	9147		
Total	**38**	**44681**	**64**	**7260**

Table 2.10: Basin-wise PML with Private /Joint Venture Companies under DSF as on 31.12.2020

Basin	No. of PML	PML Area (Sq. Km)
Assam-Arakan Fold Belt	1	47.23
Assam-Arakan Shelf	12	260.28
Bengal-Purnea	1	541.44
Cambay	8	454.92
Krishna Godavari	4	142.832
Kutch	1	46
Mumbai	11	1679.76
Rajasthan	3	96.704
Vindhyan	1	15
Grand Total	**42**	**3284.166**

Table 2.11: Basin-wise PEL with Private / Joint Venture Companies under OALP as on 31.12.2020

Basin	No. of PEL	Area
(in Sq. Km.)		
Andaman	4	9616.70
Assam Arakan Fold Belt	11	4026.99
Assam Shelf	21	9549.12
Bengal-Purnia	2	5573.44
Cambay	16	9661.13
Cauvery	4	4342.05
Himalayan Foreland	1	665.98
Kerala Konkan	1	3519.69
Krishna Godavari	4	8318.01
Kutch	6	8194.80
Mahanadi	6	12088.91
Mumbai Offshore	4	9341.68
Rajasthan	13	15655.64
Saurashtra	2	3301.62
Vindhyan	5	13259.95
Total	**100**	**117115.71**

2.8 Exploratory Efforts by ONGC and OIL under Nomination Regime

ONGC and OIL have carried out 916796 Line KiloMetre (LKM) of 2D seismic survey 143155 Square Kilometre (SKM) of 3D seismic survey and drilled 6,545 exploratory wells since inception till 31st December, 2020. The details of exploratory efforts in terms of 2D, 3D seismic and exploratory wells made by ONGC and OIL are as under:

Table 2.10 : Exploratory Inputs by ONGC and OIL under Nomination Regime

Sr. No.	Company	Cumulative exploratory efforts as on 31.12.2020		
		2D seismic (LKM)	3D seismic (Sq. KM)	Exploratory Well (No)
1	ONGC Nomination	882518	131846	6247
2	Oil India Ltd.- Nomination	34,278	11,309	396
Total		**916796**	**143155**	**6643**

2.9 Exploratory Efforts by Private / JV companies under PSC

2.9.1 The basin-wise exploratory efforts made by Private/Joint venture companies in terms of 2D seismic, 3D seismic and exploratory wells under PSC and RSC Regimesas on 31st March, 2020 are as under:

Table 2.11 : Exploratory Inputs in PSC Regime as on 01.04.2020

Basin Name	2D Seismic LKM	3D Seismic SKM	Exploratory Well (No.)
Andaman-Nicobar	27070	16562	6
Assam-Arakan Fold Belt	1352	613	2
Assam-Arakan Shelf	5453	2203	40
Bengal	5247	4573	11
Cambay	29994	9167	311
Cauvery	64727	44561	51
Deccan Syneclise	476	0	0
Ganga	6417	1683	8
Himalayan-Foreland	810	0	1
Kerela Konkan	52290	14035	7
Krishna Godavari	76106	70711	196
Kutch	2985	8345	21
Mahanadi	59542	64659	53
Mumbai	21349	27285	50
Pranhita Godavari	195	0	1
Rajasthan	14157	16396	307
Satpura-South Rewa-Damodar	2050	304	2
Saurashtra	16037	15428	16
Vindhyan	3918	376	6
Grand Total	**390175**	**296900**	**1089**

Table 2.12 : Exploratory Inputs in RSC Regime (OALP) as on 01.04.2020

Basin Name	2D Seismic (API) (in LKM)	3D Seismic (API) (in Sq. KM)
Assam Shelf	674.1	445.1
Kutch	600	1307
Mahanadi		1432.14
Mumbai	825.4	88.22
Rajasthan	1500	220.43
Saurashtra		674
Grand Total	**3599.5**	**4166.89**

2.9.2 Exploratory efforts carried out by PSUs, Indian Private and foreign companies under PSC regime as on 31st March, 2020 are given below:

Operator	2D Seismic LKM	3D Seismic SKM	Exploratory Well (No.)
Foreign Companies	61934	23841	290
Indian Private Companies	121070	107271	332
PSUs	207171	165788	467
Grand Total	390175	296900	1089

2.10 Hydrocarbon Discoveries in 2020-21

ONGC has made 8 hydrocarbon discoveries comprising of 3 discoveries in onshore acreages and 4-5 discoveries in offshore acreages under Nomination and PSC regime. Under Nomination regime total 6 discoveries have been made- 5 by ONGC and 1 by OIL. Under PSC Regime, 4 hydrocarbon discoveries have been notified, 3 by ONGC (2 Gas discoveries and one Oil discovery) and 1 Gas discovery by Pvt Operator. The details of hydrocarbon discoveries made in 2020-21 up to December, 2020 are as under:

Table 2.13 : Hydrocarbon Discoveries in 2020-21 upto December 2020

Sl No	Company	Oil Discovery	Gas Discovery	Total
1	ONGC (Nomination)	2	3	5
2	OIL (Nomination)	0	1	1
3	PSC	1	3	4
Total	3	3	7	10

2.11 National Data Repository (NDR)

2.11.1 The Government of India notified the Open Acreage Licensing Programme (OALP) as a part of the Hydrocarbon exploration and Licencing Policy (HELP) on 30th June, 2017. 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 was launched on 28th June, 2017.

2.11.2 National Data Repository (NDR) was set up at DGH and launched on 28th June, 2017 to make the entire Exploration and Production (E&P) data available for commercial exploration, research and development and academic purposes. Total data uploaded in NDR till 31st December 2020 is 2.582 Million Line Kilometres of 2D Seismic Data, 0.872 Million Square Kilometres of 3D Seismic data and 19,190 wells and 39,903 reports.

2.12 Shale Gas Exploration

2.12.1 In order to promote Shale Gas and Oil exploration in India, the Government of India on 14th December, 2013 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.

2.12.2 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 Ltd is carrying out Shale Gas and Oil exploration activities in Assam and Rajasthan basins. In phase II and III ONGC is to carry out exploration in 75 and 50 blocks respectively. Oil India is to carry out exploration in 5 blocks each in Phase II and III. So far ONGC has drilled 23 wells in 19 blocks. Till date ONGC has drilled total 29 wells in 23 blocks in four basins and OIL has drilled 4 wells in 4 blocks in two basins. Further, work for reassessment of Shale resources is under progress.

2.13 Gas Hydrate

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 is having encouraging results. NGHP-02 has discovered gas-hydrate-bearing sand reservoir system in the offshore Krishna Godavari basin. Further extensive studies are planned to assess the gas hydrate resource potential, reservoir characterization, reservoir delineation and geo-mechanical modelling for seafloor and wellbore stability and finalization of site(s) for pilot production for testing. KG deep offshore area block KG-DWN- 98/5 and KGDWN-98/3 contain gas hydrate accumulations may be suitable sites for gas hydrate Pilot Production testing.

The current understanding from studies carried out in India for Gas Hydrates hinged on the various issues related to pilot testing, production modeling, geo mechanical modeling etc. To firm strategy for pilot testing, an action plan consisting of various phases is being firmed up. Phase 1 will deal with the planning effort in

support of the NGHP-03 gas hydrate field test, which includes preparation and approval of action plan along with cost estimates, conducting studies pertaining to production test, reservoir simulation, flow modelling, sand ingress, risk & environmental impact assessment, MOD, MOEF & CC clearances, engineering design and finalisation of rig and other services tender. Pilot Production field test is divided into two phases 2 and 3. Phase 2 will deal with LWD and coring operations associated with identified site/(s) with primary goal to further characterize the geologic and engineering conditions of the sites under consideration for testing. Phase 3 will be the pilot production testing phase.

2.14 Policy Initiatives taken by the Government for Enhancing Crude Oil and Gas Production

Government has formulated path breaking policies to revolutionize the E&P sector.

In a major policy drive to give a boost to upstream hydrocarbon sector, the Government has unveiled a series of policy reforms in recent years. Some of the notable Policy reforms are listed as under:

2.14.1 Hydrocarbon Exploration and Licencing Policy / Open Acreage Licensing Programme (March 2016)

Government notified Hydrocarbon Exploration and Licensing Policy (HELP) on 30th March, 2016 and formally put in operation w.e.f. 1st July, 2017 with notification of Open Acreage Licensing Programme (OALP) and operationalisation of National Data Repository (NDR). HELP is a paradigm shift from Production Sharing Contract (PSC) regime to Revenue Sharing Contract (RSC) regime which completely overhauls the regulatory regime for the future Exploration and Production (E&P) activities by reducing the regulatory burden based on the principle of 'Ease of Doing Business'. It provides for single License for exploration and production of conventional as well as nonconventional Hydrocarbon resources, pricing and marketing freedom, reduced rate of royalty for offshore blocks etc. Open Acreage Licensing Programme (OALP) means potential investors/ companies can carve out exploration acreages of their choice and submit Expressions of Interest round the year.

Till Dec 2020, under HELP/Open Acreage Licensing Policy (OALP), five OALP bidding rounds under eight EOI submission windows have been concluded in which 105 exploration blocks have been awarded covering an area of around 156,580 sq. km.

2.14.2 Discovered Small Field Policy (DSF) September, 2015

For early monetization of un-monetized discoveries of National Oil Companies (NoCs), Government in September, 2015 approved 69 marginal fields for offer under Discovered Small Fields Policy. The Policy envisages awarding of Contract Areas under the new regime of Revenue Sharing Model with an objective to provide faster development of fields and facilitate early production of oil and gas.

First bidding round under the Discovered Small Field Policy was launched on 25th May 2016, offering 67 discovered small fields/discoveries clubbed into 46 Contract Area for international bidding. Total 30 contracts for 43 discovered small fields/discoveries were signed in March, 2017. It is expected that in-place locked hydrocarbons reserves of 44.7 Million Metric Tonnes (MMT) of oil and oil equivalent gas (O+OEG) will be monetised over a period of 15 years.

Subsequently, Government in April, 2018 had notified extension of Discovered Small Field (DSF) Policy for fast tracking monetization of un-monetized small fields / discoveries of Oil & Natural Gas Corporation(ONGC) and Oil India Limited (OIL) under the nomination regime and relinquished discoveries under the Production Sharing Contracts (PSC) regime.

On 7th February, 2018, Government approved the Discovered Small Field (DSF) Policy Bid Round- II, an extension of the Discovered Small Field Policy notified on 14.10.2015. Under DSF Bidding Round-II, 59 discovered small fields/ unmonetized discoveries estimated to have 189.61 Million Metric Tonnes (MMT) O+OEG (Oil and Oil Equivalent Gas) in-place were offered for bidding. Bidding under DSF Bidding Round – II was launched on 9th August, 2018 and a total

of 23 Contracts comprising 57 discovered small fields/discoveries were signed on March-2019 and 1 Contract comprising 1 discovery was signed in January, 2021.

2.14.3 Policy Framework to Promote and Incentivize Enhanced Recovery Methods for Oil and Gas (October, 2018)

The Government approved the Policy framework to promote and incentivize Enhanced Recovery (ER)/Improved Recovery (IR)/Unconventional Hydrocarbon (UHC) production methods/ techniques through fiscal incentives in the form of partial waiver of royalty and cess and an enabling ecosystem to improve productivity of existing fields and enhance overall production of domestic hydrocarbons. The Policy provides for systemic assessment of every field for its ER potential, appraisal of appropriate ER techniques and fiscal incentives to de-risk the cost involved in ER Projects and to make it economically viable.

2.14.4 National Seismic Programme (NSP) (October 2016)

The Government has taken up programme of undertaking 2D seismic survey of entire unappraised areas. National Seismic programme was launched on 12thOctober, 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).

As on 31st December, 2020, out of 48,243 LKM Surface Coverage of 45,141 LKM, 2D Seismic data acquisition, has been achieved under National Seismic Programme leading to 93.5 % achievement.

2.14.5 Policy Framework for streamlining the working of the Production Sharing Contracts (August 2018)

Government notified the policy for expeditious development of hydrocarbon resources by streamlining the working of PSCs in August, 2018. Policy includes extending exploration period by 2 years and appraisal period by 1 year for operational blocks in North Eastern Region (NER) besides allowing marketing including pricing freedom for natural gas to be produced in future in NER; sharing of the statutory levies including royalty & cess in Pre- NELP Exploration Blocks and to be cost recoverable with prospective effect; extending tax benefits under Section 42 of Income Tax, 1961 to operational blocks under Pre-NELP discovered fields with prospective effect for the extended period of Contract.

2.14.6 Re-assessment of Hydrocarbon Resources (September 2015- November 2017)

A Multi Organisation Team comprising of representatives of National Oil Companies (ONGC and OIL) and DGH has carried out estimation of hydrocarbon resource potential in the country. The prognosticated conventional hydrocarbon resources in 26 sedimentary basins of the country are reassessed to the order of 41.87 billion tonnes of oil and oil equivalent of gas (O+OEG), which is about 49% increase as compared to earlier estimates of 28.08 billion tonnes.

2.14.7 Policy Framework for Exploration &Exploitation of Unconventional Hydrocarbons under Existing Production Sharing Contracts, Coal Bed Methane Contracts and Nomination Fields (August 2018)

Government approved the policy to encourage the existing Contractors to unlock the potential of unconventional hydrocarbons including shale oil and gas and CBM in the existing acreages under PSCs and CBM contracts subject to conditions stipulated in policy document. An area of 72,027 sq. km. held under PSCs and 5,269 sq. km. area under CBM contracts has been opened up for simultaneous exploration and exploitation of conventional or unconventional hydrocarbons.

2.14.8 Policy Reforms in Exploration and Licensing Policy for enhancing domestic exploration and production of oil and gas (February, 2019)

Government notified 'Reforms in Exploration and Licensing Policy for enhancing domestic exploration and production of oil and gas' on 28th February 2019 with the objective to intensify exploration activities, attract foreign and domestic investment and enhance domestic production. The major features of Policy Reforms are as under:

i. Shifting of focus from 'revenue' to 'production' maximisation.

ii. No Revenue Sharing with Government in Category- II & III sedimentary basins.

iii. Boost to exploration activities by assigning greater weightage to exploration work programme.

(a) For unexplored areas in Category I basins, 70% weightage to Minimum Work Programme and 30% weightage to Revenue Sharing with cap of 50% at Highest Revenue Sharing point (HRP) and

(b) For Category II and III sedimentary basins 100% weightage for Minimum Work Programme,

iv. Shorter exploration period for early development.

v. Fiscal concessions for early monetization and commercial production.

vi. Marketing and Pricing freedom for natural gas.

vii. The policy envisages bidding out of 66 small and marginal producing nomination fields operated by National Oil Companies (NOCs) to have collaboration with private E&P players for inducting new and innovative technology, infusing fresh investment and best management practices to enhance production of oil and gas by adopting Enhanced Oil Recovery/Improved Oil Recovery (EOR/IOR) methods. NIO for bidding out 66 fields has been issued by ONGC and OIL in end June 2019. However, 49 fields under 13 contract areas were awarded by ONGC and 01 field awarded by OIL in May'20.

viii. The MoU of ONGC and OIL were restructured with 50% weightage for physical production, other physical parameters 30%. Financial performance parameters 20%.

ix. Redefining the Role of DGH by delegation of additional powers and functions to DGH to strengthen the compliance/regulatory, developmental and coordination role of DGH.

x. Simplified and investor friendly Model Bid documents including increasing of bidding cycle frequency from twice to thrice in a year.

xi. Promoting Ease of Doing Business:

(a) Simplified contractual terms with emphasis on cutting down approvals of Government/DGH /Management Committee and expeditious grant of approvals.

(b) Setting up of Empowered Coordination Committee (ECC) under the chairmanship of Cabinet Secretary for expediting process of approvals.

(c) New Dispute Resolution Mechanism for amicable and speedy redressal of contractual dispute.

(d) Electronic Single Window mechanism based on IT workflow and processes for processing of approvals. Standard Operating procedures for grant of approvals under PSC have also been finalized.

(e) Simplification of Processes and Procedures for submission of documents on self certification basis.

2.14.9 Promoting Ease of Doing Business (EODB): Following steps have been taken towards promoting Ease of Doing Business (EODB) in the E&P sector:





(a) Simplified contractual terms with emphasis on cutting down approvals of Government/DGH /Management Committee and expeditious grant of approvals.

(b) Setting up of Empowered Coordination Committee (ECC) under the chairmanship of Cabinet Secretary for expediting process of approvals.

(c) New Dispute Resolution Mechanism for amicable and speedy redressal of contractual dispute.

(d) Electronic Single Window mechanism based on IT workflow and processes for processing of approvals. Standard Operating procedures for grant of approvals under PSC have also been finalized.

2.14.10 Guidelines for Early Monetization of Hydrocarbon Discoveries (June, 2020)

Ministry, after examination the issue of monetization of hydrocarbon discoveries before completion of other activities such as Appraisal, Declaration of Commerciality (DoC) and submission of Field Development Plan (FDP), etc. in the Block under Production Sharing Contract/ Revenue Sharing Contract, issued guidelines on 23.06.2020 for monetization of discovery at an early stage within prescribed contractual timelines, in the public interest as a step towards energy security of the country. Benefitting from these guidelines, Asokenagar-1 discovery of ONGC is monetized and put on production in December 2020.

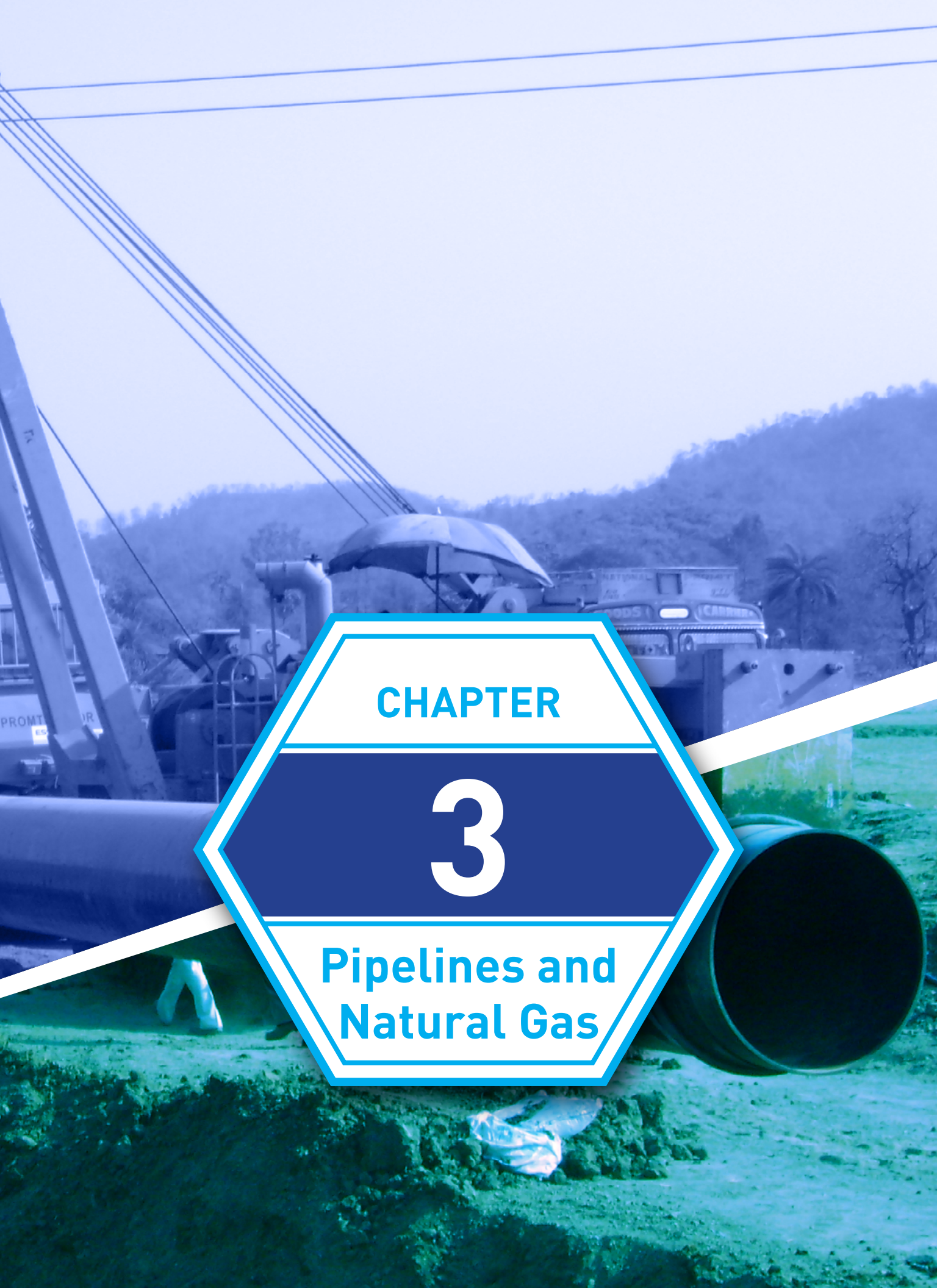
2.14.11. Natural Gas Marketing Reforms (October, 2020)

Taking another significant step to move towards gas based economy, 'Natural Gas Marketing Reforms' were announced vide Notification dated 15.10.2020. The objective of the policy is to prescribe standard procedure to discover market price of gas to be sold in the market by gas producers, through a transparent and competitive process; permit Affiliates to participate in bidding process for sale of gas and allow marketing freedom to certain Field Development Plans (FDPs) where Production Sharing Contracts already provide pricing freedom. Subsequently, detailed guidelines for Discovery of Market Price for Domestically Produced Natural Gas through e-bidding were issued vide Notification dated 03.12.2020, which would be applicable for sale of gas having pricing and marketing freedom. Agencies empanelled by DGH for carrying out e-bidding also been notified.

2.14.12. Simplification of Procedures and Processes for submission of Documents on Self Certification basis (February, 2020)

With a view to make the system transparent and faster, under Ease of doing business, guidelines for simplification of procedures and processes for submission of documents on self-certification were issued on 28.02.2020, after a review of the processes for various approvals and submission of documents under Production Sharing Contracts (PSC) under New Exploration Licensing Policy (NELP) and Pre-NELP.





CHAPTER 3

Pipelines and Natural Gas

Pipelines and Natural Gas

India is the 3rd largest energy consumer in the world after China and USA and also one of the fastest growing energy consumers. In year 2019, the primary energy consumption in the country was about 813 Million Tonnes of Oil equivalent (Mtoe) and Natural Gas has a share of 6.3% of the country's primary energy mix. It has been envisaged to increase the share of natural gas in primary energy mix of the country from current level to 15% in coming years.

In order to move forward, thrust has been put to enhance domestic gas production, encourage the greater utilization of Liquefied Natural Gas (LNG) and augment LNG import capacity, completion of national gas grid and speedier roll out of City Gas Distribution (CGD) network across the country.

3.1 Gas Grid

3.1.1 Gas Pipeline infrastructure is the most economically feasible and safe mode of transporting the natural gas by connecting gas sources to gas consuming markets. Gas pipeline practically determines the structure of the gas market and its development. Therefore, an interconnected National Gas Grid is envisaged to ensure the adequate availability and equitable distribution of natural gas in all parts of the country. At present, about 17900 km long gas pipeline network is under operation in the country and around 16600 km pipeline is under construction. Efforts are underway to complete the Gas Grid in a time bound manner.

3.1.2 Kochi - Mangaluru Natural Gas Pipeline of 450 km has been commissioned. It was a milestone effort towards the creation of 'One Nation One Gas Grid'. The pipeline has been built by GAIL (India) Ltd. It has transportation capacity of 12 Million Metric Standard Cubic Metres per day, and will carry natural gas from the Liquefied Natural Gas (LNG) Regasification Terminal at Kochi (Kerala) to Mangaluru (Dakshina Kannada district, Karnataka), while passing through Ernakulam, Thrissur, Palakkad, Malappuram, Kozhikode, Kannur and Kasaragod districts. The total cost of the project was about Rs. 3000 crore. The pipeline will supply environment friendly and affordable fuel in the form of Piped Natural Gas (PNG) to households and Compressed Natural Gas (CNG) to the transportation sector.

3.1.3 Further, Honorable Prime Minister Shri Narendra Modi has dedicated 348 km Dobhi - Durgapur Natural Gas Pipeline to the Nation recently. This pipeline is a part of the ambitious Jagdishpur – Haldia & Bokaro – Dhamra Natural Gas Pipeline Project (JHBDPL), popularly known as the "Pradhan Mantri Urja Ganga" connecting Eastern India to the National Gas Grid. This 348 km pipeline passes through Bihar (18 km), Jharkhand (205 km) and West Bengal (125 km). The pipeline was constructed with an investment of around Rs 2,400 crore. It will help revive fertilizer plant and anchor customers such as Hindustan Urvarak &Rasayan Limited (HURL), Sindri fertilizer plant in Jharkhand and supply gas to Matix Fertilizer Plant at Durgapur.

3.1.4 In order to develop gas pipeline network in the Eastern part of country, the Cabinet Committee on Economic Affairs (CCEA) has approved partial capital grant at 40 percent (Rs. 5,176 Crore) of the estimated capital cost of Rs. 12,940 Crore to GAIL for development of Jagdishpur- Haldia and Bokaro-Dhamra Pipeline project. This project will connect Eastern part of the country with National Gas Grid and will ensure the availability of clean and eco-friendly fuel i.e. Natural Gas to the industrial, commercial, domestic and transport sectors in the States of Uttar Pradesh, Bihar, Jharkhand, Odisha and West Bengal. These pipeline Projects would support the revival of 3 Fertilizer Plants namely Gorakhpur, Barauni and Sindri along the route of these pipeline projects. Connecting North east part with NGG has become more viable after the advent of JHBDPL (Pradhan Mantri Urja Ganga project). The pipeline is also being extended from Barauni to Guwahati (via Siliguri &Bongaigaon), as an integral part of Jagdishpur Haldia &BokaroDhamra Pipeline (JHBDPL) project, to connect North East Region (NER) with the National Gas Grid.

3.1.5 729 Km Barauni-Guwahati pipeline is passing through three states namely Bihar, West Bengal and Assam. Total 3384 km pipeline i.e. Jagdishpur-Haldia &Bokaro-Dhamra and Barauni-Guwahati is being executed with the

total estimated investment of Rs. 15,520 Crore. Further, 240 Km of Dhamra-Haldia Pipeline section has also been authorised to GAIL as an expansion of JHBDPL Project.

3.1.6 A MoU was signed among oil and gas CPSEs i.e. GAIL, IOCL, OIL, ONGC and NRL to form a joint venture company which will lay the pipeline connecting all north eastern State capital including Sikkim. Accordingly, "Indradhanush Gas Grid Ltd" (IGGL) a JVC has been incorporated on 10.08.2018. This JVC is developing trunk pipeline connectivity in all North Eastern States i.e. Assam, Sikkim, Mizoram, Manipur, Arunachal Pradesh, Tripura, Nagaland and Meghalaya in a phased manner. PNGRB has also issued provisional authorization to IGGL on 14.09.2018 for the development of North-East gas pipeline grid. This project will also facilitate developing City Gas projects which will ensure the 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. CCEA has approved Capital Grant (60% of project cost) of Rs.5559 crore to improve viability of project.

3.1.7 In the Southern region, work is under progress for construction of remaining 437 Km long Kochi- Kootanad- Bangalore- Mangalore (KKBMPL) Natural Gas pipeline covering 03 states i.e. Kerala, Karnataka and Tamil Nadu.

3.1.8 IOCL is laying Ennore-Thiruvallur-Bangalore-Nagapattinum– Madurai – Tuticorin Natural gas pipeline (ETBNMTPL), length- 1421 km at an investment of around Rs.6025 crore. Part section Ennore-Manali pipeline Section has been commissioned and gas supply to MFL,Manali (Fertilizer plant) has started. Further, Ramanad-Tuticorin pipeline section (pipeline to supply gas to SPIC, Tuticorin (Fertilizer plant) has been mechanically completed. Construction work is under progress in balance pipeline sections.

3.1.9 In order to de-bottleneck the upstream network of JHBDPL Project for enhanced capacity, a Parallel pipeline from Vijaipur to Auraiya (357 Km) and further to Phulpur (315 Km) is under execution by GAIL(India) Limited. Construction work is also under progress in Haridwar-Rishikesh pipeline by GAIL(India) Limited.

3.1.10 Construction work is going on in Kakinada-Srikakulam pipeline by APGDC (Andhra Pradesh Gas Distribution Corporation Limited), a JV of GAIL (Gas) Ltd and Andhra Pradesh Government entites.

3.1.11 GSPL India Gas Net Limited (GIGL) has commissioned around 340 KM section in Mehsana Bhatinda Gas pipeline and work is at advanced stage in another 950 KM pipeline section.

3.1.12GSPL India Transco Limited (GITL) has commissioned around 365 KM pipeline section in Mallavaram – Bhilwara - Bhopal Vijaipur Pipeline to feed Gas supply to Ramagundam fertilizer plant

3.2 Regasification infrastructure in the country

3.2.1 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).

3.2.2 At present, the Country is having six (6) operational LNG re-gasification terminals operational with capacity of about 39.2 MMTPA (~ 141 MMSCMD). The terminal-wise details are as under-

Location	Owner & Operator	Capacity (MMTPA)
Dahej (Gujarat)	PLL	17.5
Hazira (Gujarat)	SHELL	5
Kochi (Kerala)	PLL	5
Dhabol (Maharashtra)*	GAIL (KLPL)	1.7
Mundra (Gujarat)	GSPC LNG Ltd	5
Ennore (Tamilnadu)	IOCL	5
Total Capacity (MMTPA)		**39.2**

(Note: *Name plate capacity is 5 MMTPA but in absence of the breakwater, the terminal can only operate at 1.7 MMTPA. Construction work for creating necessary breakwater has also started for Dhabol LNG terminal).

3.2.3 In addition to above, following LNG terminals are under construction:

Location	Owner & Operator	Capacity (MMTPA)
Dhamra (Odisha)	Adani LNG Pvt Ltd	5
Dhabol Expansion	GAIL(KLPL)	3.3
Jaigarh (Maharashtra)	H-Energy	4
Jafrabad (Gujarat)	Swan Energy	5
Karaikal Port (FSRU)	AG&P	1
Chara(Guajrat)	HSEPL	5
Total Capacity (MMTPA)		**23.3**

3.3 City Gas Distribution (CGD)

3.3.1 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.

3.3.2 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.

3.3.3 Till May 2014, coverage of CGD networks could be expanded to about 34 Geographical Areas (GAs) spread over 66 districts (part/full) in different part of the country. In 2014-17, additional 58 GAs spread over 70 districts (part/full) were covered for CGD networks till 8th round of CGD biddings. In 2018, with the successful conclusion of 9th CGD bidding round, the coverage of CGDs had been extended to additional 86 new GAs covering 174 districts (part/full) spread over 22 states and UTs. Further, in February 2019, next bidding round (10th) has also expanded the coverage of CGDs to additional 50 new GAs covering 124 districts (part/full) in 14 States. 3.3.4
Above has resulted in expansion of CGD coverage from 34 Geographical Areas (GAs) spread over 66 districts (partial/full) in May 2014 to 232 GAs spread over more than 400 districts with a potential to cover about 53% of the country's area and 70% of country's population. Piped Natural Gas (PNG) supplies to domestic households has increased from the level of 25.4 lakh (May 2014) to 72.47 Lakh (as on 31.12.2020). 2622 CNG stations (as on 31.12.2020) are supplying clean and economical transportation fuel across the country.

3.3.5 In order to promote the expansion of City gas networks and enhance the usage of natural gas in cities, the Government has taken following steps-

i. Domestic gas, which is cheaper than imported gas, has been allocated to meet the entire requirement of PNG (D) and CNG (T) segments of CGD sector and it has been kept under no cut category.

ii. Public Utility Status granted to CGD Projects by Ministry of Labour and Employment (MoLE) .

iii. Ministry of Defence (MoD) has issued guidelines for use of PNG in its residential areas/unit lines

iv. Dept. of Public Enterprises (DPE) has issued guidelines to Public Sector Enterprises (PSEs) to have the provisions of PNG in their respective Residential complexes.

v. Ministry of Housing & Urban Affairs (MOHUA) has issued advisory to State Governments on following aspects-

   a. To standardize the Road Restoration/ permission charges along with time bound permission in accordance with the local conditions.

   b. Earmarking of land plot for development of CNG Stations at the planning stage of town/city and same should be specified in the revised Master Plan.

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

   vi. Further, MOHUA has directed to CPWD & NBCC to have the provisions of PNG in all Government Residential complexes.

   vii. DIPP notified amended Rule 2018 to ease out process to set up CNG dispensing facilities at existing OMC ROs.

CHAPTER 4

Refining



Refining

4.1 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 62.00 Million Metric Tonnes Per Annum (MMTPA) in 1998 to 248.866 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:

Sl. No	Refineries	Name of the company	Name Plate Capacity (MMTPA)
PSU Refineries			
1	Digboi-1901#	Indian Oil Corporation Limited	0.65
2	Guwahati-1962		1.00
3	Barauni-1964		6.00
4	Koyali-1965		13.70
5	Bongaigaon-1974		2.35
6	Haldia-1975		8.00
7	Mathura-1982		8.00
8	Panipat-1998		15.00
9	Paradip-2016		15.00
10	Mumbai-1954	Hindustan Petroleum Corporation Limited	7.50
11	Visakhapatnam-1957		8.30
12	Mumbai-1955	Bharat Petroleum Corporation Limited	12.00
13	Kochi-1963		15.50
14	Manali-1965	Chennai Petroleum Corporation Limited	10.50
15	Nagapattinam-1993		0 @
16	Numaligarh-2000	Numaligarh Refinery Limited	3.0
17	Mangalore-1996	Mangalore Refinery and Petrochemicals Limited	15.0
18	Tatipaka, AP-2001	Oil and Natural Gas Commission	0.066
Total			**141.566**
JV Refineries			
19	Bina-2011	Bharat Oman Refinery Ltd.	7.80
20	Bathinda-2012	HPCL Mittal Energy Ltd.	11.30
Total			**19.10**
Private Sector Refineries			
21	DTA-Jamnagar-1999	Reliance Industries Limited	33.00
22	SEZ, Jamnagar-2008		35.20
23	Vadinar-2006	Essar Oil Limited	20.00
Total			88.20
Grand Total			**248.866**

* MMTPA – Million Metric Tonnes per Annum.

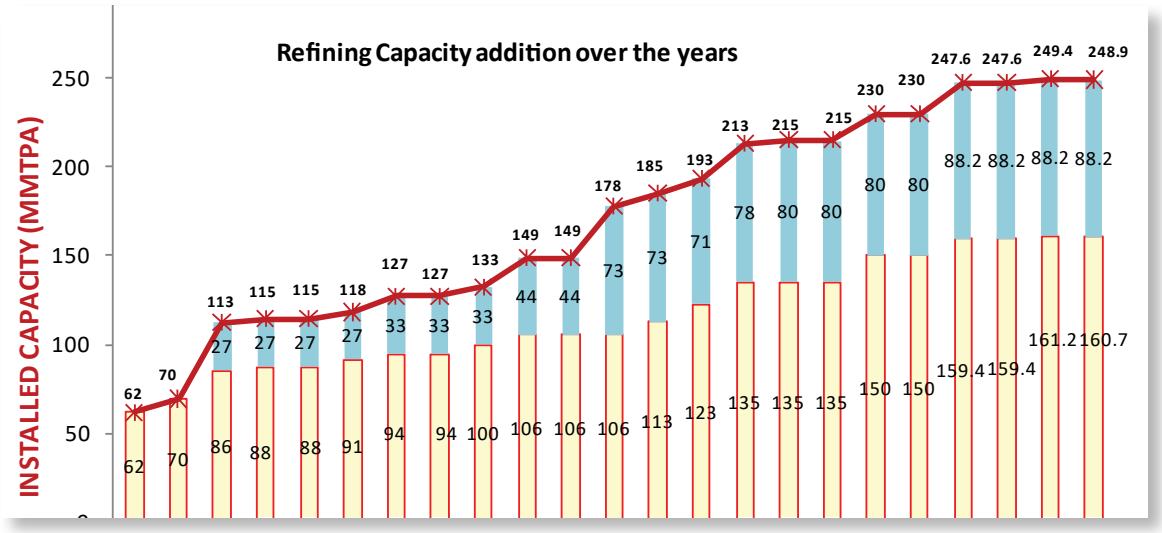
Refinery was set up at Digboi in 1901 by Assam Oil Company Ltd and later on IOCL took over the refinery on 14.10.1981.

@ Operation of Cauvery Basin Refinery (CBR) of CPCL of 1.0 MMTPA has been stopped since 1.4.2019 due to constraint in meeting product specification and to carryout project activities for new 9 MMTPA capacity refinery, planned by CPCL.

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 2020-21 (From April 2020 - December 2020), the country has exported 42.11 Million Metric Tonnes (MMT) of Petroleum products worth US Dollars 13.73 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.



4.3 New Refiney and Expansion of Existing Refineries

Green FieldRefinery

S. No.	Name of the Company	Location of the Refinery	Capacity, MMTPA
1	HPCL Rajasthan Refinery Limited (HRRL)	Barmer, Rajasthan	9.00

The Capacity expansion planned by 2024-25 is as under:

S. No.	Name of the Company	Location of the Refinery	Increase in Capacity, MMTPA
1	Indian OilCorporation Limited (IOCL)	Barauni, Bihar	3.00
2	Indian OilCorporation Limited (IOCL)	Guwahati, Assam	0.20
3	Indian OilCorporation Limited (IOCL)	Bongaigaon, Assam	0.35
4	Indian OilCorporation Limited (IOCL)	Mathura, U.P	1.20
6	Indian OilCorporation Limited (IOCL)	Koyali, Gujarat	4.30
7	Hindustan Petroleum Corporation Limited (HPCL)	Visakhapatnam, Andhra Pradesh	6.70
8	Hindustan Petroleum Corporation Limited (HPCL)	Mumbai, Maharashtra	2.00
9	Numaligarh Refineries Limited (NRL)	Numaligarh, Assam	6.00
10	Chennai Petroleum Corporation Limited (CPCL)	Nagapattinam, Tamil Nadu	9.00
11	RIL, DTA	Jamnagar, Gujarat	7.50

Green FieldRefinery

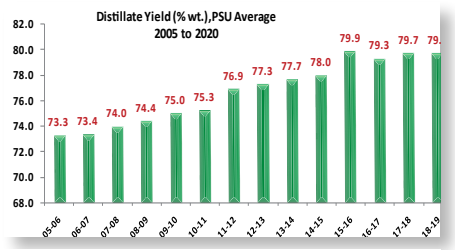
4.4 Refinery Performance Improvement

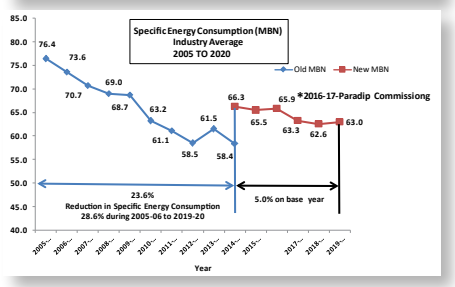
4.4.1 Indian public sector refineries are equipped with modern technologies and have continuously upgraded the technologies in line with the International trend and as per the requirement. Indian refineries have accorded top priority to reduce the energy consumption through various energy conservation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

The Centre for High Technology (CHT) carried out a Performance Benchmarking Study of public sector Refineries through M/s Solomon Associates for consecutive cycles 2010, 2012, 2014, 2016 and 2018. The study for 2020 cycle is in progress.

The distillate yield and quality of petrol/diesel has been improved progressively by PSU refineries through adoption of modern technologies. The PSU refineries' average distillate yield (wt% on crude) has improved from 73.3% in 2005-06 to 80% in 2019-20 as depicted in Graph. Similarly, energy conservation measures has helped the industry in reduction in Specific energy consumption, measured in terms of MBN (MBTU/bbl/NRGF) by 28.6% during the period 2005-06 to 2019-20 as depicted in Graph. As Fuel & Loss varies with the complexity of the refinery, the MBN methodology was developed by CHT to capture Fuel & Loss along with complexity. The MBN methodology was revamped to reflect technological trends based on input from consultants and reporting has been changed to New MBN from 2015-16.

Distillate Yield (% wt.)PSU Average





4.5 Auto Fuel Quality Up- gradation

The supply of BS-IV quality fuel across the entire country was completed in phases by 01.04.2017.

Govt. decided to leap frog directly from BS-IV to BS-VI emission norms in the country w.e.f. 01.04.2020. Ministry of Road transport & Highways, vide Notification No. GSR 889(E) dated 16.09.2016, notified emission standards for BS VI fuels. Considering rise in pollution level in Delhi, Government implemented BS-VI in NCT Delhi w.e.f. 01.04.2018, followed by major parts of NCR from 1st April, 2019. The nationwide supply of BS-VI quality fuels commenced from 1st April, 2020.

4.6 BRIEF DESCRIPTION OF THE REFINERIES

Public Sector Refineries

IOCL Refineries

4.6.1 Digboi Refinery (Assam)- Indian Oil Corporation Limited (IOCL) :

Digboi Refinery was commissioned in 1901 by Burmah Oil Company Ltd. (later Assam Oil Company Ltd.). Indian Oil 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. Digboi refinery is the oldest operating refinery in the world and produces premium grade Paraffin wax and micro-crystalline wax.

The present capacity of the Refinery is 0.65 MMTPA. The crude refining capacity utilisation of the refinery was 102.20 % in 2019-20.

4.6.2 Guwahati Refinery (Assam)- Indian Oil 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. 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.

The present capacity of the Refinery is 1.00 MMTPA. The crude refining capacity utilisation of the refinery was 89.20 % in 2019-20.

4.6.3 Barauni Refinery (Bihar)-Indian Oil Corporation Limited (IOCL):

Barauni Refinery was commissioned in July, 1964. The refinery was set up in collaboration with the then Soviet Union. The refinery, which was originally designed for processing indigenous Assam crudes, was subsequently revamped and expanded and is now capable of processing imported crudes.

The present capacity of the Refinery is 6.00 MMTPA. The crude refining capacity utilisation of the refinery was 108.60 % in 2019-20.

4.6.4 Koyali Refinery (Gujarat)-Indian Oil Corporation Limited (IOCL) :

Koyali Refinery was commissioned in October, 1965. The refinery was set up in collaboration with former Soviet Union. 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 Indian Oil's entry into Petrochemicals.

The present capacity of the Refinery is 13.70 MMTPA. The crude refining capacity utilisation of the refinery was 95.40 % in 2019-20.

4.6.5 Bongaigaon Refinery (Assam)-Indian Oil Corporation Limited (IOCL) :

Bongaigaon Refinery & Petrochemicals Ltd. (BRPL) was incorporated on 20thFebruary 1974, as a fully owned Central Government company. BRPL became a subsidiary of Indian Oil Corporation Ltd. in March 2001. BRPL was amalgamated with the holding company, Indian Oil Corporation Limited effective from March 25, 2009. BRPL which was originally processing Assam crudes is now capable of processing imported crudes.

The present capacity of the Refinery is 2.35 MMTPA. The crude refining capacity utilisation of the refinery was 87.00 % in 2019-20.

4.6.6 Haldia Refinery(West Bengal)-Indian Oil 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. Haldia refinery is the only refinery of Indian Oil 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.

The present capacity of the Refinery is 7.50 MMTPA. The crude refining capacity utilisation of the refinery was 80.80 % in 2019-20.

4.6.7 Mathura Refinery (Uttar Pradesh)-Indian Oil Corporation Limited (IOCL) :

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

The present capacity of the Refinery is 8.00 MMTPA. The crude refining capacity utilisation of the refinery was 111.90 % in 2019-20.

4.6.8 Panipat Refinery (Haryana)-Indian Oil Corporation Limited (IOCL) :

Panipat Refinery was commissioned in 1998. Panipat refinery 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 Indian Oil's entry into Plastics Industry.

The present capacity of the Refinery is 15.00 MMTPA. The crude refining capacity utilisation of the refinery was 100.30% in 2019-20.

4.6.9 Paradip Refinery (Odisha)- Indian Oil Corporaton Limited (IOCL):

Paradip Refinery was dedicated to the nation by the Hon'ble Prime Minister 07.02.2016. Pardip Refinery is Indian Oil'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 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 81.10% with no black oil production.

The present capacity of the Refinery is 15.00 MMTPA. The crude refining capacity utilisation of the refinery was 105.20% in 2019-20.

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 15thJuly, 1974 the undertakings of ESSO and Lube India Ltd were nationalized and merged to form Hindustan Petroleum Corporation Limited (HPCL). 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.

The present capacity of the Refinery is 7.50 MMTPA. The crude refining capacity utilisation of the refinery was 107.50 % in 2019-20.

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. 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 Visakh in the year 2010, Very Large Crude Carriers (VLCC), which carry up to 2 million barrels of oil, can now be received at VisakhRefinery. The Indian Strategic Petroleum Reserves Ltd. (ISPRL) nearby the refinery.

The present capacity of the Refinery is 8.30 MMTPA. The crude refining capacity utilisation of the refinery was 109.80% in 2019-20.

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 24thJanuary 1976. 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.

The present capacity of the Refinery is 12.00 MMTPA. The crude refining capacity utilisation of the refinery was 125.10 % in 2019-20.

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

The Kochi Refinery Ltd (KRL) 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 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.

The present capacity of the Refinery is 15.50 MMTPA. The crude refining capacity utilisation of the refinery was 106.50% in 2019-20.

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

The present capacity of the Refinery is 10.50 MMTPA. The crude refining capacity utilisation of the refinery was 96.80% in 2019-20.

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

Operation of Cauvery Basin Refinery (CBR) of CPCL of 1.0 MMTPA Capacity has been stopped since 01.04.2019 and a new refinery of 9 MMTPA has been planned.

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

The present capacity of the Refinery is 3.00 MMTPA. The crude refining capacity utilisation of the refinery was 79.40% in 2019-20.

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 PetroleumCorporation Ltd. (HPCL) and the Aditya Birla Group of Companies. In March, 2003 MRPL became a subsidiary of ONGC.

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.

The present capacity of the Refinery is 15.00 MMTPA. The crude refining capacity utilisation of the refinery was 93.00% in 2019-20.

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 0.07 MMTPA. The crude refining capacity utilisation of the refinery was 131.80% in 2019-20.

Joint Venture Refneries

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.

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).

The present capacity of the Refinery is 7.80 MMTPA. The crude refining capacity utilisation of the refinery was 101.40 % in 2019-20.

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 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.

The present capacity of the Refinery is 11.30 MMTPA. The crude refining capacity utilisation of the refinery was 108.30% in 2019-20.

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. 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.

The present capacity of the Refinery is 33.00 MMTPA. The crude refining capacity utilisation of the refinery was 100.10% in 2019-20.

4.6.22 Reliance Industries Limited-SEZ (RIL-SEZ) (Private Sector), JAMNAGAR (GUJARAT)

The refinery was commissioned in Dec 2008. 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.

The present capacity of the Refinery is 35.20 MMTPA. The crude refining capacity utilisation of the refinery was 101.90% in 2019-20.

4.6.23 Nayara Energy Limited, Vadinar Refinery (Private Sector), VADINAR (GUJARAT)

The refinery was commissioned in November, 2006. Vadinar refinery is the single-location second largest refinery in the country.

The present capacity of the Refinery is 20.00 MMTPA. The crude refining capacity utilisation of the refinery was 103.10% in 2019-20.

CHAPTER

5

Marketing & Distribution

Marketing & Distribution

5.1 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. Indian Oil Corporation Ltd (IOCL), Hindustan Petroleum Corporation Ltd (HPCL), Bharat Petroleum Corporation Ltd. (BPCL) and Private Companies such as Reliance, Essar, Shell, etc. As on 01.01.2021, the National LPG coverage is 99.5 %. There are 199 LPG Bottling Plants operated by Public Sector Oil Marketing Companies and 24,910 LPG Distributorships in the country as on 01.01.2021. Total active LPG consumers as on 01.01.2021 in the Country are 28.74 crores. Total 354 new LPG distributorships have been commissioned and 122 Letter of Intents (LOI) have been issued by OMCs to setup new distributorships from 01.04.2020 till 01.02.2021. The total number of new LPG connections issued by OMCs from 01.04.2020 till 01.02.2021 are 74 lakhs (approx.).

5.2 Major Initiatives Undertaken

5.2.1 PAHAL (DBTL Scheme)

The 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. Later the scheme has been extended to all over the country and as on 01.02.2021, 27.08 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.

As a part of subsidy management, the 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 1.08 crore consumers giving up their LPG subsidy voluntarily till date.

5.2.2 Pradhan Mantri Ujjwala Yojana (PMUY)

"Pradhan Mantri Ujjwala Yojana" was launched with an objective 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. The Hon'ble Prime Minister of India formally launched the scheme on 01.05.2016. Later, the Government had decided to increase the target from 5 crore to 8 crore to be achieved by FY 2019-20. The Government has further extended the benefit of PMUY to such poor families who have been left out on account of their names not appearing in either the SECC list or 7 identified categories to cover all poor families of the country.

Under this 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 Rs. 1600/- for each new connection.

The target of releasing 8 crore LPG connections under PMUY scheme has been achieved on 7th September, 2019, 7 months in advance of the target date of 31st March, 2020.

5.2.3 Pradhan Mantri Garib Kalyan Package (PMGKP)

The Scheme for providing free of cost LPG cylinders for three months to PMUY beneficiaries was started w.e.f. 01.04.2020 under Pradhan Mantri Garib Kalyan Package (PMGKP). The Scheme was initially valid for three months i.e. April to June, 2020 and subsequently, was extended upto December, 2020 for those PMUY beneficiaries who were credited with the advances for buying cylinder, but were not able to buy the free LPG cylinders in the stipulated time.

Under this Scheme, Rs. 9670.41 Cr has been transferred into the bank accounts of the PMUY beneficiaries for buying LPG refills. As on 31.12.2020, 14.17 crore free refills had been taken by PMUY beneficiaries under the Pradhan Mantri Garib Kalyan Package.

5.2.4 New LPG connections

New domestic LPG connections are released to the prospective customers once he/she approaches the concerned distributorship and fulfill the formalities. In FY 2019-20, 1.57 crore new LPG connections were issued and in FY 2020-21, nearly 74 lakhs new LPG connections have been released as on 1st February, 2021.

5.2.5 Commissioning of New Distributorships

Currently, the selection process for all types of distributorships is undertaken under Unified Guidelines for Selection of LPG distributorships. In FY 2019-20, 984 new LPG distributorships were commissioned and 487 LOIs were issued. In FY 2020-21, 122 LOIs have been issued and 354 new LPG distributorships have been commissioned across the country till 1st February, 2021.

5.2.6 Promotion of Digital Payments Undertaken by MoP&NG

There has been a significant expansion of digital payment infrastructure at retail outlets. As on 01.01.2021, 231479 POS terminals and 94447 e-wallet facility have been provided at 58437 petrol pumps across the country, 58641 retail outlets have been enabled with BHIM UPI. All the LPG Distributors and City Gas distribution companies are enabled with BHIM UPI.

5.2.7 DOOR TO DOOR DELIVERY OF DIESEL (HSD)

This novel concept has been conceived towards doorstep delivery of HSD where any person duly authorized by oil company may purchase high speed diesel from such oil company, in a mobile container or tank–truck with dispenser, only for the purpose for the site refueling of aircraft's, heavy vehicles or machineries, stationery equipment. This initiative is aimed at directly dispensing HSD into the stationery equipments of the end users.

CHAPTER 6

International Cooperation & Engagement

International Cooperation & Engagement

India is currently using only 6% of the world's primary energy and our per capita consumption of energy is about 1/3 of the global average. This, however, is rapidly changing. We have now emerged as the key centre for energy demand. During the last six years, India's energy landscape has undergone a transformational change. We are now the third largest energy consumer in the world after US and China.

As the ongoing pandemic brought about a global economic meltdown through demand destruction and supply chain shocks. In these tough times, the government worked relentlessly to strengthen the energy security, uninterrupted supply of oil & gas and collaboration in renewable energy with foreign countries for sustainable energy transition.

Despite the travel constrains due to pandemic, The government enhanced its engagement with major oil producing countries, strategic partner countries and international organization to successfully showcased on international fora its major policy reforms and investment opportunity and also resolved the issues flagged by global major oil & gas companies in various interaction with Hon'ble Prime Minister and Minister of Petroleum and Natural gas.

With the aim to reduce the import dependency and over reliance on Middle East, the Government also enhanced its engagement with USA & Brazil for sustainable energy transition by promoting biofuels, hydrogen and renewable in India's energy mix.

The year also saw, Indian Oil & Gas companies taking actively part in this clean energy transition to reduce carbon footprint. Five Public Sector Undertakings (PSUs) under MoPNG joined International Solar Alliance's Coalition for Sustainable Climate Action (ISA-CSCA) as Corporate Partners and will further contribute to ISA's Corpus Fund.

The government is now promoting aggressive investment in commercial viable overseas asset by Indian oil & gas companies to maintain a balanced portfolio and to enhance bilateral relation for mutual benefits. Today's Indian oil & gas PSUs have invested overseas to acquire quality producing oil and gas assets which not only brings equity oil to India, but also gives our companies the opportunity to work with global majors in the sector.

6.1 Key highlights of activities pursued by International Cooperation division during FY 2020-21

The G2G bilateral and multilateral engagements were enhanced through Joint Working Group meetings, Energy Dialogues and Joint Commission Meetings / Inter-Governmental Commission meetings.

The key engagement with countries are as under:-

6.1.1 Engagement with Saudi Arabia

- India uphold long standing collaboration under hydrocarbon sector with Saudi Arabia. Saudi Arabia is among the largest trade partner and a major source of energy for India. Saudi Arabia has been traditionally the top supplier of crude oil to India. In FY 2019-20 hydrocarbon trade accounted for more than 72% the total bilateral trade.
- Saudi Arabia remained 2nd largest sources of our LPG and largest source for Petroleum Products (POL) imports. India imported 3.8 MMT of LPG and 7.9 MMT of POL from Saudi Arabia in year 2019-20. India imported POL (including LPG) worth US$ 2.8 billion.
- This year Saudi Aramco has exhibited exemplary flexibility to meet the requests of our companies for supply of additional quantity of LPG during the pandemic situation in the world.
- India engaged with Saudi Arabia through Working Group Meeting on Energy. Both sides are working to enhance the supply of Crude oil, LNG and Investment from Saudi Arabia in India's energy sector.

6.1.2 Engagement with United Arab Emirates (UAE)

- India and UAE are close trading and investment partner. Traditionally, UAE has been one of India's biggest partner in hydrocarbon sector. Together we are involved in trade of crude oil, LNG, LPG, Petroleum products as well as in exploration and production activities.
- For FY 2019-20, UAE became the 3rd largest crude oil, 3rd largest sources of our LPG and 2nd largest source for Petroleum Products (POL) sourcing destination for India, accounting for 10% of India's total crude oil and 22 % of LPG imports. India's total hydrocarbon trade with UAE was worth US$ 19.9 billion.
- On the announcement of supply of free LPG cylinders to over 8 crore beneficiaries under our flagship program Ujjwala scheme from April to June 2020. ADNOC supported by supplying the additional quantity and timely supply of LPG and crude oil to India.
- Both countries engaged through 08th Meeting of the India-UAE High Level Task Force on Investment (HLTFI) on 30th September 2020 to explore investment opportunity in each other countries.
- A consortium of Indian Public Sector companies comprising OVL, IOCL and BPRL acquired 10% participating interest in Abu Dhabi's offshore Lower Zakum oil field in year 2018. This is the 1st Indian upstream investment in a producing asset in the Gulf region and in the Middle East. Further, Onshore Block-1 was awarded by ADNOC's during UAE's first bidding round 2018 to Urja Bharat Pte Limited (UBPL), a JV of BPRL and IOCL as joint operators, with participating interest of 50% each. Indian PSUs have invested US$ 705.69 million till 31st March 2020 in upstream projects in UAE.

6.1.3 Engagement with United States of America (USA)

- In order to strengthen the energy relations, India launched Strategic Energy Partnership with US in April 2018. The four Working Groups under the Strategic Energy Partnership dealing with Oil & Gas, Power & Energy Efficiency, Renewable Energy and Sustainable Development, are engaging regularly to finalize the specific action points and draw a roadmap.
- In a short span of three and half years, India's hydrocarbon trade with USA have exceeded the US $ 9 billion and US has emerged among the top ten sources of crude oil for India, with 5th position in current Financial Year.
- In 2020, Indian companies have together contracted 6.6 MMTPA of LNG from the US. Indian PSU, Gas Authority of India (GAIL) has signed two long term (20 years) LNG sourcing contracts with Dominion Energy Cove Point LNG LP and Sabine Pass Liquefaction LLC for 5.8 MMT.
- Indian Oil Corporation Limited (IOCL) has signed LNG Sale and Purchase Agreement with Diamond Gas International Pte. Ltd. (a wholly owned subsidiary of Mitsubishi Corporation) for supply of 0.7 MMTPA of LNG from Cameron LNG Project, USA for a period of 20 years. Cameron LNG Project started commercial operations in Aug 2019. Till May 2020, IOCL has received three LNG cargoes from the Project.
- MoU was signed between Ministry of Petroleum and Natural Gas, Government of India and U.S. Department of Energy for enhanced cooperation in Strategic Petroleum Reserves Programme on 17th July 2020



- The 3rd Meeting of the Working Group on Oil & Gas Pillar was held through Video Conferencing 30th June 2020, the two sides finalized the deliverables for the 2nd Ministerial meeting of SEP.

6.1.4 Engagement with Russia

- Russia has been a longstanding and time-tested partner for India. Development of India-Russia relations has been a key pillar of India's foreign policy. Since the signing of "Declaration on the India-Russia Strategic Partnership" in October 2000 (during the visit of President Putin), India-Russia ties have acquired a qualitatively new character with enhanced levels of cooperation in almost all areas of the bilateral relationship including political, security, defence, trade and economy, science and technology, and culture.

- A Joint Statement on Cooperation between India and Russia in Hydrocarbon Sector for 2019-2024 was issued in Vladivostok, Russia after Hon'ble PM's annual bilateral summit with H.E. Russian President. The Joint Statement provides a Roadmap to deepen cooperation in the hydrocarbon sector, bilaterally and in third country projects.

- Hon'ble Minister for Petroleum and Natural Gas, Shri Dharmendra Pradhan, and Mr. Igor Sechin, CEO, Rosneft had meeting on 14th April 2020 on the evolving global oil & gas markets amidst the effects of Covid-19 pandemic, and in the context of production cuts announced by OPEC+ countries including Russia.

- On 6th May 2020, Hon'ble Minister Shri Dharmendra Pradhan had a virtual meeting with H.E. Mr. Alexander Novak, Minister of Energy of the Russian Federation. The discussions encompassed the global oil and gas scenario due to Covid 19 and review of bi-lateral cooperation in the sectors of oil and gas sector and coking coal.

- Indian oil & gas PSUs are pursuing a number of business opportunities in Russia including stakes in oil & gas projects in Russian Arctic and Far East region and exploring sourcing crude oil from Russia's Far East to Eastern coast of India via Eastern sea route. Indian oil & gas PSUs have acquired stakes in 5 projects / companies and invested above US$ 15 billion till March 2020.

- The first ever India-Russia webinar on the use of natural gas as motor fuel was organized under the aegis of Ministry of Petroleum and Natural Gas, Government of India and the Ministry of Energy of the Russian Federation. The webinar acted as a catalyst for coming up with practical measures for initiating projects on pilot basis in each other's countries and eventually to scale up to the national levels and for mutual investments.

- The 23rd meeting of the Working Group on Cooperation in the Field of Energy and Energy Efficiency under the IRIGC was held virtually on 5th August 2020.

- In February 2020, during the visit of Mr. Sechin to New Delhi, The Indian PSU Indian Oil corporation Limited (IOCL) and Rosneft had signed the first-ever Term Contract for importing 2 MMT (Optional Volume) of Urals grade crude oil for the year 2020 to India. Subsequently, the first cargo of 1 million bbls of Urals crude oil was lifted by IOCL under the term contract in March 2020 for processing at Paradip refinery.

6.1.5 Engagement with Mongolia

- During the historic and first ever visit of Hon'ble Prime Minister to Mongolia in 2015, a line of credit (LOC) of US$ 1 Billion was approved for development of infrastructure.

- Subsequently, the Government of Mongolia decided to utilize this US$ 1 Billion LOC on 65% Indian content and 35% foreign, including Mongolian content basis, to set up its first ever grass root Oil Refinery Project (ORP) in Sainshand, Dornogobi Province with a capacity of 1.5 Million Metric Tonnes Per Annum (MMTPA).

- A MoU for Project Management Consultancy services for construction of an oil refinery plant in Mongolia was signed between EIL and Mongol Refinery LLC on 10th February 2019. The refinery will comprise of various process units, utilities, storages, and offsites along with truck and train loading facilities for receipt of crude and dispatching of products

from refinery. The project is planned to be completed by 2024.

- Hon'ble Minister of Petroleum & Natural Gas, Shri Dharmendra Pradhan, had a meeting through video conference met H.E. Mr. L.Oyun-Erdene, MP, Minister, Chief Cabinet Secretary and Co-chairman of the India-Mongolia Joint Committee on Cooperation held on 8th January 2021 had expressed his willingness to further share India's expertise in oil and gas sector including capacity building in accordance with the developmental priorities of Mongolia.

6.2. Endeavors to 'Neighborhood

6.2.1 Engagement with Bangladesh

- India and Bangladesh signed the frame work of understanding on cooperation in the Hydrocarbon Sector on 17th December 2020.
- A Joint Venture between IOCL and Beximco (The Bangladesh Export Import Company Limited) was signed on 30th June 2020 in the presence of Hon'ble Minister of Petroleum and Natural Gas with a plans to further expand its downstream business in Bangladesh and other countries.
- India and Bangladesh are collaborating in construction of 130 km long cross country petroleum product pipeline "Indo-Bangla friendship pipeline (IBFPL)" from Siliguri in India to Parbatipur in Bangladesh, which will supply 1 MMT of diesel to Bangladesh Petroleum Corporation for 20 years.
- The Pipeline aims to put in place a mechanism for assured, long-term, uninterrupted and eco-friendly supply of petroleum products to Bangladesh.
- Indian PSUs (OVL & OIL) have Participating interest in two exploratory blocks (SS04 & SS09) in Bangladesh. OVL & OIL has made an Investment of US$ 24.26 million in these blocks till 31st March 2020.
- Indian companies are exploring the possibility to set up a LNG terminal in Bangladesh as well as supply of R-LNG by cross border pipeline.

6.2.2 Engagement with Nepal

- India has been supplying all of Nepal's petroleum products including petrol, diesel, ATF and LPG etc. requirements since 1970s. The contract between Indian Oil and Nepal Oil Corporation (NOC) was renewed for another five years in March, 2017.
- IOCL and NOC signed the addendum to General Supply Agreement on MoU on Phase-2 of MAPL on 16th December 2020.
- The Motihari- Amlekhgunj Petroleum Product Pipeline which was inaugurated in September 2019 by Hon'ble Prime minister of India and Hon'ble Prime minister of Nepal through DVC is in operation and IOCL is supplying HSD to Nepal through MAPL. It has has achieved a major milestone of supplying 100 million litres of diesel, in a single month in December 2020.The MAPL has saved over 1 billion Nepali Rupees on transportation and other related expenditure.
- India and Nepal are exploring the possibility of extending the pipeline till Chitwan, Construct Products Pipeline from Siliguri to Jhapa, Construction of LPG Pipeline from Motihari to Chitwan, Construction of Natural Gas Pipeline from Gorakhpur to Bhairaha (Sunwal), Petroleum Vocational Training/ Skill Development Center and Augmentation of Petroleum Products Storage Facilities in Nepal
- In January 2020, Secretary Petroleum had paid a visit to Nepal and subsequent 1st and 2nd Joint Working Group meeting was held in January 2020 and August 2020 respectively.

6.2.3 Engagement with Sri Lanka

- India has a small trade in petroleum products with Sri Lanka. During FY 2019-20, India exported 1 MMT of petroleum products to Sri Lanka.
- IOC Lanka a subsidiary of Indian Oil Corporation Limited (IOCL) is engaged in retail distribution of petroleum products in Sri Lanka. The company is looking forward to expand its retail outlet networks in the country.
- Petronet LNG Limited (PLL) along with Sri Lanka Gas Terminal Company Limited and

Japanese Consortium (JC) consisting of Sojitz Corporation and Mitsubishi Corporation in a Joint Venture (JV) are developing an FSRU LNG Receiving, Storage and Regasification Terminal of ~ 3 MMTPA capacity at Colombo Port, Sri Lanka.

- Other business opportunities pursued by Indian oil & gas companies include utilization of Upper Tank Farm at Trincomalee, marketing of ATF and LPG, Refurbishment of Existing Refinery/setting up of a new Refinery and setting up CGD and CNG market & infrastructure in Sri Lanka.

6.2.4 Engagement with Bhutan

- India continues to strengthen the engagements with Bhutan and supplies full requirement of petroleum products of Bhutan by supplying 100% demand of the petroleum products by Bhutan.
- Indian PSUs (IOCL & BPCL) Supply the requirement of MS, HSD, ATF & SKO to Bhutan. IOCL supplies to eastern, western and central Bhutan is controlled by Siliguri Divisional Office with 15 Retail Outlets and Guwahati Divisional Office with 19 Retail Outlets, supplying to 3 Bhutan customers for MS, HSD, SKO (Non PDS) and ATF. Indian Oil is having a market share of 30 % in MS, 42 % in HSD in Bhutan.

6.2.5 Engagement with Myanmar

- The hydrocarbon engagement with Myanmar has been steadily strengthening. Myanmar is the largest destination for Indian upstream investment in the South East Asia region. Indian PSUs (OVL and GAIL) have already invested US$ 1.2 billion in till 31st March 2020 in upstream and midstream areas of oil & gas sector in Myanmar.
- An MoU signed between the MoPNG and the Ministry of Electricity and Energy, Myanmar on Cooperation in the Field of Petroleum Products was signed on 27th February 2020, during the State Visit of the President of Myanmar to India.
- India and Myanmar held official level deliberation for 2nd JWG meeting on Oil & Gas sector on 24th June 2020 followed by Secretary level meeting between the countries.
- Indian PSU, Numaligarh Refineries Limited (NRL) in Assam is exploring commercial supplies of diesel to Myanmar and Indian oil and Gas companies are exploring new opportunities between the two countries.

6.3. Engagements with International Organizations

India has been persistently elevating the engagement with prominent International organizations (OPEC, IEA, IEF) through interaction on regular basis at Ministerial level including forum like Asian Ministerial Energy Roundtable, G20 etc.

6.3.1 Engagement with Organization of the Petroleum Exporting Countries (OPEC)

- OPEC has traditionally been an important supplier for our hydrocarbon requirements.





The 4th High-level meeting of the India-OPEC Energy Dialogue,





The First-Ever Joint Webinar between IEA & Ministry of Petroleum and Natural Gas on 'Building a natural gas-based ecosystem in India amidst a changing global gas market landscape'.

During the last year 2019-20, OPEC has met 78% of India's crude oil demand, 59% of LPG demand, and nearly 38% of our LNG demand. In terms of value we imported US$ 92.8 billion worth of hydrocarbons from OPEC countries.

- In view of the developments in global energy markets and decline in crude oil price trends in the midst of Covid-19, Shri Dharmendra Pradhan, Minister Petroleum and Natural Gas held discussion on VC with H.E. Dr. Mohammed Barkindo, Secretary General in June 2020. Shri Dharmendra Pradhan stressed on OPEC's role in stabilising oil markets, and agreed to work in close cohesion with OPEC countries to strengthen India's energy security and stability of global energy.

6.3.2 Engagement with International Energy Agency (IEA)

- After India became the associate country of IEA in March 2017, the bilateral co-operation between India and the IEA has grown significantly. Currently, IEA is assisting India in various areas including India's Emergency response assessment, best practices in building SPRs, and increasing share of natural gas in India's energy mix.
- International Energy Agency in close collaboration with NITI Aayog conducted "In-depth review of India's energy policies". The report was launched in January 2020. The report highlighted the Government of India's remarkable and commendable progress in extending access to modern energy, including clean cooking and electricity, affordable, secure and cleaner energy for its people while implementing a range of energy market reforms.
- India is working to become a gas based economy by increasing the share of natural gas in India's energy mix from 6.3 % to 15% by 2030. In this context, the IEA and the Ministry of Petroleum and Natural gas organized the first collaborative activities on the realm of a gas-based economy on 1st July 2020. The event was the first in a series of IEA-organised workshops on Building a Gas-Based Economy in India.

6.3.3 Engagement with International Energy Forum (IEF)

- IEF is providing a global platform to both energy producers and consumers to deliberate upon global energy issues.
- Hon'ble Minister deliver Keynote Address notes on the 7th IEF-IGU Ministerial Gas Forum on 3 December 2020 at Virtual Ministerial Roundtable on "Opportunities in Growing Gas Markets: Producer-Consumer Perspectives on New Realities". Hon'ble



Hon'ble Minister deliver Keynote Address notes on The 7th IEF-IGU Ministerial Gas Forum on 3 December 2020

Minister highlighted the views to develop greater synergies between natural gas producing and consuming countries, to seize the opportunity presented by the Covid-19 pandemic.

6.4. International Events Organized / Participated by Ministry of Petroleum & Natural Gas

6.4.1. G20 Extraordinary Energy Ministers Meeting

- The G20 Extraordinary Energy Ministers' Meeting was held on April 10, 2020 through video conferencing. The meeting was called by Saudi Arabia, the current G20 chair, and it was chaired by Saudi Arabia Energy Minister Prince Abdulaziz.
- Union Minister of Petroleum and Natural Gas and Steel Dharmendra Pradhan had participated in the G20 Extraordinary Energy Ministers' virtual meeting on India's behalf. The Energy Ministers of other G20 nations, guest countries and heads of international organizations such as IEA, OPEC and IEF were also present during the virtual meeting.
- The G20 Energy Ministers' focused on ways and means to ensure stable energy markets, which are affected due to demand reduction as result of the COVID-19 pandemic and the ongoing surplus production -related matters. During the meeting, Shri Pradhan reiterated Prime Minister Shri Narendra Modi's call for G20 taking a human-centric approach for overcoming challenging hardships, especially for the vulnerable.
- The Minister advocated for a stable oil market, which is reasonable for producers and affordable for consumers. Minister appreciated the collective efforts of OPEC and OPEC-plus countries to balance the supply-side factors which is imperative for long-term sustainability.

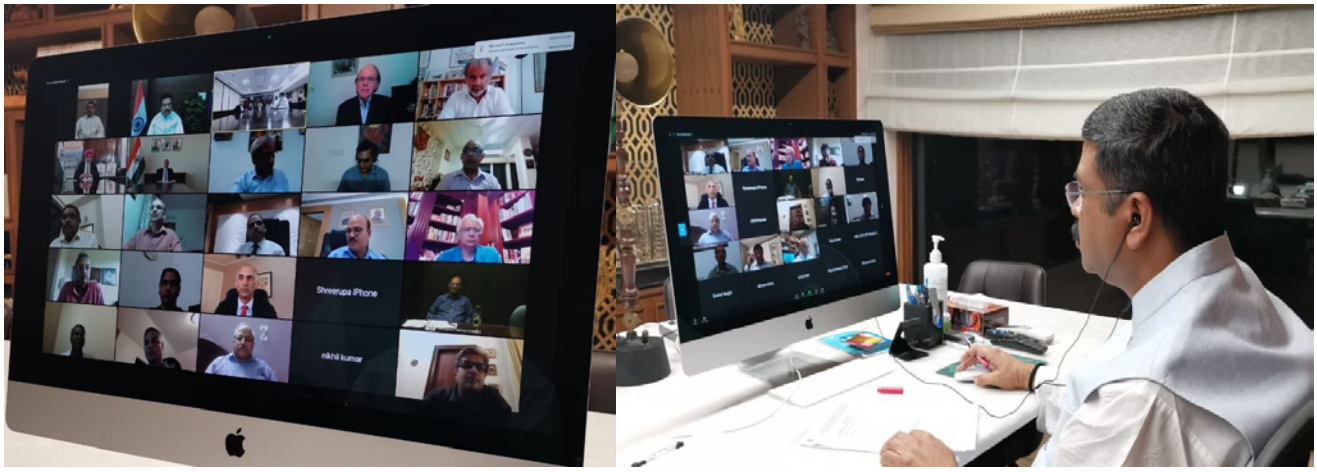


6.4.2. International Think Tank (ITT) by Ministry of Petroleum and Natural Gas.

- In order to factor in the aforementioned trends and to deliver on high expectations from this Ministry, it was decided to constitute an International Think Tank (ITT) to assist MoP&NG in policy formulation. Since people of Indian origin have reached eminent positions in oil & gas MNCs, Research Organizations, Universities and International Financial Institutions, they were considered as an important resource pool to tap for ITT. In order to make it more holistic it was decided to include participation from the financial sector in India as well as those who have been associated with the oil and gas sector in the last decades.
- The first meeting of the International Think Tank (ITT) was held on 9 October 2017 under the leadership and guidance of Hon'ble Minister for Petroleum and Natural Gas & Steel Shri Dhramendra Pradhan along with senior officials of Ministry, Chairmen & C&MD of Indian Oil & Gas PSU's held in New Delhi.



G20 Extraordinary Energy Ministers Meeting

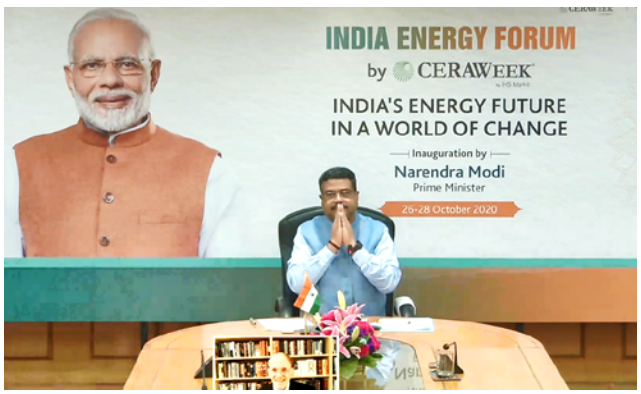


Hon'ble Minister Shri Dharmendra Pradhan had Interaction withInternational Think Tank Members

- Hon'ble Minister Shri Dhramendra Pradhan Had a meaningful dialogue on Video conferencing with the esteemed members of the International Think Tank of MoPNG on May, 2020 discussing on the range of issues related to global oil & gas markets during the critical pandemic phase.

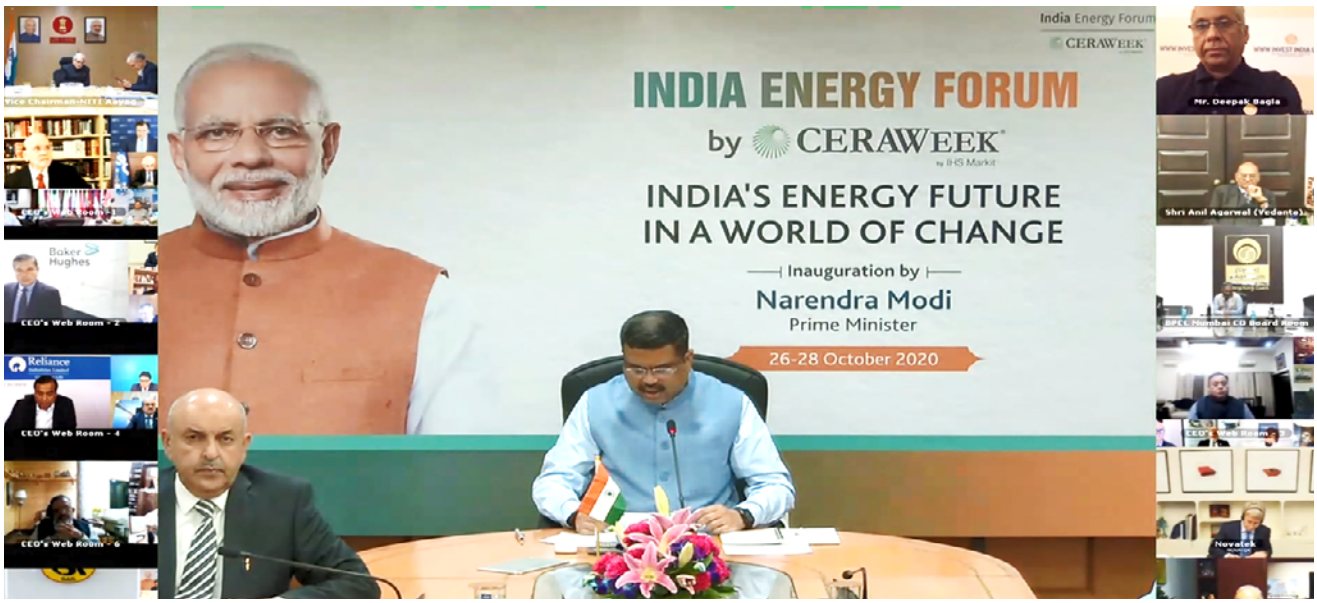
6.4.3. India Energy Forum- CERAWeek by IHS Market *26th October 2020*

- In the sweeping change from the COVID-19 pandemic, economic transformation, and the global energy transition, Ministry of Petroleum and Natural Gas in collaboration with IHS Markit, hosted the "Fourth India Energy Forum by CERAWeek", held under the patronage of Hon'ble Minister for Petroleum & Natural Gas, Shri Dharmendra Pradhan.
- The Forum was the first ever all-virtual CERAWeek conference. The three-day event focused on India's economic recovery, its energy future amid the global transition to a lower carbon system, and the major reforms underway by the government of Shri Narendra Modi, Honorable Prime Minister of India, to attract investment and increase the competitiveness of India's economy.
- The event was inaugurated by Hon'ble Prime Minister of India and witnessed participation from Hon. Dan Brouillette, Secretary of Energy, United States and H.R.H. Prince Abdulaziz bin Salman, Minister of Energy, Kingdom of Saudi Arabia
- Hon'ble Prime Minister of India, Shri Narendra Modi outlined new energy map of India with seven key drivers: Accelerating efforts to move towards a gas-based economy, cleaner use of fossil fuel, greater reliance on domestic sources to drive biofuels, achieving renewables target of 450 GW by 2030, increasing contribution of electricity to de-carbonize mobility, moving into emerging fuels like hydrogen and digital innovation across all energy systems.









6.4.4. Energy Roundtable with Global oil & gas CEOs *26th October 2020*

- On the side lines of India Energy Forum, Hon'ble Prime Minister also had an interaction with Global Oil & Gas CEOs and experts in the annual event organized by NITI Aayog and Ministry of Petroleum and Natural Gas.
- The event witnessed participation of around 40 CEOs from the oil and gas sector, with around 28 leaders presented their views to the Prime Minister. Key stakeholders such as *H.E. Dr Sultan Ahmed Al Jaber, CEO, Abu Dhabi National Oil Company & Minister of Industry and Advanced Technology, UAE, *H.E. Mr. Saad Sherida al-Kaabi, Deputy Chairman, President & CEO and Qatar Minister of state for Energy Affairs, *Mr. Mohammad Sanusi Barkindo, OPEC Secretary General, *Dr Faith Birol IEA Executive Director, *Mr. Yury Sentyurin, GECF; and *Dr Daniel Yergin, Vice Chairman IHS Markit, UK, shared their inputs on the sector.
- CEOs of major oil and gas companies, including Roseneft, BP, Total, Lyondell Basell, Tellurian, Shulumberger, Baker

Hughes, JERA, Emerson and X-Coal, had also participated in the meeting.

- The objective behind the meeting was to deliver a global platform to understand best-practices, discuss reforms, and inform strategies for accelerating investments into the Indian Oil and Gas value chain. The annual interaction has gradually become one of the most important gatherings of not only intellectual debate but also of executive action.

6.5. Overseas Asset

- Indian PSU companies which have established their presence in the Global Energy scenario by acquiring overseas Oil and Gas assets comprise of ONGC Videsh Ltd (OVL) which is a wholly owned subsidiary and overseas arm of Oil and Natural Gas Corporation (ONGC), Oil India Ltd (OIL), Indian Oil Corporation Ltd (IOCL), Bharat PetroResources Ltd (BPRL) which is a wholly owned subsidiary of Bharat Petroleum Corporation Ltd (BPCL), Prize Petroleum Corporation Ltd (PPCL) a wholly owned subsidiary of Hindustan Petroleum Corporation Ltd (HPCL) and Gas Authority of India Ltd. (GAIL).
- Indian oil and gas companies have invested in 55 assets under 25 countries with investments worth approximately US$ 36.55 billion till 31st March 2020. The assets range from exploratory block to producing assets and pipeline projects.
- During last 3 years, Indian companies have acquired strategic stakes in overseas assets in UAE, Oman, Israel and Russia. For FY 2019-20, the share of equity oil and gas for Indian PSUs from all the overseas assets was approx. 24.5 MMTOE.

Sr. No	Country	Name of Asset	Company Name	Participating Companies & P.I.
1	Australia	EP 413	BPRL	Norwest Energy - 27.945% BPRL - 27.803% AWE Perth Pty Ltd - 44.252%
		Production License T/L1 (Yolla Field)	PPCL	Beach Energy (Operations) Limited - 37.5% (Operator) Beach Energy (Bass Gas) Limited - 5% AWE Petroleum Pty Ltd - 22.5% AWE (Bass Gas) Pty Ltd - 12.5% Beach Energy Limited - 11.25% Prize Petroleum International Pte Ltd - 11.25%
		Retention Leases T/RL 2, 3, 4 & 5 (Trefoil & Others)	PPCL	Beach Energy (Operations) Limited - 39% (Operator) AWE Petroleum Pty Ltd -40% Beach Energy Limited - 11.25% Prize Petroleum International Pte Ltd - 9.75%
2	Azerbaijan	ACG	OVL	ONGC Videsh: 2.31% BP (O): 30.3746% AzACG: 25% Chevron: 9.5691% INPEX: 9.3072% Equinor (erstwhile Statoil): 7.2690% Exxon: 6.7914% TPAO: 5.7298% Itochu: 3.6489%

Sr. No	Country	Name of Asset	Company Name	Participating Companies & P.I.
		BTC Pipeline	OVL	ONGC Videsh: 2.36% BP (O): 30.1% SOCAR: 25% Chevron: 8.9% Equinor (erstwhile Statoil): 8.71% TPAO: 6.53% Itochu: 3.4% TOTAL: 5% ENI: 5% INPEX: 2.5% CIECO: 2.5%
3	Bangladesh	SS-04	OVL OIL	ONGC Videsh (O): 45% OIL: 45%, BAPEX: 10% (Carried)
		SS-09	OVL OIL	ONGC Videsh(O): 45%OIL: 45%, BAPEX: 10% (Carried)
4	Brazil	BC-10	OVL	ONGC Videsh: 27% Shell(O): 50% QPI : 23%
		Block BM-SEAL-4	OVL	ONGC Videsh: 25% Petrobras (O) : 75%
		BM-SEAL-11 (2 blocks)	BPRL	Petrobras - 60% IBV@ - 40% (BPRL-20%)
		BM-C-30 (1 block)	BPRL	IBV@ – 35.7% (BPRL-17.85%) BP – 35.7% Total – 28.6%
		BM-POT-16 (2 blocks)	BPRL	Petrobras - 30% IBV@ - 20% (BPRL-10%) BP - 30% Petrogal - 20%
5	Canada	PNW LNG Project	IOCL	Petronas (Petronas Energy Canada Ltd.) : 62% (O) Sinopec-Huadian :15% IML (IndianOil) : 10% Japex : 10% Petroleum Brunei : 3%

Sr. No	Country	Name of Asset	Company Name	Participating Companies & P.I.
6	Colombia	MECL	OVL	ONGC Videsh: 25-50%SIPC: 25-50%Ecopetrol: 50%
		Block RC-9	OVL	ONGC Videsh: 50% Ecopetrol (O): 50%
		Block RC-10	OVL	ONGC Videsh (O): 50% Ecopetrol: 50%
		Block SSJN 7	OVL	ONGC Videsh : 50% Canacol Energy (CNE) (O): 50%
		Block CPO-5	OVL	ONGC Videsh (O): 70% Petrodorado : 30%
		LLA 69	OVL	ONGC Videsh: 50%, SIPC: 50% (Operator MECL 100% JVC of ONGC VIDESH & SIPC)
		GUA OFF 2	OVL	ONGC Videsh: 100%
7	East Timor	JPDA -06-103	BPRL	Oilex – 10% Japan Energy – 10% Videocon – 20% GSPC – 20% BPR JPDA – 20% Pan Pacific Petroleum – 15%
8	Gabon	Block:Shakthi- II	OIL	OIL : 50.00 (Operator) IOCL : 50.00
			IOCL	
9	Indonesia	Nunukan	BPRL	Pertamina Hulu Energi Nunukan Company – 64.5% BPRL Ventures Indonesia BV – 12.5% Videocon Indonesia Nunukan Inc. – 23%
10	Iran	Block Farsi Farzad	OVL	ONGC Videsh(O): 40%IOC : 40%OIL : 20%
11	Iraq	Block-8	OVL	ONGC Videsh: 100%
12	Israel	Block 32	OVL	ONGC Videsh (O): 25% BPRL: 25% IOCL: 25% OIL: 25%
			BPRL	
			IOCL	
			OIL	
13	Kazakastan	Block Satpayev	OVL	ONGC Videsh : 25% KazMunaiGas: 75%
14	Libya	Contract Area 43	OVL	ONGC Videsh: 100%
		Area 95/96	OIL	Sipex : 50.00(Operator) OIL : 25.00 IOCL : 25.00
			IOCL	

Sr. No	Country	Name of Asset	Company Name	Participating Companies & P.I.
15	Mozambique	Offshore Area 1, Rovuma Basin	OVL OIL BPRL	ONGC Videsh: 10%BREML: 10% (ONGC Videsh: 6% & OIL: 4%)TOTAL (O): 26.5%ENH: 15%Mitsui: 20% BPRL: 10% PTTEP: 8.5%
16	Myanmar	Blocks A-1 & A-3	OVL OVL GAIL	ONGC Videsh : 17% MOGE : 15% POSCO International (O): 51% Kogas: 8.5% GAIL: 8.5%
		Offshore Mid-stream Gas Pipeline (Pipeco 1)	OVL GAIL	
		Onshore Gas Pipeline (SEAGP) (Pipeco 2)	OVL	ONGC Videsh: 8.347% CNPC (O): 50.9% MOGE : 7.365% POSCO International: 25.041% GAIL: 4.1735% KG-SEAGP: 4.1735%
		Block B-2	GAIL OVL	ONGC Videsh (O): 97% M&S: 3% (Carried)
		Block EP-3	OVL	ONGC Videsh (O): 97% M&S: 3% (Carried)
17	Nigeria	OML 142	OIL IOCL	Summit Oil : 30% (O) Suntera Nigeria 205 Ltd : 70%* (* Consortium Partners : Suntera 50%, IndianOil 25%, OIL 25%)
18	Oman	Mukhaizana	IOCL	Occidental Mukhaizna LLC : 45% (O) IndianOil :17%; Oman Oil Company S.A.O.C : 20%; Liwa Energy Limited :15% Total E & P Oman : 2% Partex (Oman) Corporation: 1%
19	Russia	Sakhalin -1	OVL	ONGC Videsh: 20% ENL(O) : 30% Sodeco: 30% Roseneft Subsidiaries:20%
		Vankorneft	OVL OIL BPRL IOCL	Vankorneft (O) Rosneft Oil Company : 50.1% ONGC Videsh Vankorneft Pte Ltd : 25% Vankor India Pte. Ltd. : 23.9%* (*comprises of IndianOil Singapore Pte. Ltd.: 33.5% ; Oil India International Pte. Ltd. : 33.5%; BPRL International Singapore Pte. Ltd. : 33%)
		Imperial Energy	OVL	ONGC Videsh:100%

Sr. No	Country	Name of Asset	Company Name	Participating Companies & P.I.
		License-61	OIL	OIL: 50.00 Petroneft Resources: 50.00
		Taas Yuryakh	OIL	Rosneft : 50.10 British Petroleum : 20.00 Taas India Pte Ltd : 29.90 OIL INDIA INTL PTE. LTD :33.5% (Effective PI: 10.0165%) IOCL SINGAPORE PTE. LTD : 33.5% (Effective PI: 10.0165%) BPRL INTL.SINGAPORE PTE. LTD:33.0% (Effective PI: 9.867%)
			BPRL	
			IOCL	
20	South Sudan	GPOC (Block -1A, 1B, 4S)	OVL	ONGC Videsh: 25% CNPC: 40% Petronas: 30% Nilepet: 5%
		SPOC (Block 5A)	OVL	ONGC Videsh: 24.125% Petronas: 67.875% Nilepet: 8%
21	Syria	AFPC	OVL	SSPD(O): 62.5-66.67% ONGBV: 16.67-18.75% CNPC: 16.67-18.75%
		Block 24	OVL	ONGC Videsh: 60% IPR(O) : 25% TOM : 15%
22	UAE	Lower Zakum Concession	OVL	ADNOC : 60% (O) Inpex :10 %; Total :5%; CNPC : 10%; Eni : 5% Falcon Oil & Gas B.V : 10%* (*IndianOil: 30%; OVL: 40%; BPRL: 30 %)
			BPRL	
			IOCL	
		Onshore Block 1	BPRL	BPRL International Singapore Pte. Ltd. (BISPL) - 50% Indian Oil Singapore Pte. Ltd. (ISPL)- 50%
			IOCL	
23	USA	Niobrara Shale Project	OIL	Verdad LLC : 60% (O) Haimo Oil & Gas LLC : 10% Oil India (USA) Inc. : 20% IndianOil (USA) Inc. : 10%
			IOCL	
		GAIL-Carrizo Eagle Ford Joint Venture (JV)	GAIL	Formed unincorporated JV with M/s Carrizo Oil & Gas Inc. through GGUI. Participating Interest of GGUI in the JV is 20%.

Sr. No	Country	Name of Asset	Company Name	Participating Companies & P.I.
24	Venezuela	San Cristobal	OVL	ONGC Videsh: 40% CVP-PDVSA: 56% PDVSA Social: 4%
		Carabobo Project-1	OVL	PdVSA : 71% (Operator: O) OVL : 11% Repsol : 11% IndianOil : 3.5% OIL : 3.5%
			IOCL	
			OIL	
25	Vietnam	Block 06.1	OVL	ONGC Videsh: 45% Roseneft Vietnam B.V. (O): 35% Petro Vietnam : 20%
		Block 128	OVL	ONGC Videsh: 100%

CHAPTER 7

Development of North East Region

Development of North-Eastern Region

7.1 Background

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 North-Eastern region 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 Oil & Natural Gas Corporation Limited (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, Tichna, Gojalia, Rokhia, Khobal, Hortoki have been discovered by Oil India Limited (OIL) and 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 knowhow of producing and managing complex reservoirs and contributing to about 8.44 Million Metric Tonnes per Annum (MMTPA) 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 are of the order of 1633 MMT. Thus, there is about 34% increase in the prognosticated hydrocarbon resources as compared to previous assessment. The North-East region is having around 18% (7634 MMT) of country's total prognosticated hydrocarbon resources. About 2246.6 MMT of inplace hydrocarbon reserves have been established so far by E&P companies, which means about 73% of hydrocarbon resources are under "yet to discover' category.

7.1.5 The two national oil companies, namely, Oil and Natural Gas Corporation Limited (ONGC) and Oil India Limited (OIL) have been engaged in the North-East Region for exploration and exploitation of oil and gas for more than 60 years and generated a vast geo-scientific database and geological understanding of the basin.

7.2 Exploration Activities in North-East under the Nomination Regime

7.2.1 Oil India Limited (OIL) 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. Till date OIL has acquired more than 27,000 GLKM of 2D seismic data and nearly 9000 square kilometres (sq. km.) of 3D seismic data in the North- East.

7.2.3 During the nineties, intensive exploration/ exploratory well drilling & development activities resulted in discovery of fields such as Bogapani, Kumchai, Hapjan, Shalmari and Rajgarh.DeeperExploration: 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 metres in the central basement high areas of Dikom-Kathaloni-Chabua-Matimekhana to more than 5500 metres in Mechaki areas towards the eastern flank of Upper Assam Basin. As on 1st January, 2020, OIL holds 3 exploration blocks in North-East under nomination regime. OIL also holds 3 NELP (New Exploration Licensing Policy) exploration blocks in the North-Eastern region. Moreover, under Open Acreage License Policy (OALP) Round-I, OIL was awarded 7 Blocks as operator in North-East across Assam and Arunachal Pradesh and another 3 blocks under OALP Bid Round – III in Nagaland, Assam & Tripura states.

7.2.4 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.

7.2.5 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. In the North-eastern Region, as on 31.12.2020, ONGC has drilled 791 exploratory wells in the state of Assam,208 wells in Tripura,3 in Meghalaya,4 in Mizoram and 26 in the State of Nagaland.

7.2.6 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.

7.2.7 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.

7.2.8 Currently, ONGC holds 3 PEL blocks in the State of Nagaland under nomination regime. It also holds 65 PML blocks (46 in Assam, 18 in Tripura, 1 in Nagaland) in North East comprising both long term and short term PMLs. During 2020-21 as on 01.01.2021, ONGC acquired 19.72 LKM of 2D, 76.24 SKM of 3D seismic data and drilled 11 exploratory wells. ONGC made two discoveries (Sundalbari-16 and KU-13) in Nomination acreage in Tripura state which has already been monetized. However, these discoveries are yet to be accepted by DGH. Further exploratory efforts are in progress.

7.3 Exploration Activities in North-East under the PSC Regime

Under the PSC regime, exploration blocks were first awarded in the State of Assam in the year 1998 under Pre-NELP rounds of bidding. Subsequently, blocks were awarded under various rounds of NELP. 31 awarded blocks (Assam-21, Manipur- 2, Mizoram- 3, Nagaland-2 and Tripura-3) covering an area of 43,722 sq. km. Out of these, 9 blocks are operational, and 22 blocks have been relinquished. In addition, there are 2 discovered fields under PSC regime, namely, Kharsang in Arunachal Pradesh and Amguri in Assam. At present Kharsang field is in operation. Currently, ONGC holds 2 exploration blocks under NELP regime (1 each in Mizoram and Tripura) in North East.

7.4 Crude Oil and Natural Gas Production in North-East

7.4.1 The contribution in crude oil production by North Eastern States is about 12.9% of the total production. In FY 2019-20, crude oil production

in North-East is about 4.15 Million Metric Tonnes (MMT). The state wise and company-wise trend of crude oil production in last 5 years is given below:

Company	Asset	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21 (Apr-Dec 2020)
OIL Nomination	Arunachal Pradesh	0.01	0.01	0.01	0.01	0.02	0.018
	Assam	3.22	3.25	3.37	3.28	3.08	2.202
OIL Total	3.23	3.26	3.37	3.29	3.10	2.22	
ONGC Nomination	Assam	0.96	0.95	0.97	0.99	0.99	0.721
	Tripura	0.00	0.00	0.00	0.00	0.00	0.00
ONGC Total		0.96	0.95	0.97	0.99	0.99	0.721
PSC	Arunachal Pradesh	0.05	0.05	0.04	0.03	0.03	0.022
	Assam	0.00	0.00	0.00	0.03	0.03	0.025
PSC Total	**0.05**	**0.05**	**0.05**	**0.07**	**0.06**	**0.047**	
Grand Total	**4.24**	**4.26**	**4.40**	**4.35**	**4.15**	**2.988**	

7.4.2 From the above table, it may be observed that in FY 2019-20 OIL has the share of 74.7% in crude oil production in North-East, followed by ONGC with a share of 23.9%. The share of Private/ Joint Venture companies in crude oil production is about 1.4%, 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 in FY 2019-20 is about 14.9% of the total production. In 2019-20 natural gas production natural gas in North-East is about 4.66 Billion Standard Cubic Metre (BCM). The state-wise and company wise trend of natural gas production in last 5 years is given below:

Company	Asset	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21 (Apr-Dec 2020)
OIL Nomination	Arunachal Pradesh	0.01	0.01	0.01	0.01	0.04	0.038
	Assam	2.62	2.69	2.66	2.48	2.38	1.695
OIL Total	2.63	2.70	2.67	2.49	2.42	1.733	
ONGC Nomination	Assam	0.40	0.44	0.51	0.48	0.46	0.296
	Tripura	1.33	1.43	1.44	1.55	1.47	1.221
ONGC Total	1.74	1.87	1.95	2.04	1.93	1.517	
PSC	Arunachal Pradesh	0.02	0.02	0.02	0.02	0.01	0.004
	Assam	0.00	0.00	0.05	0.32	0.30	0.279
	Tripura						
PSC Total	**0.02**	**0.02**	**0.07**	**0.34**	**0.31**	**0.283**	
Grand Total	**4.39**	**4.59**	**4.69**	**4.87**	**4.66**	**3.533**	

7.4.4 From the above table, it may be observed that in FY 2019-20 OIL has the share of 51.9% in natural gas production in North-East, followed by ONGC with a share of 41.4%. The share of Pvt/ JV companies in natural gas production is about 7.2%.

7.5 Discovered Small Fields Policy

7.5.1 In order to accelerate exploration and production activities in North-East, Government of India has awarded 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 in the State of Assam.

7.5.2 In second round of Discovered Small Fields Policy, out of 25 Contract Areas offered for bidding, 6 Contracts Areas (5 Blocks in Assam and 1 Block in Tripura) have been awarded in North-Eastern region. ONGC is not holding any DSF block in the North-East region.

7.6 Alternate Hydrocarbon sources in North-East

7.6.1 Shale Gas: Based on the data available from conventional oil/gas exploration it appears that few sedimentary basins, including Assam Arakan Basin may be prospective from Shale gas point of view. In October, 2013, Government has issued guidelines for exploration and exploitation of Shale Oil & Gas by national oil companies in the nomination acreages under which ONGC and OIL have identified 50 blocks and 6 blocks respectively. Out of 55 blocks, 3 blocks operated by ONGC and 4 blocks operated by OIL are in the state of Assam. So far ONGC has drilled 2 wells (1 each in Namti and Lakwa). OIL has acquired conventional cores from Dibrugarh, Dumduma and Chabua PML of Assam. Interpretation of Dibrugarh PML block has been completed. In Arunachal Pradesh, OIL has identified two locations for acquiring the conventional cores.

7.7 North-East Vision 2030

7.7.1 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-Eastern 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.

7.7.2 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.

7.7.3 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.

7.7.4 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.

7.7.5 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.

To fulfill one of the major goal envisaged under Vision 2030, Government has allowed special dispensation of 2 year extension in exploration

period and 1 year in Appraisal period for operational blocks in North–Eastern region. Government has also provided marketing and pricing freedom for natural gas produced in future in North-Eastern region. This is likely to result in increased investment in development of oil & gas resources.

7.7.6 In the current year (2020-21), ONGC has planned to acquire 160 LKM of 2D (AAFB areas), 260 SKM and 164SKM of 3D seismic data and to drill 11 and 14 exploratory wells in Assam Shelf and Assam-Arakan Fold Belt respectively. As on 01.01.2021, ONGC has completed the acquisition of 76.5 SKM of 3D seismic data, drilled 11 exploratory wells and has notified two discoveries in the region.

7.7.7 ONGC has planned its exploratory activities in Assam Self and Fold Belt Areas for the next three years which is tabulated below.

Particulars	2021-22	2022-23	2023-24	Total	
Assam Shelf	2D (LKM)	130	100	100	330
	3D (SKM)	275	275	275	825
	Exploratory wells	11	11	11	33
Assam Arakan Fold Belt	2D (LKM)	105	50	50	205
	3D (SKM)	225	225	225	675
	Exploratory wells	14	14	14	42

7.7.8 With these planned exploratory efforts (2020-21 to 2023-24), it is envisaged to accrete total 102.5 MMTOE of In-place 3P (82 MMTOE of In-place 2P) and 45.2 MMTOE of Ultimate 3P (35.3 MMTOE of Ultimate 2P) reserves.

7.8 New Exploration blocks in North-Eastern Region under Hydrocarbon Exploration & Licencing Policy (HELP)

7.8.1 A total of 26 Blocks have been awarded till OALP Bid Round -V in North eastern Region. Total area of these 26 Blocks is 19836 Sq Km. Committed Investment in these blocks in next 3-4 years is approximately 495 MMUSD.

7.8.2 In OALP-III bid round, ONGC, as an operator was awarded one onshore block: AA-ONHP-2018/4 in Assam having a total PEL area of 44.01 Km2. ONGC is committed to carry out its exploration activities as per the Revenue Sharing Contract signed on 16.07.2019. PEL approval from the State Govt. obtained on 14.02.2020, further efforts are in progress to carry out exploratory activities.

7.8.3 Besides, in NE region, ONGC has PI in 2 blocks (AA-ONHP-2017/10(543 Km2) and AA-ONHP-2017/13 (Area: 841 Km2) awarded under OALP-I where M/s OIL is operator.

7.9 National Seismic Programme

Government formulated a plan to conduct 2D seismic Data Acquisition, Processing and Interpretation (API) of 48,243 LKM in un-appraised areas of all sedimentary basins of India under National Seismic Programme, OIL has been assigned to carry out 2D seismic API of 7408 LKM, which later on revised to 6032 LKM. as Govt. of Nagaland denied permission for undertaking seismic survey in the State. Till December, 2020, 4637.28 LKM (76.9%) of 2D seismic data has been acquired. ONGC has been assigned the responsibility of API of 42211LKM of 2D seismic data in Un-apprised areas of Indian sedimentary basins grouped in 11 on-land sectors comprising of Saurashtra-Cambay, Rajasthan-Kutch, KG-PG-Cuddapah-Cauvery, Andaman, Mahanadi-Bengal, Ganga, Deccan Synclise North, Bhima-Kaladagi-Deccan Synclise South, Vindhyan A-Narmada-Satpura, Vindhyan B-South Rewa-Damodar-Chhatisgarh-Batsar and Himalayan Foreland-SpitiZanskar, Karewa. As on 31.12.2020, ONGC has achieved surface coverage of 40503.81 LKM (95.96 %) of 2D Seismic survey and completed the processing of 39268.43 LKM (93.03 %) of 2D seismic data.



CHAPTER

8

R&D and New Technology

R&D and New Technology

8.1 R & D BY INDIAN OIL CORPORATION LIMITED (IOCL)

8.1.1 IndianOil's world-class R&D Centre is focused on GoI intent of 'Atmanirbhar Bharat". Apart from carrying out path breaking research in core petroleum activities like Lubricant, Refining, Petrochemicals and Pipeline, IndianOil R&D is pursuing pioneering work in Alternate Energy segments like Bioenergy, Solar Energy, Hydrogen, Energy Storage, Battery Technologies etc.IndianOil R&D has surpassed major milestone of 1000 patent filing in April 2019; thereby becoming the first Indian Oil & Gas PSU to achieve this milestone. Presently, IOC has massive portfolio of 1253 patents with 1117 effective patents as on December 2020.

8.1.2 IndianOil's R&D Centre has been a pioneer in development and commercialization of indigenous technologies. Today R&D Centre has banquet of refining technologies from gasoline, kerosene and diesel treating to value-added octane enhancement processes. Major developments during Apr'20 to Dec 20 are:

i. Thebottom up-gradation technology INDMAX remains the crown jewel of the technological banquet, having a mega unit of 4.17 MMTPA installed at Paradip refinery of IndianOil. Recently another INDMAX unit is successfully commissioned at Bongaigaon Refinery.After first ever overseas licensing of this technology last year to NaftnaIndustrijaSrbije (NIS) for Pancevo Refinery in Serbia, in 2020-21 this technology has been selected by Numaligarh Refinery Ltd against competitive bidding, making it the first domestic success outside captive deployment.

ii. In line with GoI vision under "Make in India" initiative, R&D Centre has recently demonstrated its patented "INDICATPrime" DHDT catalyst at World's oldest operating refinery at Digboito produce BS-VI Diesel.

iii. Performance Guarantee Test Run of 55 kTA Octamax® Unit at Mathura Refinery and Diesel Hydrotreating (DHDT) unit at Bongaigaon Refineryhave been conducted successfully meeting all the specified guaranteed parameters. This technology has enabled IOCL to be first to launch 100 Octane premium fuel XP100 in 2020-21 for high-end cars in India.

iv. The commissioning of 5th commercial unit with indeDiesel® technology at Haldia refinery this year has firmly established the indeDiesel® technology as mature and reliable for employment in hydrotreating of diesel for meeting BS-VI / Euro-VI specifications

8.1.3 R&D Centre's sustained effort in the field of lubricants has helped achieve self sufficiency to meet domestic reuirements. IOCL's Servo lubricant brand is approved by major global OEMs like Wartsila, MAN, Maruti Suzuki, Hyundai Motor,Volkswagen etc.Additing to the past performance, many new OEM approvals received in 2020-21 from major automotive players as Mahindra,Cummins India, TATA Motors Ltd, Ashok Leyland, VECV Ltd, BHEL Hardwar, NTPCGadarwara, BEML etc

8.1.4 R&D Centre is working for development, deployment and harnessing of different alternative energy sources like Biofuels, Hydrogen/H-CNG, Solar Energy, Green Diesel, Carbon Capture, and Utilization etc. Extensive research in alternate energy has resulted in development of technologies for production of biodiesel and 2G ethanol to support government initiative of reducing crude imports. Major developments in 2020-21 are:

i. Recently, a4 TPD HCNG (Hydrogen spiked CNG) demonstration plant at Rajghat Bus Depot based on R&D patented compact reforming technology

to conduct on-road trial of HCNG fuel in 50 identified city CNG buses was inaugurated by Union Minister of P&NG and Steel in Oct'20. The ongoing trial will prove to be a major initiative in journey towards a hydrogen economy in India.

ii. The Centre has developed and patented feedstock agnostic Biomethanation technology wherein different types of the organic waste can be used. Based on this technology, a 5 TPD bio methanation plant is already set up in past under collaboration with Municipal Corporation Faridabad adjacent to the R&D Centre. In 202-21 R&D has further evolved the process by initiating work on Off-site pre-treatment technology of Paddy Straw Biomass (Shredding & Extrusion). For this a facility has been created at Palwal, Haryana.

iii. IOCL R&D Centre has developed a novel 2G Enzyme to replace the imported options to enable production of 2G Ethanol from lignocellulosic biomass. A demo plant of 10 TPD is under construction at Panipat to showcase this technology.

iv. R&D Centre has exchanged into MoU with Indian Council of Agricultural Research (ICAR) - Central Avian Research Institute (CARI), Bareilly for assessment of biomass generated in upcoming 3G ethanol plant from PSA off gases at Panipat Refinery as bird feedwhich will in turn help valorizing the biomass to improve financial viability of the process.

v. To work towards the CO2 capture and utlisation technologies IndianOil has entered into an agreement with US Trade and Development Agency (USTDA) for first of its kind initiative in Gujarat Refinery to capture CO2 from Gujarat Refinery to utilise for Enhanced Oil Recovery at Gandhar Oil fields of ONGC and also for food and beverage industrial applications

vi. To reduce India's dependence on imported LPG, R&D Centre has setup a Solar Cooker Laboratory. Work is underway to develop a low cost indoor solar cooking solution. Last year pilot Studies conducted at two locations i.e. Leh and Udaipur. Further action for wide scale trial is being taken. R&D Centre is also working to develop the CSP Technologies to use sun energy for making electricityand to use it to produce hydrogen etc

8.1.5 To support the Waste to Value initiative of GoI, this R&D Centre has taken major initiative in current year with development and demonstration of technology to convert single use waste plastic to Fuels. Further large scale trials are underway.

8.1.6 IOCL R&D Centre has developed a Novel Anti-Covid Multifunctional Hand tool to eliminates direct contact of our hands with a surface thus reducing potential source of contamination. This centre has also developed sanitizer based on WHO formulation. Third party testing of IOC clean confirmed compliance to WHO & EN 1500 standards for its efficacy towards bactericidal and chemical disinfectant. The Hand Rub Solution has been certified for it's 99% anti COVID efficacy in <1 min as tested against real viral stain extracted from a COVID patient by Centre for Cellular & Molecular Biology

8.1.7 To further expand its footprint, IndianOil is working to set up a net-zero power & water neutral new campus at IMT, Sector-67 in Faridabad, consisting of many new research centers for Alternative & Renewable Energy, Corrosion Research, Nanotechnology and Synthetic Biology. The foundation stone of the 2nd Campus was jointly laid by the Hon'ble Chief Minister, Haryana, and the Hon'ble Union Minister of P&NG.

8.1.8 This Centre is also spearheading the IOCL StartUps initiative under which 24 Start Ups have been incubated till dates through 2 rounds. Major areas of funding/ support are artificial intelligence, Robotics, Societal relevance, pipeline surveillance & maintenance etc. Besides funding, IndianOil is being closely involved by hand holding the identified Start UPs through

dedicated Process Owners till achievement of Proof of Concept. The 3rd round is soon to be launched.

8.2 R&D BY ONGC

8.2.1 ONGC has established separate R&D institutes 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.

8.2.2 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.

In the year 2019-20, ONGC carried out R&D studies for conventional and Non-conventional Hydrocarbons at its different Institutes.

In the year 2020-21, ONGC carried out R&D studies for conventional and Non-conventional Hydrocarbons at its different Institutes.

8.2.3 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. ONGC's R&D Institutes and the IITs shall jointly undertake advanced research and development projects for the E&P sector of the country in general. It also ideates promoting internships, visiting and adjunct faculty programs, research oriented career programs through an ONGC Scholar Programme. The Memorandum of Collaboration (MOC) also ideates promoting internships, visiting and adjunct faculty programs, research oriented career programs through an ONGC Scholar Programme. Within the ambit of this collaboration, while ONGC will make its laboratories available to the students and research scholars of IITs.

ONGC geoscientists and engineers will also have the opportunity of working with IITs. Under ONGC-Pan IIT Collaborative initiative, KDMIPE, Dehradun is the coordinating institute. Total 42 projects have been approved in different Phases (Phase-I:15, Phase-II:12, Phase-III:5, Phase-IV:10).

8.2.4 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 salient R&D measures to enhance recovery factor are as under:

- Association with Simulation study and Preparation of FR for MHS L-III, MHN L-1 & S1 Reservoirs under Phase-V Redevelopment: GCM based simulation study was completed for early monetization of 08 discoveries beyond Cluster-8. The study envisages a total 14 inputs (13 OP + 1 WI) with envisaged cumulative oil & gas production of 1.37 MMt and 0.133 BCM respectively by March 2035 with a peak oil rate of about 6000 bopd in 2022-23.
- Low Salinity EOR in MHS L-III (A1 layer): Lowsal EOR has been conceptualized for MHS L-III in western periphery (A1 layer) based on Coreflood/Simulation results starting from April 2021 as per availability of facility. Incremental oil gain of 1.37 MMt is envisaged in the period April 2021 to March, 2040.
- Further development in Cluster-7+ area (Cluster-9): GCM based simulation study was completed to monetize these 8

discoveries viz. B-192-15, 16, 18, WO-24-5, 6, 7, B-45-2 & B-203-2. Study envisages a total 14 inputs (13 OP + 1 WI) with envisaged cum. Oil & Gas production of 1.37 MMt and 0.133 BCM respectively by Mar-35 with a peak oil rate of ~6000 bopd in 2022-23.

- Reservoir management and Identification of side track locations for Heera field: Total Identified 35 locations (26 OP + 9WI) for sidetracking based on the performance analysis and model saturation. A total 19 S/T locations (18OP +1WI) were finalized out of identified 35 locations in Heera Field after considering drilling feasibility

- Performance Analysis and Simulation studies on major pays of Wadu-Paliyad Field: The recommended variant considers optimized liquid withdrawal/ water injection by drilling of 04 new infill locations (03 OP+ 01WI), conversion of 01 OP to WI (WD-059), Z/T in 01 well (WD-077). Envisaged plateau liquid rate is ~175 m3/d with peak oil rate of 165 m3/d in 2022-23 and water injection rate is ~230 m3/d in 2021-26. The cumulative production envisaged 0.56 MMt by March 2040 amounting to ~30 % of recovery. The incremental with respect to BAU is 0.14 MMt by 2040. Techno-economic analysis was done and the recommended variant involves an un-escalated capex of Rs. 23.83 Cr (3.22 USDMM) and the IRR and NPV come out to be 95.47 % and Rs 27.23 Cr (3.68 USDMM) respectively.

- EOR screening reports (Preliminary) of 7 fields (Laxmi, Gauri, NI, NE, Saraswati, Ragdeep Oil and Ragdeep Gas field) of operator Vedanta Cairn India Ltd. were submitted as per contract.

  An oil gain of about 86771 m3 (as on December, 2020) during 2020-21 achieved from 13 profile modifications and 11 water shut off jobs using in house chemical formulations in different fields of ONGC.

8.2.5 R & D Initiatives by ONGC Under Make in India Campaign:

a. Multi-pronged approach to improve access to overseas technology (investment in R&D through entering into a Memorandum of Collaboration (MOC) worth Rs. 100 crores with various IITs (IIT-Kh, IIT-K, IIT-M, IIT-D, IIT Gu and IIT-R) to work towards a collective R&D program for developing indigenous technology to enhance exploration and exploitation of hydrocarbons and alternate source of energy. A total of 15 projects have been taken up in Phase-I under the ONGC-Pan IIT Collaborative Research Program. In Phase-II, 12 projects were approved and taken up. For Phase-III, 05 proposals have been approved and in Phase –IV 10 projects have been approved and taken up. The projects are in various stages of progress, where preset milestones are being realized.

b. An R&D collaborative project titled "Development of Shock Wave assisted fracking" is being taken up by ONGC with a company promoted by professors of IISc Bangalore. The MoU was signed in the presence of Hon'ble Prime Minister. The project cost is around Rs. 68.86 Crore. Laboratory tests indicate that shock wave can induce cracks/fissures in test samples in simulated conditions of about 1500m depth.

c. ONGC and IIT (ISM) Dhanbad have entered into Memorandum of Collaboration (MoC) on 2 July 2017 in various areas like training, Coal Bed Methane (CBM), Nano technology in Chemical EOR etc. This Umbrella MoC will facilitate early execution of projects in these new areas.

d. IDT of ONGC has two patents in use, one for Synergistic lightweight cement slurry composition and the other for Synergistic cement slurry composition for EOR wells both developed in-house. IDT has also conducted field trials on Micro-bubble drilling fluid, and on Rapid Setting Acid soluble loss control material.

e. ONGC Energy Centre, of ONGC takes up various R&D activates with involvement of eminent scientists and policy makers. Some of the ongoing projects include investigation of Properties of Molten Salt as a Heat Storage Medium, development of polymeric charged membranes for thermochemical hydrogen generation processes, Uranium Exploration Programme, In-situ-leaching

(ISL) process development, In-house R&D on Geothermal Power Generation, R&D project on Thermo-chemical Hydrogen generation, R&D project on Development of microbial process for in-situ generation / enhancement of methane from underground coal seams, Development of Solar PV and wind hybrid power plant.

f. Under CPSE collaboration in R&D, ONGC and IOCL identified 7 projects for joint research. Two projects have been completed by Institute of Drilling Technology, ONGC where Base Oils suitable for Drilling Fluids and High pressure extreme pressure lubricants have been indigenously developed and established for use in operation.

g. "In-situ strength characterization of deep-water Indian seabed using free fall penetrometers – a scientific framework and field implementation guidelines" under ONGC-Pan-IIT collaborative research program with IIT Bombay. Project commenced on 14th Mar-2018 and in progress.

h. "Development of Structural integrity management system (SIMS) for Offshore platforms of ONGC" under ONGC-Pan-IIT collaborative research program with IIT Madras. Project commenced on 12th Sep-2018.

i. "Corrosion of carbon steel (API 5L X60) in CO2 – H2S medium in the presence of volatile fatty acids" under ONGC-Pan-IIT collaborative research program with IIT Guwahati. Project commenced on 25th Sep-2018.

j. "Development and study of Low Corrosion Rate Completion Fluid Formulation for High Pressure High Temperature Oil and Gas Wells" under ONGC-Pan-IIT collaborative research program with IIT Bombay. Project commenced on 22nd Oct-2018.

8.2.6 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 2020-21 upto December, 2020, ONGC has obtained 7 patents, filed 6 patents. Besides, it has registered 3 copyrights and filed 4 copyright applications. The details are given below:

a. Patents obtained by ONGC:

- Fracturing Fluids for Hydro-fracturing utilizing sea water.
- Process for corrosion control of carbon steel tubing and casing of oil and gas wells.
- Process for removing scale deposits in effluent dispatch lines.
- Thermogel system and a method for preparing the same.
- A system for breaking the hard crust overlying soft soil at the sea bed in oil and gas fields.
- A method for Biomarker compounds separation identification and enrichment.
- A drilling fluid composition comprising microbubbles.

b. Patents filed by ONGC:

- A process for bioconversion of crude oil into methane.
- A system and method for suppression of multi spectral vegetation response in multispectral images.
- A method for preparing efficient and scalable self-cleaning coating.
- A Process for organic preparation of saponin extract from soap nuts.
- A self-cleaning coating solution and confocal dual-spray coating process.
- Automated well to seismic calibration method.

c. Copyright filed by ONGC:

- **SynCeps:** A very useful software used

in thin bed delineation by enhancing the spectral bandwidth of seismic data using the concept of Cepstral analysis on Synchrosqueezed wavelet transformed seismic data.

Automated Morphostructural Analysis 1.0.: Automated Morphostructural Analysis 1.0 (AMA 1.0) is a Python 2.7 based code that uses drainage shapefile and a Digital Elevation Model to derive different fault signatures.

GALLOP (Group Analysis of Laterally loaded offshore piles): A software for the analysis of 'Group effect' for laterally-loaded offshore piles. Piles of the permanent foundation for many offshore structures especially for fixed jacket platforms.

Thin layer inversion- an innovative software tool using pursuit algorithms: The spectral properties of thin bed are used in this seismic deterministic inversion algorithm to delineate thin clastic reservoirs. In order to study the spectral properties of thin bed, accurate seismic well tie and wavelet extraction are crucial.

RESEMBLE: An in-house developed Software for performing Material Balance studies on entire gamut of hydrocarbon reservoirs – oil, gas, HPHT and CBM. When applied judiciously, RESEMBLE software can be used to estimate initial hydrocarbon in-place, drive mechanism, predict future reservoir performance and estimate hydrocarbon recovery under various types of drive mechanisms.

d. Copyright registered by ONGC:

- SynCeps.
- Automated Morphostructural Analysis 1.0.
- GALLOP (Group Analysis of Laterally loaded offshore piles).

8.2.7 New Technologies inducted in ONGC

Concerted efforts to upgrade and induct technology are being continuously made in ONGC as per the industry requirement. During 2020-21, following technologies were evaluated/ inducted.

- Remote Isoperibol Calorimeter: Advanced version of fully Automatic Isoperibol Calorimeter has been installed which is used for measuring calorific value of coal or the fuel content. The match between calorific value of the coal and the associated gas has been used as a tool to decipher the genetic linkages.
- 2-D Gas Chromatograph has been installed which provides a complete picture of the composition of crude oil sample with enhanced resolution in comparable analysis time.
- GNSS Survey equipment: The instrument has precession 1cm per km. The instrument is helpful in survey and mapping in large areas.
- Remote Sensing Software: Induction of a remote sensing software with capability of physics based atmospheric correction and spectral analysis of surface cover data-sets (rocks/ soil) that would help in classifying lithology and areas of mineralogical alteration characteristic of onland micro-seeps.

8.2.8 Technology developed/tested in house and absorbed during the year for IOR /EOR processes:

a. Low Salinity Water Flood (LSWF) Pilot in Mumbai High South field: As a step towards solution search for offshore EOR, single well micro pilot for low salinity water flood was carried out in January 2017 in Mumbai High South field. Based on laboratory and field results, profiles generated for multi-well pilot application of Low Salinity Water Flood in western periphery of MHS L-III (A1 layer). It envisages improving an incremental recovery by 0.8% by 2035. The project has been approved by the board.

b. Bechraji Polymer Flood pilot: FR for

polymer flood in Bechraji heavy oil field (Average Viscosity of 270 cP) of Mehsana Asset was approved. This is the first time polymer flood planned in heavy oil and envisaged potential to improve recovery by 4%. The Pilot started on 06.05.2019. The commercialization of project is planned for implementation after completion of pilot and it envisages to improve incremental recovery by 7%.

c. Commercialization of ASP Flood in Viraj (K-IX+X): After successful completion of ASP pilot in Viraj field, ASP Commercialization started from 12th July-2019. It envisages incremental oil recovery of 4.5%.

d. North Kadi Polymer flood: Field implementation of Polymer Flood in North Kadi started from 17.01.2020. It envisages incremental oil recovery of 4.2%.

e. Immiscible Gas Injection in Borholla field: Gravity assisted Immiscible gas injection in depleted reservoir in KSU-5 Sand of Borholla field has been planned with an objective to enhance oil production and increase recovery from a depleted dipping reservoir. The plan envisages recovery of 36%. The process initiated though two wells in January 2017 on pilot scale. This is the first time EOR has been implemented successfully in Assam. FR is approved and project is under implementation. The Expected Date of Completion of the project is December, 2021.

f. Gas Assisted Gravity Drainage (GAGD) process: A comprehensive study on the GACD process has been carried out for improving recovery from mid Bokabil pay of Kasomarigaon field. It envisages recovery of 33% by 2030 through 4 OP and 2 gas injectors. FR has been approved and project under implementation. The Expected Date of Completion of the project is December, 2021.

g. Immiscible Gas Injection (EOR) in Bokabil pay of Khoraghat Field: To maintain reservoir health with recovery & productivity maximization two inputs considered with 1 LCMD in each injector. The scheme envisages the recovery of 22.7% from 11.1% by 2035. The Expected Date of Completion of the project is April, 2022.

h. Cyclic Steam Stimulation (CSS) in Lanwa: Commercialization of CSS full field will increase the recovery factor significantly from 6% to 13%. FR is approved and integrated approach for pilot implementation has been planned.

i. ONGC has undertaken study to establish the feasibility of injecting anthropogenic CO2 for Enhance Oil Recovery (EOR). CO2 EOR has potential to significantly improve recovery from mature fields thereby increasing their economic life. The main drivers of CO2 EOR are the availability of CO2 source and its proximity to the oilfields. In this regard, IOCL-Gujarat Refinery, Koyali is a potentially reliable source for supply of CO2. The study is in progress to implement CO2 Enhanced Oil Recovery (EOR) as Carbon Capture Utilization and Storage (CCUS) in the GS-9 sand of Gandhar field. IOCL has to build the CO2 Capture plant at Gujarat Refinery, Koyali and supply the captured CO2 to its battery limit. ONGC has to utilize CO2 for injection in Gandhar field.

j. Alkaline-Surfactant Polymer(ASP) Commercialization in Jhalora Field(K-IV): After successful implementation of ASP pilot in Jhalora field, ASP Commercialization has been planned from April,2022. FR has already been approved. The scheme recommends 14 Inverted 5 spot patterns. It envisages incremental recovery of 0.78 MMt.

8.2.9 R&D Expenditure in last 3 years and current year

FY	R&D Expenditure (Rs. in Crore)
2016-17	592
2017-18	586
2018-19	583
2019-20	556
2020-21 BE	658

8.3 GAIL

8.3.1 R&D plays a critical role and is widely recognized to be the keystone of technological advance in Oil & Gas sector. Apart from contributing to economic growth, R&D is a crucial factor in determining the competitiveness of Oil & Gas firms in the marketplace, nationally and internationally. Indeed, the importance of Natural Gas energy to national security, economic well-being, and environmental sustainability makes GAIL to continuously invest in R&D. GAIL carries out joint R&D programs through partnerships with national Institutes/ Laboratories on specific technologies pertaining to waste plastic to diesel, adoptive intelligent pipe health monitoring robot, Methane to Olefins , Pipeline Integrity Management & Waste to Energy.

8.3.2 Adoptive Intelligent Pipe Health Monitoring Robot:

GAIL has developed a prototype of 'Adoptive Intelligent Pipe Health Monitoring Robot for Fuel transporting systems' with IIT Kanpur under Uchhatar Avishkar Yojana (UAY) funded by MHRD and GAIL. The prototype was showcased in the Technology Exhibition (Tech Ex) on 4th August, 2019 at IIT-Delhi and further, extensive trials are under way. GAIL is also developing a 'Low Altitude Long Endurance (LALE) Unmanned Aerial System (UAS) for Surveillance, Reconnaissance and Asset Monitoring (SRAM)' system for airborne monitoring of pipeline ROU.

8.3.3 Methane to Olefins:

Under the Natural gas to value addition initiative, a research project on direct conversion of Methane to Olefins is being pursued. Further, novel 3-D Covalent Organic Framework (COF) based adsorbents with high surface area with promising methane storage capacity were synthesized for Adsorbed Natural Gas (ANG) Technology.

Further, collaborative research works on; Demonstrative up gradation of existing BS-IV CNG HCV Engine to meet BS-VI emissions; Development of Hollow fibre membranes and modules for separation of Acid gases from Natural Gas; and Methane Production from Marine Hydrates by CO replacement are being pursued in 2 collaboration with reputed R&D labs across the country.

8.4 R&D BY OIL INDIA LIMITED (OIL)

8.4.1 R&D activities are undertaken primarily with the focus of solving field related problems with regards to increasing oil & gas production. R&D Department carries out applied research to develop in-house remedial solutions in the areas of petroleum geochemical exploration, enhanced oil / improved oil recovery, oil field chemicals, flow assurance, water shut off, well stimulation, petroleum microbiological intervention to mitigate microbial corrosion and for microbial enhanced oil recovery etc. The projects/studies undertaken during the year 2020-21 are as under:

i. Reservoir fluid identification through Geochemical Analysis of Sidewall cores

ii. Rock-Eval pyrolysis study of core samples for study of source potential

iii. Mineralogical study of various wells and elemental study for corrosion evaluation using SEM-EDX

iv. Unconventional Hydrocarbon Studies

v. Reservoir Continuity study in Kathalani 1 Block using Oil Geochemistry

vi. Integrated Geochemical Study of Oils and Source Rocks from neighboring Oilfields from OIL and ONGC operational areas in Upper Assam

vii. Isotopic and Compositional Study of Gas from Baghjan Oilfield

viii. Kinetic and Pyrolysis Study of

Source Rock Using Rock Eval and Pyrolysis GCMS

ix. Quantification of Mineral composites By Rietveld Refinement in Powder X-ray Diffraction

x. Crude oil Compositional Characterization by High Performance Liquid Chromatography

xi. Surface geochemical prospecting study in OIL's operational areas through analysis of adsorbed gas in soil samples

xii. X-ray diffraction analysis of samples from different formations of OIL's operational areas

xiii. Laboratory studies for designing a matrix treatment using combination of acids.

xiv. Field trial of in-house developed solvent formulation for Well Stimulation

xv. Gelation Study of PHPA–Hexamine–Hydroquinone polymer gel system used for Water Shut Off Jobs in Oil Wells

xvi. Solvent Stimulation Jobs at different locations

xvii. Development of Oil Field Chemicals

xviii. Development of Liquid Flow Improver

xix. Development of Wax Dispersant additive for Branchline and Mainline crude

xx. Studies on development of "Low-temp" Demulsifier (LT-OSD)

xxi. Optimization of Crude oil demulsification process at field installations

xxii. Control of Scale Formation at Various Field Locations

xxiii. Flow Assurance Studies in different wells, pipelines and flowlines

xxiv. Understanding the chemistry and in-house formulation of Oil Soluble Demulsifier

xxv. Standardization of Wax Depositional Experimental Techniques on Wax Flow Loop Equipment and Correlation of Depositional Behavior of Various Crude Oils with Cold Finger experiment

xxvi. Performance Evaluation of Bactericides

xxvii. Microbial Prospecting for Oil and Gas (MPOG)

xxviii. Field implementation of in-house microbially enhanced oil recovery in oil wells

xxix. In-Situ Bio-Stimulation for recovery of residual oil from Sandstone reservoirs

xxx. Periodic monitoring of corrosive bacterial population in Kathaloni OCS and ITF Tengakhat and Evaluation of Bactericide efficacy, generation of dosage plan for their control

xxxi. Laboratory experiments pertaining to chemical EOR simulation study for Hapjan 2D block

xxxii. Monitoring of the pilot polymer flooding in NHK 11D+18 block

xxxiii. Experiments related to polymer flooding project in NHK 11D+18 block

xxxiv. Foam Flooding to enhance sweep efficiency

xxxv. Smart water flooding options for incremental recovery with Effluent Treatment Plant (ETP) water

xxxvi. Conformance control study

xxxvii. Joint Industry Project (JIP) on

Carbonated Water Injection Carbonate water injection (CWI) with Heriot-Watt University, Edinburgh, UK.

xxxviii. AAQM & Stack Emission Monitoring

8.4.2 Patent granted in 2020-21:

1) China: Patent no. 105873671B was granted to the invention titled "Systems and methods for screening solvents for dissolving tank bottom sludge", date of grant 30.10.2020

(2) Europe: Patent no. 3071321B1 was granted to the invention titled "Systems and methods for screening solvents for dissolving tank bottom sludge", date of grant 06.01.2021

(3) India: Patent no. 349757 was granted to the invention titled "A Novel Method for Investigation of solubility of tank bottom sludge with solvents", date of grant 21.10.2020

(4) India: Patent no. 348925 was granted to the invention titled "Method for preventing wax deposition in oilwells with packers", date of grant 09.10.2020

Note: Patents (1), (2) and (3) were filed jointly with IIT Madras..

8.4.3 R&D Expenditure (Revenue) in last 3 years and current year upto December, 2020 (Provisional)

(Rs. Crores)

Head	2017-18	2018-19	2019-20	2020-21 (Upto Dec'20 – Provisional)
	Actual	Actual	Actual	Provisional
R&D	56.45	80.01	80.75	59.05

CHAPTER 9

Bio-fuels

Bio-fuels

9.1 NON-CONVENTIONAL ENERGY:

India is one of the fastest growing economies in the world. The Development Objectives focus on economic growth, equity and human well being. Energy is a critical input for socio-economic development. The energy strategy of a country aims at efficiency and security and to provide access which being environment friendly and achievement of an optimum mix of primary resources for energy generation. Fossil fuels will continue to play a dominant role in the energy scenario in our country in the next few decades. However, conventional or fossil fuel resources are limited, non-renewable, polluting and, therefore, need to be used prudently. On the other hand, renewable energy resources are indigenous, non-polluting and virtually inexhaustible. India is endowed with abundant renewable energy resources. Therefore, their use should be encouraged in every possible way. Biofuels are derived from renewable bio-mass resources and, therefore, provide a strategic advantage to promote sustainable development and to supplement conventional energy sources in meeting the rapidly increasing requirements for transportation fuels associated with high economic growth, as well as in meeting the energy needs of India's vast rural population:-

9.1.1 Ethanol Blended Petrol (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 2001, Government of India launched three pilot projects, two in Maharashtra and one in Uttar Pradesh for supplying ethanol blended petrol only to the retail outlets under their respective supply areas. Apart from the above field trials through pilot projects, R&D studies also were undertaken simultaneously. Both pilot projects and R&D studies were successful and established blending of ethanol up to 5% with petrol and usage of ethanol blended petrol in vehicles. Accordingly, Government of India, with effect from 01.01.2003 resolved to supply ethanol blended petrol in nine States and four Union Territories for sale of 5% ethanol blended Petrol. This Programme is aimed at achieving multiple outcomes such as:

- addressing environmental concerns,
- reducing import dependency, and
- providing boost to agriculture sector,

In order to augment the supply of ethanol, the Government on 10th December, 2014, decided to procure ethanol produced from other non-food foodstocks besides molasses, like cellulosic and lingo-cellulosic materials including petrochemical route. It was also decided to administer the price of ethanol under EBP Programme.

During Ethanol Supply Year (ESY) 2019-20 (01.12.2019-30.11-2020) 173.03 crore litres of ethanol was blended in petrol and a blending percentage of 5% was maintained despite disruptions due to Covid.

In ESY 2018-19 sugar and sugar syrup were allowed for the first time for ethanol production to support the industry in liquidating their excess stocks. Further, in ESY 2020-21 surplus rice available with Food Corporation of India (FCI) and maize have also been allowed for the production of ethanol. With these decisions the availability of ethanol for the EBP Programme is expected to increase significantly.

For ESY 2020-21, the Government has fixed an enhanced remunerative price for ethanol procurement based on raw material utilized as under:

Raw Material	Ethanol Ex-mill price in Rs / litre
C heavy molasses	45.69
B heavy molasses	57.61
Sugarcane juice / sugar / sugar syrup	62.65
Damaged Food Grains	51.55
Surplus rice issued by FCI	56.87
Maize	51.55

GST & transportation charges are to be paid over and above these prices.

9.1.2 Several representations were received from the various stakeholders of the ethanol industry to explore the possibility of long term contracts between Oil Marketing Companies and ethanol suppliers. Based on these representations the Government has come out with a long term ethanol procurement policy so that the industry can plan a long term investments in this sector. The salient features of this policy are as under:

- The ethanol procurement quantity shall be estimated by the Oil Marketing Companies (OMCs) for a period of five years and will form part of the procurement tender.
- The annual ex-mill price from sugarcane based raw materials shall be declared by Government.
- A mechanism will be made by OMCs for change in transportation rates with the change in fuel prices over this long term contract period.
- Flexibility to introduce any new category of raw material for ethanol procurement.
- Mechanism to be available for induction of a new distillery /sugar mill or additional quantity offers by an existing ethanol supplier as well as a provision for exit by an existing / participating distillery / sugar mill as per ESY in the tender.

9.1.3 Towards promoting ease of doing business, the OMCs have incorporated many changes in the Expression of Interest (EOI) for ethanol procurement released by them for ESY 2020-21.

- For the first time the requirement of ethanol for the next five years has been released and EOI has been invited for enrolling / registering bidders only once for a period of five years.
- The Security Deposit amount payable by the suppliers has been reduced from earlier 5% to 1% thereby translating to a benefit of around Rs. 400 crores to the suppliers.
- The applicable penalty levied on the suppliers on non-supplied quantity of ethanol has been reduced from earlier 5% to 1% thereby translating to a benefit of around Rs. 35 crores to the suppliers.
- Rates and slabs for transportation of ethanol payable to the ethanol suppliers have been increased.

9.1.4 OMCs are providing comfort letters giving offtake guarantee to new entrepreneurs and have also agreed to lend support by signing tripartite agreement with bankers and ethanol suppliers, thereby, providing much needed confidence to the bankers and sugar mills so that the ethanol capacity expansion proposals become bankable.

9.1.5 Ethanol meant for EBP Programme is compulsorily denatured in the distillery itself, prior to its dispatch from the distillery premises. Thus, there should not be any requirement by States to regulate ethanol after it is denatured and rendered unfit for human consumption. Despite the above, several States continued to regulate ethanol movement by way of excise control, licenses, levy of import/export duty. In view of above, Government of India amended the Industries (Development and Regulation) Act, 1951 in 2016. As per the Notification, the State Governments can legislate, control and / or levy taxes and duties on liquor meant for human consumption; and denatured ethanol, which is not meant for human consumption, will be controlled only by the Central Government. The amended provisions of Industries (Development & Regulation) Act, giving control on production, movement and storage of ethanol to the Central Government, has now been implemented in 14 States Viz., Karnataka, Goa, Maharashtra, Gujarat, Bihar, Chhattisgarh, Tamil Nadu, Andhra Pradesh, Punjab, Himachal Pradesh, Madhya Pradesh, Haryana, Uttarakhand and Jharkhand.

9.1.6 A scheme for extending financial Assistance to sugar mills & molasses based standalone distilleries through Interest subvention for enhancement and augmentation of the Ethanol Production capacity by them has been notified by Department of Food and Public Distribution (DFPD). Under this scheme 607 proposals worth Rs. 35038.3 crore have been accorded in-principle approval which are estimated to add 1204 crore litres per annum of ethanol distillation capacity. A new interest subvention scheme extending financial assistance to project proponents for enhancement of their ethanol distillation capacity or to set up distilleries for producing 1st Generation (1G) ethanol from feed stocks such as cereals (rice, wheat, barley,

corn & sorghum), sugarcane, sugar beet etc. has also been notified by DFPD on 14.01.2021.

9.1.7 With an aim to provide more choices of alternative automotive fuels to consumers, the following approvals have been given by the Government:

(i) Retailing of 100% Ethanol (E-100) as a transportation fuel on a pilot basis by Oil Marketing Companies at a few retail outlets in areas where ethanol is sufficiently available. After assessment of the economic, operational and developmental aspects of usage of E100 as automotive fuel, the same may be expanded to other outlets.

(ii) Retailing of petrol blended with methanol (M15) as an automotive fuel by Indian Oil Corporation Ltd. at a few outlets in Assam and NE States on a pilot basis. Based on the outcome of this pilot and availability of methanol for blending, the same may be subsequently expanded to other retail outlets.

9.2 Bio-diesel Programme & Biodiesel from UCO.

During the period April to March, 2020, 10.55 crore litres of biodiesel has been procured by OMCs for blending with biodiesel. In order to encourage production of biodiesel from Used Cooking Oil (UCO), Oil Marketing Companies have floated Expression of Interest for supply of biodiesel produced from UCO at 300 locations across the country. The ex-factory UCO based biodiesel price has been fixed for three years. The price for the first year has been fixed at Rs 51/litre, for the second year at Rs 52.7/litre and for the third year at Rs 54.5/litre. GST and transportation shall be payable in addition to this price. OMCs have received offers for setting up 65 Biodiesel Plants with a production capacity of approx 1300 MT/day (48 Crore litre/annum).

9.2.1 Bio-Jet (ATF).

- The first flight using 25% Biojet Fuel between Dehradun to Delhi operated by Spicejet was received by Minister, Petroleum and Natural Gas on 27.8.2018. Bio jet Fuel used in the aforesaid flight had been developed by CSIR laboratory in IIP, Dehradun, using Jatropha seeds.
- In order to provide a roadmap to the Bio-Jet Fuel (Bio ATF) program in the country, two committees had been formed on 02.08.2019 by MoP&NG.
- Based on the report of the Committees and further discussions in the matter, MRPL has been asked to setup a Bio-ATF manufacturing facility integrated with MRPL refinery.

9.2.2 Second Generation Ethanol

The demand for petrol and diesel is ever increasing and for year 2022, the consumption of petrol and diesel is expected to be around 4,400 crore litres and 13,200 crore litres respectively. The National Policy on Biofuels announced in 2018 is aimed at accelerated promotion of Biofuels with indicative targets of achieving 20% blending of ethanol in Petrol and 5% blending of biodiesel in Diesel by 2030. Therefore, to maximize the production of ethanol in the country for the purpose of blending with petrol, other options/routes for enhancing ethanol production need to be explored. Government has already allowed procurement of ethanol produced from other non-food feedstock besides molasses, like cellulosic and lignocelluloses materials including petrochemical route.

Lignocellulosic biomass is being considered as a prospective source of Second Generation (2G) ethanol for supplementing the rising demand of ethanol for EBP Programme. A October, 2018 report by Technology Information, Forecasting & Assessment Council (TIFAC), an autonomous organization under Department of Science & Technology indicated an availability of surplus biomass across country to the tune of 178 Million Tonnes per annum. Most of this surplus biomass is presently being burnt by the farmers as a waste disposal activity which is also contributing towards the environment pollution.

Subsequent to opening up of alternate route i.e. Second Generation (2G) route for ethanol production, Public Sector Oil Marketing Companies under the administrative control of Ministry of Petroleum and Natural Gas are in the process of setting up 2G bio-refineries in different parts of the country. Projects at Panipat (Haryana) by IOCL, Bhatinda (Punjab)

by HPCL, Bargarh (Odisha) by BPCL and Numaligarh (Assam) by NRL are in advance stage of construction.

In order to encourage setting up of second generation bio-fuels plants, Government has launched a scheme namely i.e. "Pradhan Mantri JI-VAN (Jaiv Indhan- Vatavaran Anukool fasal awashesh Nivaran) Yojana" for providing financial support to integrated bio-ethanol projects, using lignocellulosic biomass and other renewable feedstock. In this scheme, financial support to twelve Integrated Bio ethanol Projects using lignocellulosic biomass & other renewable feedstock with total financial outlay of Rs 1969.50 crore for the period 2018-19 to 2023-24 will be provided along with support to ten demo projects for 2G technology.

Financial assistance to 4 commercial projects at Panipat, Haryana (IOCL), Bhatinda, Punjab (HPCL), Bargarh, Odisha (BPCL), Numaligarh, Assam (NRL) and one demonstration project of Indian Oil at Panipat, Haryana has been approved under the scheme.

9.2.3 Two days 3rd Bilateral Conference "EU-India Conference on Advance Biofuels" during 3-4 March, 2020 at New Delhi, India

Ministry of Petroleum & Natural Gas jointly organised with the European Union a two days 3rd bilateral conference "EU-India Conference on Advanced Biofuels" during 3-4 March, 2020 in New Delhi. This conference was organized for recognizing the pioneering work done by the EU members in the field of Biofuels and their widespread usage, combined with commitment of Government of India towards moving to green fuels. This helped in improving the contacts and discussions among technology providers, Researchers and investors of both sides with reference to deployment of advanced biofuels in Indian Transport Sector.

9.2.4 World Biofuel Day

World Biofuel Day 2020 was organised by Ministry of Petroleum & Natural Gas on 10th August, 2020. The theme for World Biofuel Day 2020 was "Biofuels towards Atmanirbhar Bharat".In view of the Corona/ Covid-19 pandemic, the function was held through a webinar this year which was telecast live. The same was attended by more than 1000 persons.

9.2.5 FUEL CONSERVATION INITIATIVES :

Petroleum Conservation Research Association (PCRA) engaged in promoting energy efficiency in various sectors of economy helps the government in proposing policies and strategies for petroleum conservation, aimed at reducing excessive dependence of the country on oil requirement. It 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 various sectoral activities, PCRA reached out to the targeted groups by conducting activities like Energy Audit, PAT (MEA and M&V) and Compliance Audits, Technical Seminars, Institutional Training Program, Driver Training Program, Transport Workshop, Fuel Efficiency Improvement Program for STU depots, Agricultural Workshops and Educational programs for students of agricultural colleges, Workshop for LPG Users, Youth Programs, National competitions for School Students etc. It also participates in KisanMela, exhibitions etc. These activities span across a large spectrum of socio-economic profile of our country covering different sectors viz. Industry, Transport, Domestic, Agricultural. During the period (Apr-Dec 2020), savings of 54765 MTOE has been identified through its sectoral activities. Despite countrywide restrictions during pandemic, PCRA has completed 70 Nos of Energy Audits, 154 Nos of Compliance Audit, 2 Nos of PAT audits and 6 Nos of ISO 50001:2018 Consultancy assignment during financial year 2020-21 so far.

In order to provide sustained impetus on fuel conservation efforts, PCRA also undertakes nationwide people centric mass awareness campaign, called "Saksham (SanrakshanKshamtaMahotsav) each year in association with PSU Oil & Gas Companies. The theme of this year's event is "Green and Clean Energy" – स्वच्छ एवं हरित ऊर्जा. During this one-month drive (16th Jan 2021 – 15th Feb 2021), various sections of society viz school children,

youths, women, drivers (light, medium & heavy commercial vehicles), fleet operators, industry employees/workers, farmers, residential societies, gram panchayats, NGOs, groups/ societies/clubs etc. are engaged with a set of targeted activities such as training programs, group talks, quizzes, debates, cyclothons, technical workshops, fuel efficient cooking contests and fuel efficient driving contests, CNG vehicle rally etc. In view of the prevailing pandemic situation, many of these activities are being conducted in an online mode and if otherwise, they are being held with strict adherence to social distancing norms and Covid protocols.

Every year, PCRA has been conducting nationwide Essay, Quiz and Painting competitions for school children covering various aspects of fuel conservation with the idea of inculcating the importance of fuel conservation and environment protection on the impressionable mind with the hope that as future leaders and harbinger of change they would adopt and effectively propagate the message of fuel conservation and fuel efficiency. This year, the eventis being held in completely online mode, because of prevailing pandemic.

Number of policy initiatives with respect to fuel efficiency and conservation measure have been carried out/ initiated like fuel efficiency norms for heavy, medium and light duty vehicles, standard & labelling program for tractors and tyres, mandatory BIS certification for LPG stoves etc.

PCRA in collaboration with IIP-Dehradun has developed a high thermal efficiency PNG stove. The average thermal efficiency of the developed PNG burner, when tested in laboratory, was found to be in the range of 52% to 56% (an improvement of about 10% to 15% from the converted LPG burner into PNG burner). PCRA has entered into an MOU with EESL to distribute 10 Lakh Pieces of PNG Stove among PNG customers Pan India.

These activities of fuel efficiency and conservation has been making positive contributions towards the Government's ambitious programme on reduction of 10% of import of crude oil by the year 2021-22.

9.2.6 Impact of Crude Oil on CIF basis by Oil PSUs

On the request of Oil PSUs and pursuance of this Ministry's efforts, Ministry of Shipping has granted advance 'NoC' to Oil PSUs for import of crude oil on CIF basis, upto 35% of their annual crude import, for the year 2020-21.

9.3 Sustainable Alternative Towards Affordable Transportation (SATAT) initiative

Sustainable Alternative Towards Affordable Transportation (SATAT) was launched on 1st October 2018 aiming to establish an ecosystem for production of CBG and Bio mnaure from various waste/ biomass sources in the country. SATAT has envisaged developing 5000 CBG plants with total CBG production capacity of 15 Million Metric Tonne Per Annum (MMTPA).

As an enabling mechanism, bio manures produced from CBG plants has been included under Fertilizer Control Order 1985 as Fermented Organic Manure to facilitate its marketing. To address the concern of Entrepreneurs regrading financial resource, Reserve Bank of India has included CBG projects under Priority Sector Lending. SBI has approved a policy for debt funding of CBG projects under SATAT with a financial outlay of Rs 5000 cr. Bank of Baroda has also formulated a scheme for financing of CBG projects. Possibilities are also being explored to arrange soft loans for CBG projects from multilateral financial institutions. MNRE has extended Central Financial Assistance (CFA) Scheme for FY 2020-21.

Under this initiative about 640 Letters of Intent (LoIs) have been issued till 31st December 2020. 9 CBG plants have initiated supply of CBG from 15 Retail Outlets. Some private companies have signed MoU with MoPNG for establishing 900 CBG plants. Technologigy partners have also signed MoU with MoPNG for providing technical assistance to the upcoming CBG plants.

CHAPTER

10

Conservation

Conservation

10.1 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 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.

PCRA also spreads various awareness campaigns on Energy Conservation thru it'ssocial media handles and My Gov. Apart from various Fuel saving tips and update on PCRA's conservation activities, numerous contests are organized time to time to captivate the interest of the masses. PCRA has developed a number of films, TV spots and radio jingles in various languages for promoting oil conservation, which are being utilized from time to time.

10.2 Sectoral Activities:

Conducting Sectoralactivities are one of the core areas of PCRA. Through such activities, PCRA engineers and its empaneled experts reach outto the targeted groups by conducting activities like Energy Audit, PAT (MEA and M&V)andCompliance Audits,Technical Seminars, Institutional Training Program, Driver Training Program, Transport Workshop, Fuel Efficiency Improvement Program for STU depots, KisanMelas and Educational programs for students of agricultural colleges, Workshop for LPG Users, Youth Programs etc. These activities span across a large spectrum of socio-economic profile of our country in different sectors viz. Industry, Transport, Domestic, Agricultural and Commercial. During the period (Apr-Dec 2020), savings of 54765 MTOE has been quantified through its sectoral activities. PCRA also assisted industries in obtaining ISO 50001:2011 Energy Management System (EnMS), which is essentially an ISO procedure for energy management.

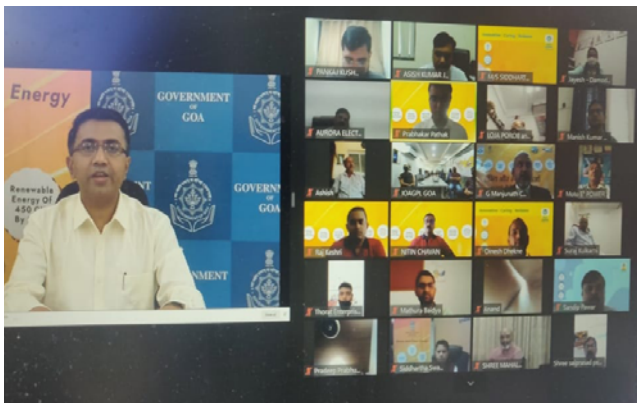
10.3 Industrial Sector:

10.3.1 Energy Audit:

PCRA provides assistance to Energy intensive industries by conducting Mandatory Energy Audits and Monitoring &Verification audits in PAT (Perform, Achieve & Trade) regime. PCRA has received a prestigious order of carrying out of Mandatory Energy Audit of 15 Nos of PSU Refineries under PAT cycle V. PCRA has commenced the MEA in 3 Refineries i.e. IOCL Panipat Refinery, MRPL & IOCL Barauni Refinery. All statutory guidelines for social distancing and PPEs are being followed during these audits. Industry Department at PCRA is planning balance MEAs in order to meet the scheduled timelines for completing MEA of 15 PSU Refineries.



Secretary, MoPNG Shri Tarun Kapoor graced the Main Inaugural Event held in Delhi on 16th Jan'21 as Chief Guest



Dr. PramodSawant, Hon'ble CM of Goa speaking on the occasion of Inauguration of "Saksham 2021" celebration in Goa - 16th Jan'21

Despite countrywide restrictions during pandemic, PCRA has completed 70 Nos of Energy Audits,154 Nos of Compliance Audit, 2 Nos of PAT audits and 6 Nos of ISO 50001:2018 Consultancy assignment during financial year 2020-21 so far.

10.4 Sanrakshan Ksahamta Mahotsav (Saksham)-2021:

10.4.1 In order to provide sustained impetus on fuel conservation efforts, PCRA undertakes nationwide people centric mass awareness campaign, called "Saksham"during 16th January – 15th February, each year, in association with PSU Oil & Gas Companies. The theme of this year's event is "Green and Clean Energy"

10.4.2 The main inaugural program of SAKSHAM-2021 was held in Constitution Club of India on 16thJan 2021 with a very limited audience due to the prevailing pandemic. The event was live streamed through various media channels of PCRA and other Oil and Gas Companies.

10.4.3 Inaugural functions were also held in the capitals of various states and Union Territories and the various Units and Establishments of O&G Companies under MoPNG. These functions in various states were graced by the august presence of Hon'ble Governor, CM, Deputy CM, State Ministers and other dignitaries.

10.4.4 During SAKSHAM, a comprehensive plan has been drawnto reach out to various mass segments such as school children, youths, women, drivers of light, medium & heavy commercial vehicles, fleet operators, industry employees/workers, farmers, residential societies, gram panchayats, NGOs, groups/ societies/clubs etc. with a set of targeted activities such as training programs, group talks, quizzes, debates, Cyclothon, technical workshops, fuel efficient cooking contests and fuel efficient driving contests, CNG vehicles rally. In view of the prevailing pandemic situation,

many of these activities are being conducted in an online mode and if otherwise, they are being held with strict adherence to social distancing norms and Covid protocol.

10.4.5 Some of the SAKSHAM activities are mentioned below-

a) Saksham Cycle Day in over 240 cities throughout the country on 31st January 2021 and E-Cycle Rally at New Delhi on 6th February 2021

b) CNG Car Rally on 7th February 2021 in various cities e,g Mumbai, Pune, Bengaluru, Patna, Cuttack and others.

c) Debate Competition/Group Talk/ Graffiti/ Wall Painting Competition on Fuel Conservation in Schools/Colleges.

d) Workshop in Engineering Colleges/ Technical Meet in Industrial Sectors on Fuel Conservation through Technical Meets/ Workshops.

e) Group Talk at RWAs/Housing Societies/ Colonies.

f) Cycle Rally by Club members/Online pledge/Quiz/Essay competition/ Fuel Efficient Cooking Competitions for women in residential societies for Clubs/Societies/ NGOs/Groups etc.

g) Fuel Efficient Driving Contest for Cars/ LCVs/MCVs/ HCVs.

h) Publication of message of Minister, P&NG/ Chief Minister/Governor in Newspapers & Magazines, Address by Governor/Chief Minister/Ministers on TV & Radio, Talk Show in TV /Radio, Article Writing Competition for Newspaper agencies, Extensive Social Media Campaigns, Jingles/Spots on TV, Radio & Cinema Halls.

i) Press conference / press release

j) LPG Panchayats and training of LPG delivery boys on LPG saving tips and Health Camps at all LPG Distributorships.

k) Group Talk at all Retail Outlets & CNG Stations.

l) Agriculture workshops for farmers.

m) Workshops/Group Talks for STUs/ Fleet Operators (Organized/Unorganized Sector).

n) Various events at PSU Units and Establishments like Emission Check of all petroleum consuming Equipment, Emission Check of all Vehicles, Valedictory



Hon'ble Minister P&NG during the flagging off of a CNG Awareness Rally at Cuttack as a part of SAKSHAM event

Function on 15th Feb'21

10.5 Mega media campaign during Saksham-2021:

Media campaigns are being run on Doordarshan, All India Radio, Lok Sabha TV, Pvt. FM Channels, Pvt. TV channels across the country, educating people about the need for fuel conservation during Saksham-2021. The Appeal of Hon'ble Minister of P&NG was aired on Radio channels across the country.

Besides the mega campaign, many people connect activities were carried out on social media platforms. Some of them are Saksham Buzz contest, live coverage of several events like Saksham Day, SwachttaPakhwada, etc. Besides these, 18 Twitter trending activities were done between April 2020 to January 2021, gathering large number of impressions. 10 social media campaigns were done on all platforms on campaigns on special days like Yoga Day, Earth Day, Environment Day, Bio Fuel Day etc.

10.6 R&D projects:

PCRA, through its R&D Department, strives to promote Research, Development and Deployment efforts aimed at petroleum conservation and environment protection; to support and facilitate efforts for adoption and dissemination of fuel efficient technologies; and to establish synergistic institutional linkages at the national & international levels in the areas of petroleum conservation and environment protection.

10.7 Project proposals completed in FY 2020-21.

Title of R&D Project:	Research Organization:
Improving thermal efficiency of LPG domestic cooking stoves	BPCL Corporate R&D Center, Greater Noida
Development of methodology for traffic circulation plans around Metro stations and their impact quantification using Microscopic Simulation	CSIR-CRRI, New Delhi

10.8 New project proposals approved in 85TH SCM (Screening Committee Meeting of PCRA)

held on 08.12.2020:

Title of R&D Project:	Research Organization:
Design and development of a micro turbine combustor working on biogas	IIT Jodhpur & IIP Dehradun
Design and Development of Inline Bio-methane Enrichment and CO2 Separation System	CSIR-CMERI-Centre of Excellence for Farm Machinery, Ludhiana
Interventions to Improve Performance of Combustion Systems in MSMEs	Department of Mechanical Engineering, IIT Delhi
Performance evaluation of a bio gas Integrated Semi-Transparent Photovoltaic Thermal (SPVT) collectors (Bi-SPVT)	Rajiv Gandhi Institute of Petroleum Technology, Amethi, U.P
Development of Encapsulated Asphalt-rubber Pavement (EARPAVE) Product for Road Applications	IIT Tirupati

10.9 New policy initiatives:

10.9.1 Number of policy initiatives with respect to fuel efficiency and conservation measure have been carried out/initiated like fuel efficiency norms for heavy, medium and light duty vehicles, standard & labelling program for tractors and tyres, development of high thermal efficiency PNG burner, mandatory BIS certification for LPG stoves etc.

a) Fuel Efficiency Norms for Heavy Duty Vehicles:

The transport sector is the major consumer of diesel and accounts for more than 70% of total diesel sales in India. Heavy duty vehicles (Trucks & Buses) have maximum HSD consumption share in transport sector. Mandating Fuel Economy norms for manufacturers/ importers will help in saving diesel consumed in this sector. MoP has notified on 21.09.2020 the amendments in the notification of date 16th August 2017, that the fuel economy norms shall apply only for vehicles complying with BS-VI emission norms by applying a suitable correction factor on the BS-IV norm values. The derivation of correction factor is in the process.

a) Fuel economy norms for Light & Medium Commercial Vehicles:

As, light & medium commercial vehicles (LCVs and MCVs) account for a significant share of HSD consumption in transport sector, it was decided to formulate action plan and monitor development of fuel economy norms for this segment of vehicles. BEE had notified Fuel Economy Norms for BS IV compliant Light & Medium Commercial Vehicles vide S.O. 2540(E) dated 16.07.2019. MoRTH is required to notify the norms under Central motor vehicle rules (CMVR) and also issue the administrative procedure. The norms shall apply only for vehicles complying with BS-VI emission norms by applying a suitable correction factor on the BS-IV norm values. The derivation of correction factor is in the process.

b) Standard and Labelling of Tyres:

Tyres, as a component, have been identified to have a huge potential for improving fuel efficiency of on road vehicles, as 73% of total tyre market of India is replacement market segment. The transport sector users are unware of the fact that there is a wastage of the fuel of the order of 20% of fuel consumption on account of inefficient tyres. Keeping in view of above, PCRA is developing bandwidth and procedure of labelling program for automotive tyres. MoP/ BEE is in the process of notification of Schedule. The voluntary phase of labelling will start thereafter.

c) Star and Labelling of Agricultural Tractors:

In view of growing dependence of the country on import of crude oil and the fact that consumption of HSD by tractors is about 7.7 %, it has been felt imperative by the government to define norms for economic usage of diesel and monitor progress from time to time for tractors in India. MoP/BEE is in the process of notification of Schedule.

d) Development of high thermal efficiency PNG burner:

IIP-Dehradun in collaboration with PCRA,

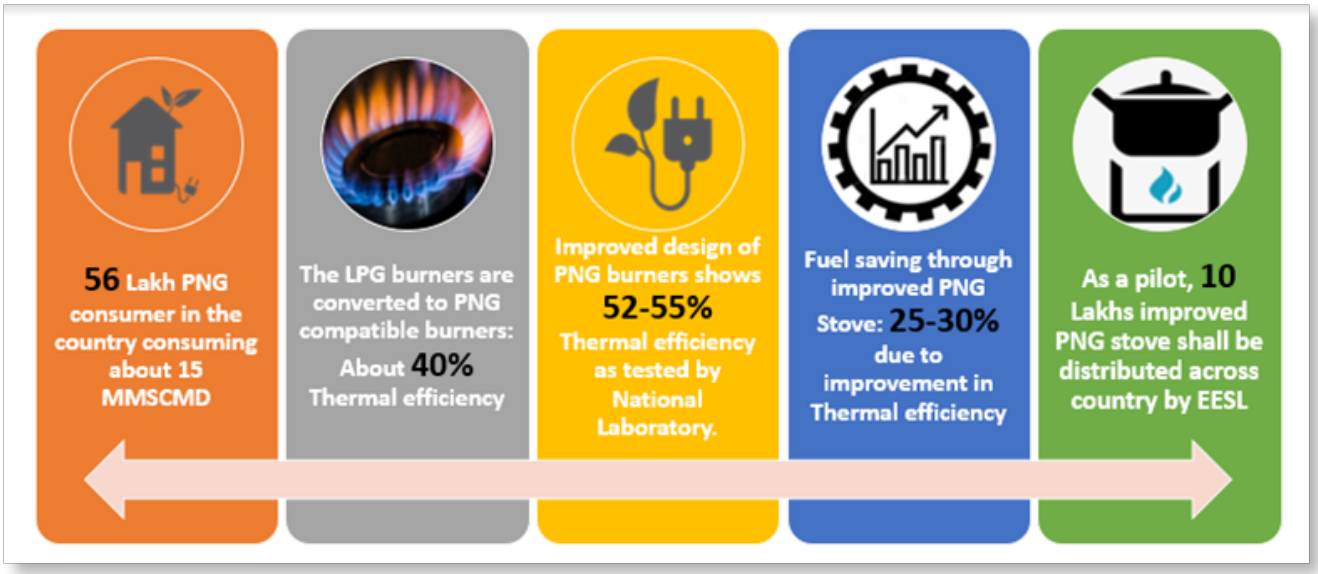
has developed a high thermal efficiency PNG stove. The average thermal efficiency of the developed PNG burner, when tested in laboratory, was found to be in the range of 52% to 56% (an improvement of about 10% to 15% from the converted LPG burner into PNG burner). The field trials of the developed PNG stove were undertaken at different places and the average fuel saving of up to 40% was observed. The design/ technology of this newly developed PNG stove has been disseminated and transferred to 40 stove manufacturing companies and 05 of them have started commercial production after approval of their prototype.PCRA is aggressively working to promote this newly developed PNG stove among PNG consumers.

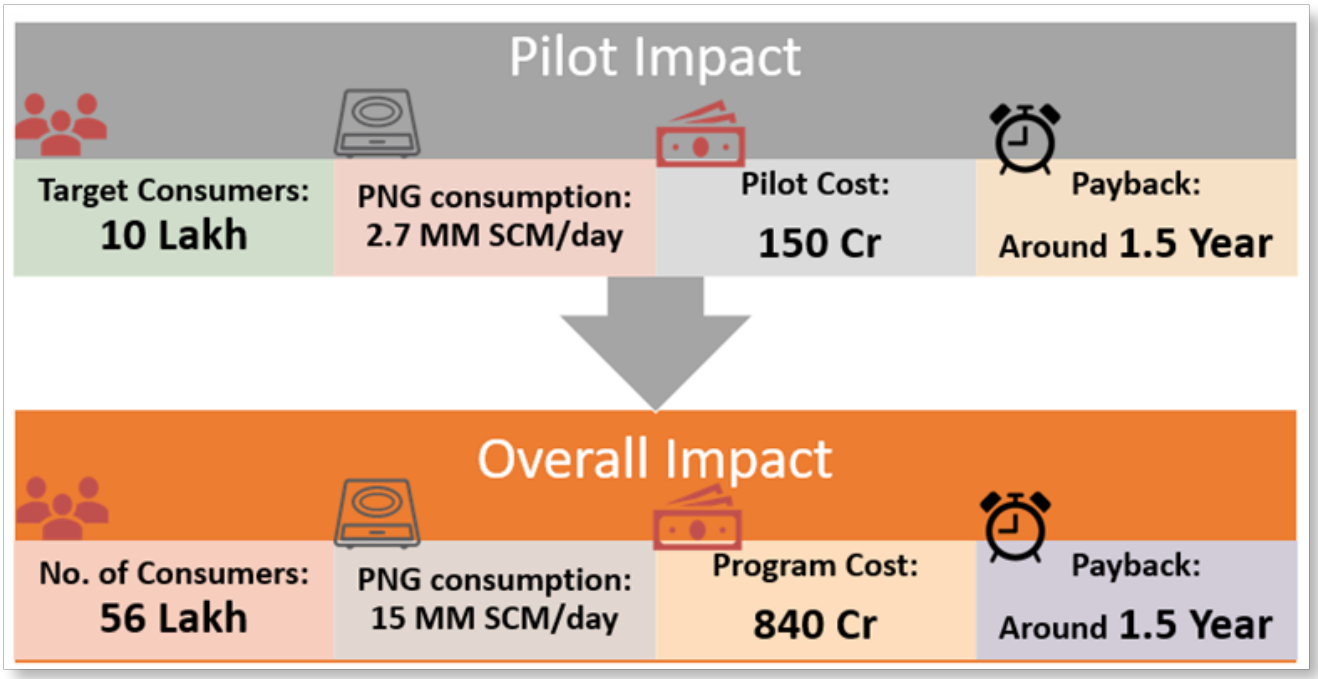
e) MoU with EESL:

PCRA entered into an MOU on 16.01.2021 with EESL to distribute 10 Lakh Pieces of PNG Stove among PNG customers Pan India. This programme is to be implementedsimilar to "UJALA" program after suitable demand aggregation.

f) S&L Program for Domestic LPG Stove:

As of November 2020, India have 2,845





Lakh active domestic consumers covering 98.8% of Indian population. As, Star band of S&L program for Domestic LPG Stoves propose a thermal efficiency of 68% and above, it is expected to result in reduced LPG consumption and substantial savings to the nation. PCRA is focusing on creating awareness to promote use of fuel efficient Star Labelled Domestic LPG Stoves amongst the masses. Since launch of S&L program, many manufacturers have obtained authorization to use Star label on their models and as in December 2020, there were 99 models of star rated LPG stoves from 36 brands available in market.

Bureau of Indian Standard has developed the BIS Standard IS 4264: 2002 for "Domestic Gas Stove for use with Liquefied Petroleum Gases - specifications". The LPG stove model needs to have a minimum thermal efficiency of 68 % get BIS certification.

With efforts of PCRA, BIS certification has been made mandatory for all the domestic LPG stoves manufactured, imported or sold in India with effect from 01.06.2020

g) S&L Program for Diesel Engine Driven Monoset Pumps (2-10 HP):

The S&L program for equipment consuming petroleum products as fuel, has been initiated by PCRA in association with BEE and since then Energy Efficiency Norms have been notified by Govt. on voluntary basis for Diesel Engine Driven Mono-set pumps for Agricultural Purposes (2-10 HP).Under this program, Star ratings from 1 to 5 are allocated in the increasing order of energy efficiency as per Star Rating band of the product so as to provide the consumers an informed choice about the energy efficient equipment, energy saving and cost saving potential of the relevant marketed product.

h) S&L Program for Diesel Generator Sets (up to 19 KW):

S&L Program for Diesel Generator Sets covers DG sets with engine up to 19 KW capacities. All Star Labelled DG Sets are going to be powered with Engines having BIS certification conforming to IS 10001, alternators compliant with relevant latest BIS code and DG Set conforming to latest CPCB norms, thus assuring quality, safety and reliability and also considerable savings of HSD owing to improved Specific Fuel Consumption.

These activities of fuel efficiency and conservation have immensely contributed towards the Government's ambitious program on reduction of 10% of import of crude oil by the year 2021-22.

CHAPTER

11

Pricing

Pricing

11.1 Background

11.1.1 The pricing of petroleum products was brought under the 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.

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. To administer these budgetary subsidies, the Government formulated a 'PDS Kerosene and Domestic LPG Subsidy Scheme, 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, 2016-17 and 2017-18 was recorded at $46.17/bbl, $47.56/bbl and $56.43/bbl respectively. The price increased to $ 69.88/ bbl during 2018-19 and fell to $60.47/bbl in 2019-20 and fell further to $40.49/ bbl during the current financial year 2020-21 (up to 19th January, 2020). The trend of Indian basket of crude oil during 2002-03 to 2020-21 is given at Annexure-I.

11.2 Petrol and Diesel

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.

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 effective price to consumer 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 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.

11.4 PDS Kerosene

11.4.1 In order to insulate the common man from the impact of rise in international oil prices, the Government was modulating the retail selling prices of PDS Kerosene. Effective 1st March, 2020 the retail selling price of

PDS Kerosene is being maintained at NIL under-recovery level on pan India basis

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.

11.4.3 In the year 2018-19 there was an overall reduction of 12% in the PDS Kerosene allocation given to the States in comparison to the allocation of 2017-18 and similarly a reduction of 30% for the year 2019-20 in comparison to the allocation of 2018-19. The allocation for 2020-21 has been further reduced by 26% in comparison to the allocation for 2019-20. Over and above the above reduction in the PDS Kerosene allocations, till date, 13 State Governments/UTs (Karnataka, Haryana, Telangana, Nagaland, Chandigarh, Gujarat, Andhra Pradesh, Bihar, Goa, Puducherry, Rajasthan, Maharashtra and Uttar Pradesh) have availed 'Cash incentive for voluntary cut in kerosene allocation' scheme. As on date, 9 State Governments/UTs have already cut down their PDS Kerosene allocation to nil.

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:

Rs. in crores

Particulars		2016-17	2017-18	2018-19	2019-20	H1-2020-21 (P)
PDS Kerosene		7,595	4,672	5,950	1,833	-
Domestic LPG		-	-	-	-	-
Total Under-recoveries (A)		7,595	4,672	5,950	1,833	-
Total DBTL related subsidies (B)		12,905	20,905	31,539	22,726	3,018
Total PMUY related subsidy (C)		2,999	2,559	5,670	1,446	(38)
DBTK Subsidy (D)		11	113	98	42	-
PMGKY (E)					7,883	
PDS Kerosene and Domestic LPG Subsidy Scheme, 2002[2]	SKO[4]	860	-	-	-	-
	LPG[4]	2,433	-	-	-	-
Natural Gas Subsidy for North East[5]		498	435	557	574	197
Other Subsidies (F)		3,791	435	557	574	197
Total Subsidy/ Under-recovery on Petroleum Products & Natural Gas (A+B+C+D+E+F)		27,300	28,684	43,814	26,621	11,060

(P) Provisional

1 On payment basis.

[2] DBTK subsidy excludes cash incentive/ assistance for establishment of institutional mechanism for direct transfer of subsidy paid to States/UTs.

[3] The payment relates to the year 2014-15 has been received in the year 2016-17.

[4] NE Gas Subsidy - Claims of OIL from Jan 2020 onwards are provisional.

[5] DBTK Subsidy for the year 2019-20 is for the period upto October 2019.

11.6 Pricing of crude oil

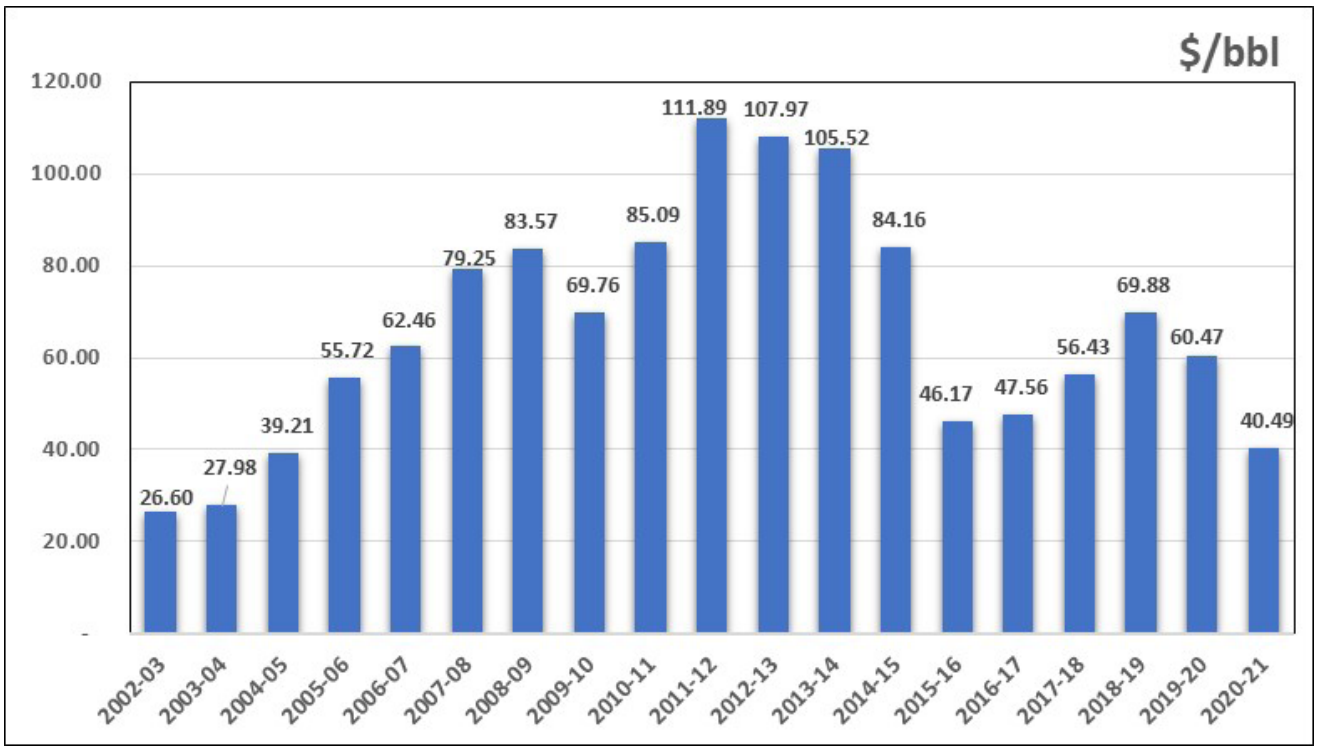
11.6.1 Indian basket of crude oil represents the average of crude oil processed by Indian refineries in the ratio of actual processing of sweet crude and sour crude in the immediate preceding year.

11.6.2 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 2018-19, Indian refineries processed 75.50% sour crude and 24.50% sweet crude. Therefore, for 2019-20, 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 75.50:24.50.

11.6.3 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.

Annexure-I

Trend of Crude Oil: Indian basket



Note: 2020-21 prices are up to 19/01/2021

CHAPTER

12

Welfare of SC/ST, OBC &Divyangjan

12 WELFARE OF SCHEDULED CASTES, SCHEDULED TRIBES, OTHER BACKWARD CLASSES AND 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 of this Ministry. The SCT Cell of this Ministry monitors the implementation of reservation policies in the Ministry as well as PSUs and other organization and other under the administrative Jurisdiction 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) 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 report 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 Chief Liaison Officer of this Ministry inspects the Reservation Rosters maintained by the Units of PSUs, annually.

PROFORMA-I

BACKLOG OF SC/ST/OBC/PWD IN OIL COMPANIES UNDER THE ADMINISTRATIVE CONTROL OF THE MINISTRY AS ON 31.12.2020.

PSU	Number of backlog Vacancies in respect of SC, ST, OBC and PWD (Direct Recruitment)															
	Group A				Group B				Group C				Group D			
	SC	ST	OBC	PWD	SC	ST	OBC	PWD	SC	ST	OBC	PWD	SC	ST	OBC	PWD
MoPNG	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	-	1 (EWS)	-	-	NA			
IIPE	NIL															
CPCL	NIL	NIL	NIL	NIL	NIL	1$	NIL	1	3	NIL	7#	6	NIL	NIL	NIL	NIL
MRPL	5	3	12	4	NIL	NIL	NIL	NIL	10	9	1	8	NIL	NIL	NIL	NIL
HPCL	0	7	0	23	-*	-	-	-	0	11	1	0	-	-	-	-
BPCL	NIL															
EIL	4	5	10	9	-	-	-	1	-	-	-	1	-	-	-	-
OIL	02	04	07	03	NIL	NIL	NIL	01	10	07	10	16	02	NIL	02	NIL
IOCL	11	22	36	54	No recruitment undertaken in Group 'B'				9	8	23	74	3	2	5	25
RGIPT	0	0	0	0	0	0	1	0	0	0	1	0	NA	NA	NA	NA
OIDB	NIL															
NRL	7	2	7	5	0	0	0	0	2	0	0	3	1	0	0	0
ONGC	36	13	44	57	-	-	-	-	15	20	29	59	2	0	0	0
GAIL	17	11	26	19	-	3	3	5	24	17	26	14	-	-	-	-
BLL	NIL															

CPCL : $ Also reserved for PwBD
- Out of 7,2 posts are reserved for PwBD
MRPL:- No direct recruitment in Group B and D at MRPL.
*The above figures includes both backlog and shortfall.
The backlog vacancies in Group A are unfilled from year 2019 and we are in the process of re-advertising the same in upcoming recruitment drives.
The backlog vacancies in Group C had already been advertised and the recruitment process is in progress.
BPCL: There is no backlog of vacancies in Direct Recruitment amongst SCs, STs and OBCs

12.3 Special Recruitment Drive for Persons with Disabilities (PWDs)

Hon'ble Supreme Court on 28.4.2015 in the Contempt Petition No. 499/2014 in CA No.9096 /2013 filed by National Federation of Blind ordered for filling up of posts with Persons with Disabilities. This matter is being monitored by DoPT. 359 posts were identified in Ministry of Petroleum & Natural Gas and PSUs under the administrative control of this Ministry. As on 31.12.2020 the position for the filling up of vacancies for Persons with Disabilities are as under:

S. No.	Step –Wise Details	Posts
1	No. of posts in the Ministry and Oil PSUs reported to Hon'ble Supreme Court	359
2.	No. of Posts already filled in	310
3.	Remaining posts to be filled up by 31.12.2020	49

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.

Women Forum has been formed in the 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.'

PROFORMA-II

The number of women employees vis-à-vis total number of employees as on 31.12.2020 in the oil PSUs is tabulated as below:

Sl. No.	Name of PSU	Total No. of Employees	Total No. of Women Employees
1	MoPNG	211	41
2.	PCRA	62	06
3.	IIPE	27	04
4.	CPCL	1603	86
5.	MRPL	1940	134
6.	HPCL	9481	926
7.	BPCL	9368	747
8.	EIL	2835	341
9.	OIL	6317	407
10.	IOCL	31852	2795
11.	RGIPT	66	06
12.	OIDB	16	03
13.	NRL	961	60
14.	ONGC	29028	2151
15.	GAIL	4726	303
16.	Balmer Lawrie	1009	102

13.2 In line with the guidelines laid down by Hon'ble Supreme Court in the Case of Vishakha v/s State of Rajasthan 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 Smt. Perin Devi, MoPNG is the chairperson of the committee with four other members, including one member from NGO. The Committee holds its meetings on regular intervals.

CHAPTER 14

Undertakings / Organisations

Undertaking / Organisations

14.1 MAHARATNA PSUs

14.1.1 Indian Oil Corporation Limited (IndianOil)

Indian Oil Corporation Limited (IOCL) is one of India's largest commercial enterprises and the country's flagship integrated and diversified energy major. IndianOil philosophy is embedded in the principles of strong customer connect, quality consciousness and transparency, where energy is tapped responsibly and delivered to the consumers most affordably.

IndianOil is listed among the world's largest corporates in Fortune's prestigious 'Global 500' listing, and is also ranked among the top 10 strongest brands of India in 2019 by Brand Finance, UK. Guided by the corporate vision to establish itself as 'a globally admired company' and energised by a committed team of around 33,000 high-calibre people, IndianOil's business interests encompass the entire hydrocarbon value chain – from exploration & production (E&P) of oil & gas, refining, pipeline transportation and marketing to natural gas, petrochemicals, alternative energy sources and globalisation of downstream operations.

While the performance of the sector in India is affected by the volatility of crude and product prices along-with the exchange rate fluctuations even during normal times, the year 2019-20 also saw the performance being affected due to the impact of Covid-19 towards the end of the year.

a) Financial Performance:

Indian Oil's turnover (Revenue from Operation) was Rs. 5,66,950 crore for the year 2019-20 as against Rs. 6,05,932 crore during 2018-19. During the year 2019-20, Indian Oil registered a profit (after tax) of Rs. 1,313 crore as against Rs. 16,894 crore in 2018-19. GRM stood at US$ 0.08/bbl in 2019-20 as against US$ 5.41/bbl in 2018-19.

b) Refinery Performance:

The year 2019-20 was the year in which all the refineries of IndianOil achieved BS-VI fuels (MS & HSD) upgradation. During the year, the 9 refineries of IndianOil achieved a throughput of 69.42 MMT equivalent to 100.32% of installed capacity.

The performance on parameters like capacity utilisation, distillate yield and energy performance was slightly lower as compared to the previous year due to shutdown of refineries for implementation of BS-VI projects.

During the year, Digboi Refinery was the first refinery to produce & supply BS-VI compliant fuels in August 2019 using indigenously developed R&D Catalyst. Mathura Refinery upgraded to the BS-VI club in January 2020 along with Panipat, Gujarat, Haldia and Bongaigaon Refineries in February 2020. This was followed by the other remaining refineries going BS-VI, producing the upgraded fuel which was made available through the IndianOil's retail outlets across the country w.e.f. March 16, 2020, ahead of April 1, 2020, the deadline stipulated by the Government of India.

During the year, six new crude oil grades were included in the crude oil basket of the Company, taking their number to 186, to improve flexibility in refinery operations / crude purchases.

Delivering greatest value across its spectrum of customers has been the motto of IndianOil. IndianOil was the first in the country to supply bunker fuel with new specifications mandated by the International Maritime Organisation from its Gujarat Refinery in September 2019, followed by Haldia Refinery in November 2019. The other major achievements include production of BS-VI compliant winter-grade High Speed Diesel (HSD) from Panipat Refinery in November 2019, capable of withstanding extremely low temperatures in winter of -33oC in the Himalayan region and supply of NATO-grade HFHSD (High Flash HSD) for the Indian Navy from Paradip & Haldia refineries.

To support the national commitment of achieving climate change goals and a 10% reduction in the oil import bill by the year 2022, the Company has joined hands with Oil and Natural Gas Corporation Limited (ONGC) and Oil India Ltd. (OIL) for carbon capture, utilisation & storage projects. MoUs were signed with ONGC and OIL during the year

which entails capturing carbon dioxide from refinery stacks at Gujarat & Digboi and supplying it to the depleting oil fields of these companies for enhanced oil recovery (EOR). For carrying out the feasibility study, an aid of USD 1 million has been sanctioned by USTDA.

With long term energy demands in horizon, Barauni Refinery will also witness expansion from current installed capacity of 6 MMTPA to 9 MMTPA at an estimated project cost of ₹ 14,000 crore, as a part of IndianOil's capacity augmentation plans.

With the ethos of Make in India in perspective and to address the ever-increasing demand of butyl acrylate, a largely imported petrochemical in India, IndianOil is also putting in place an Acrylics / Oxo-Alcohol Project at Dumad, Gujarat at an estimated cost of ₹ 4500 crore. The key end user applications of Butyl Acrylate being adhesives, paints & coatings, textile chemicals, synthetic tanning agent/leather chemicals.

c) Pipeline Performance:

The robust logistics network of IndianOil is strengthened by its formidable network of pipelines transporting crude oil to its refineries and finished products to high-consumption centres across the length and breadth of the country. The extensive network was further expanded by 438 km during the year to span more than 14,670 km, with a combined throughput capacity of 94.56 MMTPA for crude oil / product and 21.69 MMSCMD (million metric standard cubic metres per day) for gas pipelines.

The Product pipelines recorded the highest ever throughput of 37.92 MMT in 2019-20 as against 37.20 MMT achieved during 2018-19, registering a growth of 1.9%. The gas pipelines also achieved the highest ever throughput of 2,400 MMSCM during the 2019-20, as against a throughput of 1834 MMSCM during 2018-19.

For the first time in India, the first batch of 10% ethanol - blended petrol was pumped through the Mathura - Tundla pipeline in April, 2019. Subsequently, the same was carried out in the Mathura - Delhi pipeline in October, 2019 and in Mathura - Bharatpur pipeline in February, 2020.

d) Marketing Performance:

IndianOil has the largest share towards meeting the domestic petroleum product demand of India that leverages its behemoth customer base catered to by its ever expanding touch points. IndianOil achieved domestic sales of 78.54 MMT of petroleum products during 2019-20, with footfall of 2 crore per day at retail outlets and delivery of 25 lacs LPG cylinders per day, as against 79.45 MMT in the previous year, registering a drop of 1.1% mainly due to the countrywide lockdown in March 2020 leading to a significant drop in overall sales.

IndianOil continued to meet the fuel requirements of the defence services and the railways during the year. In order to ensure uninterrupted availability of petroleum products in Leh & Ladakh during the winter season, when the region gets cut-off from the rest of the country, IndianOil successfully completed the Advance Winter Stocking exercise well before the closure of roads.

During 2019-20, the country's first Compressed Bio-Gas dispensing station was commissioned by IndianOil in Pune, followed by another station in Kolhapur. As a part of IndianOil's plan to foray into alternative energy segment, 54 battery charging / swapping stations were also set up in partnership with various companies.

To cater to the rising fuel demand, IndianOil commissioned new state-of-the-art automated bulk storage terminals at Una (Himachal Pradesh) and Doimukh (Arunachal Pradesh) during the year. In addition, new LPG bottling plants were commissioned at Bhatinda (Punjab), Banka (Bihar) and Tirunelveli (Tamil Nadu) to improve turnaround of LPG cylinders.

During the 2019-20, IndianOil released more than 75 lakh LPG connections, of which 41 lakh connections were released under Pradhan Mantri Ujjwala Yojana (PMUY) to women from poor households. The target of releasing 8 crore LPG connections on industry basis under PMUY was achieved in September 2019, seven months ahead of the targeted timeline. Out of the 8 crore PMUY connections, IndianOil has released 3.75 crore connections.

IndianOil also commissioned 524 new LPG distributorships, taking their total number to 12,450. IndianOil achieved the highest ever annual sale of 12.33 MMT of LPG during the year.

SERVO, the lubricant brand of IndianOil, continued to be the market leader in finished

lubricants segment with sale of 407 Thousand Metric Tonnes (TMT) during 2019-20. 110 SERVO grade approvals were obtained from Original Equipment Manufacturers (OEMs) like Tata Motors, Mahindra & Mahindra, KIA Motors, Nissan, Honda, etc., during 2019-20. With the appointment of lubricant distributors in four new countries, i.e., Myanmar, Indonesia, Qatar and Vietnam, SERVO exports increased by 12.7% during 2019-20.

The Aviation Service of IndianOil continued to maintain its leadership position with a market share of 63.8% during 2019-20. With the commissioning of four new Aviation Fuel Stations (AFS), IndianOil is now providing aircraft refuelling services at 119 airports in the country. IndianOil continued to be the reliable fuel supplier of Indian Air Force during the relief operations carried out during natural calamities.

The Cryogenics group of IndianOil sold 33,000 units of cryo-cans and cryo-vessels during 2019-20, as against the previous year's sale of 29,555 units, registering a growth of 13%. During the year, the Cryogenics group also fabricated 16 aviation refuellers.

e) Petrochemical

IndianOil's offerings in petrochemical segment include Polymers, Linear Alkyl Benzene, Purified Terephthalic Acid, Glycols and Butadiene. The PROPEL brand of IndianOil is now a leading brand in the Indian petrochemicals market. During the year 2019-20, petrochemicals sales, including exports, was 2.29 MMT as against 2.64 MMT in the previous year. The fall in sales as compared to last year was due to planned turnarounds and unplanned outage of a few units. In addition, towards the end of the year, COVID-19 crisis also weighed in on the demand.

The Product Application Development Centre (PADC) at Panipat continues to be a major driver of competitive advantage for IndianOil's petrochemicals business. A new PADC has been made operational at Paradip for carrying out quality assurance testing of grades manufactured at Paradip as well as to extend technical support to downstream customers. During the year 2019-20, IndianOil received approvals from 15 major Indian and international original equipment manufacturers for its various polymer grades.

A major milestone was the commissioning of the 700 KTA Polypropylene (PP) plant at Paradip in July 2019. Seven grades were introduced from this plant, which soon became well established in the market.

f) Natural Gas:

The Re-gasified Liquefied Natural Gas (RLNG) is also gaining momentum as an important energy delivery pathway of IndianOil. During the year 2019-20, IndianOil's natural gas sales (including internal consumption) grew by 19% to touch 5.42 MMT as against 4.56 MMT in 2018-19. This includes 0.45 MMT from the Ennore LNG import terminal commissioned in March 2019. IndianOil now has a customer base of over 60 R-LNG customers besides supplies to its own refineries at Mathura, Panipat and Koyali. A major scale-up was witnessed in sales through IndiaOil's 'LNG at the Doorstep' segment, which achieved a level of 8.73 TMT, with a rise of 132% over the previous year.

IndianOil has in the recent years been making significant headway in the City Gas Distribution (CGD) business and now has a standalone presence in 17 Geographical Areas (GAs). In addition, IndianOil has 23 GAs in its fold through two joint venture companies, namely Green Gas Ltd. (with GAIL India Ltd.) & IndianOil Adani Gas Pvt. Ltd. (with Adani Gas Ltd.).

IndianOil is making major investments in building the natural gas infrastructure in the country and is in the process of developing three cross-country gas pipelines i.e. Mehsana - Bhatinda, Bhatinda - Jammu - Srinagar & Mallavaram – Bhopal – Bhilwara - Vijaipur pipelines, through two joint ventures, viz., GSPL India Gasnet Ltd. & GSPL India Transco Ltd., wherein Gujarat State Petronet Ltd., Bharat Petroleum Corp. Ltd., and Hindustan Petroleum Corp. Ltd. are its partners.

The Company is also implementing a 1,656 km natural gas pipeline grid in the northeast through Indradhanush Gas Grid Ltd., a JVC with ONGC Ltd., Oil India Ltd., GAIL (India) Ltd. and Numaligarh Refinery Ltd. The Cabinet Committee on Economic Affairs has in January 2020, approved viability gap funding of 60% of the estimated cost of ₹ 9,265 crore for this project.

LNG imports by IndianOil rose by 22% during the year with direct import of 32 LNG cargoes,

which included 27 spot cargoes, 2 cargoes from Cameron Project, USA, and 3 from Ras Laffan LNG Co., Qatar, against long-term contracts.

g) Alternative Energy:

A hallmark of its clean energy agenda, IndianOil exhibits an installed capacity of 226 MW of renewable energy, including 168 MW wind-power capacity and 58 MW solar energy capacity as on March 31, 2020, with addition of 10 MW solar photo-voltaic capacity during 2019-20. These projects generated 393 million units of power (equivalent to about 5% of IndianOil's electricity consumption) during 2019-20, resulting in emission mitigation of 322 thousand metric tonnes of carbon-dioxide equivalent.

IndianOil took a significant step in promoting use of bio-fuels in the country during the year with the commencement of sale of Compressed Bio-Gas (CBG) under the Sustainable Alternative Towards Affordable Transportation (SATAT) scheme of the Government of India. CBG is being sold through one retail outlet each in Pune and Kolhapur in Maharashtra from September 2019, under the brand name IndiGreen. IndianOil has also issued Letters of Intent (LOIs) to entrepreneurs for setting up 295 CBG plants across the country for production of 0.6 MMTPA of CBG under the SATAT scheme.

IndianOil is putting up a second - generation Ethanol plant at Panipat to produce 100 kl per day of Bio-Ethanol with paddy straw as feedstock. In addition, a Bio-fuels Complex is being developed at Gorakhpur comprising a CBG plant that will process 200 tonnes per day of feedstock. IndianOil is also working on converting used cooking oil (UCO) to bio-diesel, against which LOIs have been issued to interested entrepreneurs for setting up seven plants with an annual cumulative capacity of 12.16 crore litres of bio-diesel from UCO.

In the field of electric mobility, IndianOil has signed MoUs with potential partners for setting up charging and battery swapping stations. As on March 31, 2020, 54 battery charging / swapping stations have been installed at its various retail outlets. IndianOil has also taken a minority stake in Phinergy Ltd. of Israel with the intention of setting up Aluminium - Air battery manufacturing facility in India for electric vehicles and stationary applications, through the joint venture route.

h) Sustainable Development:

Sustainable development is one of the thrust areas of IndianOil to address the issue of climate change and to do business in an environmentally benign way. As part of this, IndianOil has been pursuing energy conservation, energy efficiency, renewable energy & carbon sequestration; water management through reducing consumption, recycling & rain-water harvesting; and waste management through reducing, reusing & recycling initiatives.

IndianOil is replacing all conventional lighting with LED lights across its installations, and during 201-20 around 1.5 lakh LED lights were installed with a cumulative replacement count of more than 6 lakh LED lights. Waste paper recycling is a major initiative of IndianOil and during 2019-20, 203 tonnes of waste paper was recycled through designated recyclers. Across IndianOil, 683 rain-water harvesting systems have been installed, which together harvested 3.75 billion litres of water in 2019- 20. Besides, 1.96 lakh saplings were planted at various locations across the country.

The Mathura and Gujarat refineries of IndianOil have committed to use treated municipal sewage water for refinery operations. With this initiative, the sewage water, which is being discharged in the river, will be used for industrial purposes, thus eliminating the use of fresh water.

i) Exploration & Production:

IndianOil continued its endeavour in E&P activities through participating interests (PI), joint ventures and wholly-owned subsidiaries. Its upstream portfolio consists of 12 domestic and 12 overseas assets, which are in various stages – exploration, development and production. The major developments in the E&P business segment were approval of Declaration of Commerciality for the gas discovery in Gujarat - Kutch Offshore by the Director General of Hydrocarbons in August 2019, grant of Petroleum Mining License by the Govt. of Assam in Umatara Cluster (Assam), where IndianOil is the Lead Operator with 90% PI, commencement of Gas Sales from Coal-Bed Methane Block in Jharkhand, and award of three domestic exploration assets under the Open Acreage Licencing Policy (OALP) Round-I and Round-II.

j) Corporate Social Responsibility (CSR):

IndianOil has been actively engaged in various CSR activities over the years, encompassing the entire gamut of social welfare / upliftment activities across the nation. IndianOil lays significant emphasis on development of communities around which it operates and has identified thrust areas under CSR, which interalia include healthcare and sanitation, education and employment-enhancing vocational skills, empowerment of women and socially / economically backward groups, etc. During the year 2019-20, IndianOil spent the entire budget of ₹ 543.38 crore on various CSR activities.

k) Contribution to Exchequer:

Over the years, IndianOil has been the largest contributor to the Government exchequer in the form of duties, taxes and dividend. During the year 2019-20, ₹ 1,82,067 crore was paid to the exchequer as against ₹ 1,93,422 crore paid in the previous year. An amount of ₹ 96,104 crore was paid to the Central Exchequer and ₹ 85,963 crore to the States Exchequer during the year 2019-20 as against ₹ 1,01,395 crore and ₹ 92,027 crore paid in the previous year respectively.

l) Some of the Major Awards & Recognitions

- IndianOil bagged the prestigious 'Vigilance Excellence Award' of the Central Vigilance Commission for its outstanding vigilance awareness initiatives during 2019.
- IndianOil was felicitated with the Super Buyer Award-2019 in December 2019 for excellence in procurement through the Government e-Market Place (GeM).
- IndianOil was adjudged first amongst PSUs in the 3rd Innovative Practices Awards-2019 for Sustainable Development Goals (SDGs) by the United Nations Global Compact Network-India at a felicitation ceremony held at Mumbai in May 2019.
- IndianOil won recognition as the Best PSU/Corporate for promotion of sports at the annual Sportstar Aces Awards-2019.
- IndianOil bagged the award for the best company in the Oil (Refining & Marketing) category at Dun & Bradstreet's Annual Corporate Awards-2019 event held at Mumbai in June 2019.
- IndianOil bagged the AIMA Managing India Award-2019 for Outstanding PSU of the Year.
- IndianOil's Corporate Social Responsibility (CSR) efforts received national recognition from the Government of India with the Ministry of Corporate Affairs felicitating select corporates for outstanding CSR initiatives for the very first time.
- IndianOil bagged the Federation of Indian Petroleum Industry's (FIPI) 'Sustainably Growing Corporate of the Year' award for excellence in sustainability performance and benefits extended to society and the environment, at a glittering awards ceremony held at New Delhi in December 2019.
- IndianOil was bestowed with the 'Company of the Year' award in petrochemicals category by FICCI (Federation of Indian Chambers of Commerce and Industry) in November 2019.
- IndianOil bagged the Swachhta Pakhwada Awards-2019, an MoP&NG initiative to honour companies that have done exemplary work during the Swachhta Pakhwada fortnight (July 1-15, 2019).
- IATA (International Air Transport Association) honoured IndianOil with Award of Recognition at the Aviation Fuel Forum held in New Orleans, USA, in December 2019.
- IndianOil was recognised as one of the top 10 digitally empowered PSUs of the country at the 17th Infotech Forum organised by Var India, India's frontline IT magazine, in June '19. IndianOil is the first and largest

PSU in the country to migrate to the SAP HANA technology in just seven months.

- IndianOil's AmyleMax technology has won recognition as the Best Indigenously Developed Technology at the Refineries & Petrochemicals Technology Meet-2020 hosted by the Centre for High Technology in April 2019.
- IndianOil and its lubricant brand SERVO have been conferred the Reader's Digest Trusted Brands (2019) recognition for another successive year in June '19. IndianOil was chosen as a trusted brand in 'Automobiles – Petrol Stations' category while SERVO earned the recognition in 'Automobiles – Lubricants' category.
- IndianOil was felicitated as the Best Performer in Maharatna category for promotion of SC/ST entrepreneurs during 2019 by the Ministry of Micro, Small and Medium Enterprises, Govt. of India.
- IndianOil bagged the Express Supply Chain & Logistics Award for the "Most Humanitarian Supply Chain in POL Sector" in recognition of its efforts in maintaining rescue supplies during Cyclone Fani on the east coast, floods in Kerala, and the rescue supplies provided to Indonesia in the aftermath of the Tsunami through the NDRF (National Disaster Response Force).
- IndianOil was conferred the "Supply Chain and Logistics Excellence Award" (SCALE Award) by CII (Confederation of Indian Industries) for the best supply chain management in the petroleum sector.

14.1.2 Oil and Natural Gas Corporation Limited (ONGC)

Oil and Natural Gas Corporation Ltd. (ONGC) was incorporated on 23rd June, 1993 under the Companies Act, 1956 to transform the statutory Commission into a Public Limited Company. Government of India shareholding is 60.41% as on 31.12.2020.

ONGC Videsh Limited (OVL) is a wholly owned subsidiary of ONGC. ONGC acquired 51.11% equity stake in HPCL on January 2018. Mangalore Refineries and Petrochemicals Ltd. (MRPL) is another partially owned subsidiary with management control.

(i) Major highlights for the year 2020-21 upto December, 2020

A. Domestic portfolio

- **ONGC stands with the Nation during Covid-19 crisis**

  Apart from contributing Rs.300 Crore to PM CARES Fund, ONGC continues to undertake several COVID relief activities. More than Rs.26 Crore worth of activities have been taken up by the Work Centres of ONGC in the operational areas for the benefit of local populace.

- **Operation Nishtha**

  In view of COVID-19 pandemic and national lockdown, ONGC undertook a massive calibrated operation to effect crew replacement for both offshore and onshore fields by special flights with the help of Air India Management and the Ministry of Petroleum and Natural Gas. The first flight operated on 6 May 2020 in Delhi-Mumbai-Delhi sector for replacement of offshore personnel after following COVID SOPs and protocol. Subsequently, other flights were also operated in other sectors to enable replacement of field personnel in both Offshore and Onshore fields.

- **ONGC takes step forward to promote Atmanirbhar Bharat; encourages Indian vendors to go local**

- During a webinar on Vendor Development for E&P Sector requirements – Vision of Aatmanirbhar Bharat, ONGC showcased how it is pursuing localization of equipment and tools at every location and exhorted Indian vendors to come up in fields where currently India is mostly dependent on import.

Exploration Initiatives:

- ONGC acquired **844.08 LKM** of 2D, **3657.62 SKM** of 3D seismic data and drilled 53 exploratory wells till 31.12.2020.
- • During the year 2020-21, as on 31.12.2020, a total of 08 hydrocarbon discoveries have been made by ONGC in its operated acreages. Out of these, 3 are in onshore and 5 in offshore acreages. Under Nomination regime total 5 discoveries have been made- (3 Gas discoveries and 2 Oil discoveries). Under PSC Regime, 3 hydrocarbon discoveries have been notified- 2 Gas discoveries and one Oil discovery.Two on-land discoveries in Nomination have been monetized by ONGC viz.Sundalbari-16 and KU-13 in the State of Tripura. Besides, seven (7) other discoveries of previous years i.e.,Tichna, Bhubander, Bhubander-6, Ashokenagar-1,R-13, Sundalbari-15 and GS-15 E have also been monetized.
- As on 31st December, 2020, ONGC has achieved surface coverage of 40503.81 LKM (95.963 %) of 2D Seismic survey and completed the processing of 39268.43 LKM (93.03 %) of 2D seismic data along with Interpretation of 35047.29 LKM (83.03%) of processed data under National Seismic Program (NSP).
- With the culmination of fifth round of Open Acreage Licensing Policy (OALP) bidding, ONGC was awarded **24 block**s as an operator in onshore and offshore areas falling in 3 tier category Indian sedimentary basins adding exploration acreage of **46313.36 Km²**.ONGC has already initiated exploratory work in its OALP awarded blocks. As on **01.01.2021**, ONGC has completed the acquisition of 1113.00 LKM of 2D and 3644.77SKM of 3D seismic data.
- During the period April'20 to Dec'2020, a total of 326 wells have been drilled, which includes 53 exploratory, 273 (development & sidetrack) wells.
- Bengal Basin, India's 8th producing basin put on production by ONGC was dedicated to Nation by Sh. Dharmendra Pradhan, Minister for Petroleum & Natural Gas and Steel on 20th Decemeber'2020.
- **MBA Basin flags-off Crude Oil transportation from Asokenagar:** MBA Basin Kolkata achieved yet another milestone on 5 November 2020, when Basin Manager flagged-off transportation of oil collected during reactivation of Well Asokenagar-1 to Haldia Refinery.
- Micro bubble drilling mud system was used in well NLM-3#12H which helped in drilling of complete drain-hole section without any mud loss.
- Hazira plant supplied NATO grade HSD to IOC for Indian Navy during COVID-19 pandemic in May20. This was an urgent requirement to supply special grade NATO HSD in view of Samudra Setu mission to repatriate expatriates stranded in neighbouring countries due to COVID-19 pandemic.
- Uran Plant initiated chlorine free oxidizing biocide (chlorine dioxide) for cooling water system, thus phasing out old chlorine gas system.
- Dahej Plant has achieved near unity power factor
- Ahmedabad Asset achieved the highest oil production of 4355 MT for the year on 25th Dec'20 surpassing the previous high of 4348 MT on 04.01.2012.
- Cambay Asset achieved the highest ever oil production of 705 MT on 31.12.2020.
- As on 31.12.2020, a total of 16 projects (Development-10, Infrastructure-6) are under various stages of implementation to enhance Crude Oil and Natural Gas Production. In addition, ONGC has also taken up development of new marginal discoveries through innovative cluster development approach.
- 02 projects (Neelam Redevelopment & Pipeline replacement project-V) have been completed in 2020-21 upto December, 2020.
- Well Stimulation Services of Rajahmundry Asset achieved a milestone by execution of first ever high tonnage hydro fracturing jobs in tight reservoirs of Mandapeta field with in-house expertise.

Production Initiatives:

- During the period April'20 to Dec'2020, ONGC's Crude oil production (Nomination + NELP) was 15.275 MMT.
- During the period April'20 to Dec'2020, ONGC's Natural Gas production (Nomination + NELP) was 16.711BCM.
- Pilot project of replacement of Carbon Steel (CS) pipeline with Reinforced Thermoplastic Pipeline (RTP) in gas lift network of Sobhasan field of Mehsana Asset was commissioned in Jul'2020.
- Well BRMAF in Tripura Asset drilled with Managed Pressure Drilling (MPD) Technology, first time in Onshore.
- SIMEX integrated analysis of 4 wells was carried out in Narimanam fields of Cauvery Asset which helped oil production rise to above 100 TPD after a span of 12 years.
- Controlled Exothermic Formulation was successfully implemented for removal of wax deposits in flow line of 2 wells in Jambusar Field in Ankleshwar Asset. The formulation developed in-house by Institute of Oil & Gas Production Technology (IOGPT) has helped in production improvement by reduction in back pressure through removal of wax deposit in the flow line.
- Micro bubble mud system successfully used in NH Asset in well NLM3#12 for the first time. Very less mud loss was observed in drain hole drilling.

Drilling Initiatives:

- **Micro Bubble Technology:** This is an improved and more effective MBS technology developed in IDT to drill reservoirs with low pressure (4.5-6.0 ppg). As a part of technology field validation seven wells have so far been drilled (4 in NH field, 2 in B&S field 1 in MH). Since this technology is indigenous and been found to be cost effective, is planned for extensive use in future.
- **HT Starch:** This chemical is poly grafted starch developed in IDT which works upto 140°C as a fluid loss additive in reservoir drilling fluid.
- **Mixed Metal Complex Drilling Fluid:** Unique remedy for losses and works as a drilling fluid too. Two successful validations have been done. The procurement of additives is in process for larger scale field application.
- Successfully carried out on-board repair of split type packer of Telescopic Joint (Slip Joint) of Sagar Bhushan using indigenously fabricated tools and jacks, saving precious 35 rig days (Saving of around Rs 21 Crores).

Well Services Initiatives:

1. WSS, Ahmedabad successfully executed first in-house Foam Fracturing job in well GMJ#19 of Ahmedabad Asset.
2. WSS Ahmedabad also introduced Use of Light Weight Proppant in Hydro-Fracturing which helps in maximizing fracture conductivity by reducing gel viscosity.
3. In order to reduce failure of tubing in SRP wells and reducing flowing wells falling sick, the following initiatives have been adopted in Ahmedabad and Mehsana:
    - Use of Tubing Rotator
    - Use of Inline Tubing
    - Use of Shop Molded Multiple guide sucker rods
    - Use of P-110 tubing

Technical Services Initiatives:

- ONGC is in the process of installing Micro turbines for flare gas reduction. Micro turbines generators can be used to generate power by utilizing low-pressure/ flare gas, thereby effecting substantial flare gas reduction.

  After installation of 65 KW micro turbine in Linch GGS, Mehsana and 200 KW micro turbine in GGS-1 Geleky, Assam, procurement of three more micro turbines (2 X65 & 1X200 KW) at Mehsana is under process. Installation of micro turbines for

flare gas reduction at Cambay, Tripura and Rajahmundry Assets is under consideration.

- In order to enhance the knowledge and develop the expertise in solar field and to adopt the best & latest technology, maintenance practices of the evolving solar industry. Two class room training programs & one online training programme (considering the Covid-19 pandemic) were organized at National Institute of Technology, Gurugram, an autonomous institute under Ministry of New and Renewable Energy, Government of India.
- Technical Services, through SMP, has developed domain experts on Caterpillar engines and vibration monitoring. Efforts are also being made to develop such expertise in Turbine Borescopic inspection and Repair of Top Drive Systems.
- SAKSHAM -2021 is being organized at all locations of ONGC and planned to carried out different activities like Mass rally/ Human Chain, Quiz/Essay/ Painting/Debate program, pollution checkup etc.(as per guidelines of PCRA) for creating energy conservation awareness and efficient use of energy across ONGC.

Corporate Infocom Services

- Initiative was taken to bring a system where users from heterogeneous environment viz. through Corporate VC network & Internet can join seamlessly. Services are continuously being utilized to conduct various VC meetings.
- An Industry 4.0 technology, Robotic Process Automation is under implementation for three identified business use cases, work awarded to M/S CI Infotech. Implementation of another Industry 4.0 technology, based on Blockchain, for contract management, have also been initiated.

Information Consolidation for Efficiency (ICE)

- Exploration to Production –a over view of a well : To give complete details of a well from Exploration stage to Production stage, Data linking between the Exploration, Drilling, Well Services and Production Modules of ICE. The joint initiative has started and various brain storming session are ongoing for the following:
  - o Well data card with all relevant data.
  - o Linking of Field, Reservoir, Sand and layers table of PRA and PS.
  - o Mapping of process for Locations release.

Institute of Engineering and Ocean Technology (IEOT)

- IEOT applied the new method for computation of axial capacity of the soil, developed based on international Joint Industry Project (JIP), using CPT results, for ICG platform which resulted in establishing the required level of safety for the foundation of the platform and would help in avoiding costly alternatives like strengthening of foundation

Renewable Energy and Sustainable Management initiatives by ONGC

- ONGC being one of the premier energy majors of the world and realises its responsibilities in ensuring sustained development through protection of the ecological system. ONGC has taken several requisite measures to minimize the impact of E&P activities and taken various measures to mitigate the environmental pollution. The following efforts undertaken by ONGC illustrate its commitment to

Sustainable Management and Renewable Energy:

- **Clean Development Mechanism (CDM) Projects: ONGC commenced its Clean Development Mechanism (CDM) journey in 2006. Currently, ONGC has 15 registered CDM projects with United Nations Framework Convention on Climate Change (UNFCCC) that yield (potential) Certified Emissions Reductions (CER) approx. 2.1 million yearly. The details of 15 projects are as under:**
  - Waste Heat Recovery Project (Mumbai High South).

- Up-gradation of Gas Turbine at co-generation plant of Hazira Gas Processing Complex.
- Gas Flaring reduction Project at Uran Plant.
- Gas Flaring reduction Project at Hazira Gas Processing Plant.
- Energy Efficiency in Amine circulation Pumps.
- 51 MW Wind power project at Bhuj.
- Green Building at Mumbai.
- Green Building at Dehra Dun.
- Gas Flare reduction at Neelam &Heera Asset.
- Green Building at Rajarhat, Kolkata.
- Green Building at Delhi.
- Gas Flare Reduction Project at GGS Chariali, Assam Asset.
- 102 MW Wind power project at Jaisalmer Rajasthan.
- Replacement of Main Oil Line (MOL) Pumps at Neelam &Heera Asset of ONGC.
- Natural gas based combined cycle power plant in Tripura, India

Presently, approval of three renewable energy projects for registration as CDM projects is awaited from MoEF&CC.

- Global Methane Initiative (GMI) Programme:

The Global Methane Initiative (GMI) is an action-oriented initiative from the United States Environment Protection Agency (US-EPA) aimed at reducing global methane emissions to enhance economic growth, promote energy security, improve the environment and reduce Greenhouse Gases. ONGC was the first non-American oil company to enter in to a collaboration (MoU) with the US-EPA. Through this programme alone in our different work-centers, the company could so far prevent approximately 20.48 MMSCM of methane gas leakages in to the atmosphere with an environmental benefit of approximately 3,06,250 ton CO2 equivalent (TCO2e), apart from ensuring safety and enhancing availability of gas for monetization.

- Green House Gas (GHG) Accounting & Mitigation:

GHG accounting is being carried out every year through our in-house expertise, to assess the Scope-1 and Scope-2 emissions of the company. The scope-1 emissions of the company for the period 2019-20 is 9.57 MMT CO2e and scope-2 emissions is 0.45 MMT CO2e, making the total GHG inventory of the company to 10.02 MMT CO2e.

Emission mitigation is a business as usual case in ONGC. Different types of projects are taken up across the organization for emission reduction. Projects for Reduction in Gas Flaring, Renewable Energy, Dynamic Gas Blending in diesel engines, Installation of Gas Compressors, Energy Efficient Lighting Systems, Energy Efficient Motors, Micro Turbines, Replacement of Natural Gas with Pneumatic Air for instrumentation purposes, etc. are to name a few.

ONGC has already installed around 3,04,000 LED lights as on date across various work centers of ONGC in the year 2020-21. This has resulted in a reduction of 5.7 crores of electricity units per annum and would realize into a monetary savings of about Rs. 40 crores annually.

- Green Buildings:

ONGC has set up LEED certified platinum rated Green Buildings for its office complex at Delhi, Dehradun and Mumbai. The fourth one is under implementation at Kolkata. Green Buildings are expected to save 30-40% of energy and they are harnessed with rain water harvesting system, efficient lighting and electrical equipment system.

- Paperless Office Project:

The Paper Less Office (PLO) initiative of ONGC is another Giant Leap towards Office Automation and Environmental Protection. In line with the Digital India Campaign of Government of India all our offices are

functioning in paperless mode through Digitization, Integration and Standardization by Harnessing Automation (DISHA). This has transformed the business process of our work-centers into digital processing of their files; making seamless electronic transfer across different users and work centres of ONGC at the click of a mouse; saving a lot of time, space, money spent on cartridges, printer and paper while setting a new standard in efficiency, accountability and transparency of the organization.

- EV battery technology

  Electric mobility and promotion of electric vehicles is one of the major thrust area of the Government to reduce liquid fuel consumption in the country from the automobile sector. To fulfill the GoI's guidelines, ONGC has deployed 10 e-cars and 33 e-Scooters at different work centres.

- Energy Efficiency Motors/equipments

  New-technology electronic diesel control engines, Hundreds of high-vintage electrical motors which out-lived their lives, have been replaced with energy-efficient motors, Variable Frequency Drives (VFD), replacement of old air conditioners with new energy efficient air conditioners, etc. contributing to substantial reduction in electricity consumption and hence emissions.

- Dynamic Gas Blending in Large Diesel Engines

  Dynamic Gas Blending is a dual fuel technology which enables to run diesel engines on a mix of diesel and gas. The method was first implemented in three Drilling Rigs of Ankleshwar Asset (E-1400-VII, E-1400-III & EV-2000-II rigs) and observed about 45 % reduction in Diesel consumption has been recorded, with significant reduction in stack emissions. The method is also in the final stages of implementation at EV-2000-III drilling rig of Assam Asset.

- Wind & Solar Energy Projects :

  ONGC has been a frontrunner in adopting renewable energy with its first wind power project of 51 MW capacity installed in the state of Gujrat (Bhuj district) in 2008 and another wind power project of 102 MW capacity at Jaisalmer, Rajasthan was successfully commissioned in 2015.

  Solar power plants are also installed at work centres depending the availability of open spaces and rooftops. So far, an aggregate of about 31 MW capacity plants are installed across different work centres and at many places, projects are under different stages of implementation.

  The total installed capacity of renewable energy as on date is about 184 MW. Another 20 MW solar projects are under way for commissioning in work centres. Also, ONGC's "Energy Strategy 2040" envisages to build a 5-10 GW capacity portfolio with focus on offshore wind; towards de-risking of portfolio against long term disruptions and reducing carbon footprint of the company.

- **Sustainable Water Management (SWM):**

  ONGC has adopted the policy of Sustainable Water Management (SWM) in its water management practices and also modified its policy on Rainwater Harvesting (RWH) for smooth implementation, monitoring and regular maintenance of RWH projects. Different types of activities like conducting water footprint study of individual work centres, RWH, Sewage Treatment Plants, Seawater Desalination Projects, and Produced Water Management are taken up under these policies with the broader vision of sustainable growth and development.

  Feasibility study has been conducted at Rajahmundry Asset for setting up of three Seawater Desalination plants of capacity 2 MLD (Million Liters per day) each at Krisanapally, Mori and Malleswaram locations. Uran plant is setting up a 10 MLD Seawater Desalination plant, scalable up to 20 MLD capacity, to meet the fresh water requirements of the plant.

- **Carbon Capture, Storage and Utilisation (CCSU)**

  Carbon Capture, Storage and Utilisation

(CCSU) is a critical CO2 emission abatement technology that can prevent large quantities of CO2 from being released into the atmosphere. CCSU is the only clean technology capable of de-carbonizing major industrial sectors such as steel, cement, pulp and paper, refining and petrochemicals. Enhanced Oil Recovery (EOR) is worldwide one of the most attractive options for CO2 storage, since the cost of storing the CO2 is offset by the revenues accrued by the hard-to-extract oil that can be recovered from depleted oil fields. Considering these benefits, ONGC entered into an MoU on 1st July,2019 with Indian Oil Corporation Limited for CO2 based Enhanced Oil Recovery (EOR). Under this initiative, the CO2 captured from the IOCL's Koyali refinery will be utilized for EOR from the depleting oil fields of ONGC in Gandhar field, near Vadodara. A techno-commercial study is in progress to establish the feasibility of the project. The project has the potential for sequestrating 5 to 6 million Ton CO2 by the year 2040.

- **Initiation of GRI based Environmental, Social and Governance (ESG)Reporting and also engaging a Rating Agency for ESG Rating of ONGC**

  ONGC has been publishing GRI based, Independently assured Group Sustainability Report with reporting coverage of ONGC, ONGC Videsh, MRPL, OMPL, OPaL and OTPC. The focus of Sustainability Reporting is on Social, Environmental and Economic impacts (also called triple bottom-line performance) of the company with limited Governance aspects covered. The Principle of Responsible Investment (PRI) is rapidly becoming a mainstream concern based on the belief that addressing Environmental-Social-Governance issues will protect and enhance portfolio returns of all stakeholders. Most international and domestic public companies are being evaluated and rated based on their Environmental, Social and Governance (ESG) performance by various institutions and rating agencies. ESG Reporting has evolved as industry best practices and become necessary as ESG considerations are incorporated in to the Credit Ratings of the company. Taking note of the merits of ESG reporting ONGC would be publishing GRI based ESG report along with traditional Sustainability Report from this year.

Technical highlights

- Around 24000 LED lights have been installed as on date across various work centers of ONGC in the year 2020-21. This totals to 3.04 lakhs LED lights installed so far under implementation of LED lighting program through M/s Energy Efficiency Services Ltd. (EESL). This has resulted in a reduction of 5.7 crores of electricity units per annum and would realize into a monetary savings of about Rs. 40 crores annually.
- ONGC has deployed 10 e-cars and 33 e-Scooters at different work centres.
- Central Workshop (CWS) Vadodara has acquired American Petroleum Institute (API) certification (API spec Q1 as per API 16 AR standards) for BOP refurbishment. CWS Vadodara becomes first work center by acquiring API certification for its BOP refurbishment facility and thus ONGC enters in the elite list of companies having API certification for BOP.
- To provide business continuity during the lockdown imposed due the COVID 19 pandemic, implemented secure remote access to facilitate users to work from home by creating VPN based access and SSL based web access.
- In the wake of the lockdown, infrastructure for conducting of internet-based Video Conferencing facilities was established to organise virtual meetings for the top management and for meetings at local Asset/Basin/office level through multiple virtual meeting platforms like Microsoft teams, Cisco Webex, Sametime, etc. Meetings were closely monitored & pursued for improved performance.
- Successfully provided uninterrupted 24x7 remote support to users of the paperless e-office system, DISHA, users and for system management after the lockdown due to COVID-19.
- Vendor Invoice Management inaugurated

on 23.06.2020 which is for online invoice submission.

Overseas portfolio

ONGC Videsh Ltd. (OVL), is a wholly owned subsidiary and overseas arm of Oil and Natural Gas Corporation Limited (ONGC), the flagship national oil company of India. The primary business of the company is to prospect for oil and gas acreages abroad, which includes acquisition of oil and gas fields in foreign countries as well as exploration, production, transportation and sale of oil and gas. OVL produced about 30.3% of oil and 23.6% of oil and natural gas of India's domestic production in FY'20. OVL holds 586.907 MMTOE of 2P Reserves spread across the globe.

In terms of reserves and production, OVL is the second largest petroleum company of India, next only to its parent ONGC.

OVL operates in highly competitive international oil and gas sector by competing with the best in the industry. Over the years, ONGC Videsh has built inherent capabilities and expertise in its areas of operations. ONGC Videsh has developed strong partnership alliance with a host of IOCs and NOCs including ExxonMobil, British Petroleum, Shell, ENI, Total, Repsol, Equinor, MOL, Petrobras, Sodeco, AzACG, Rosneft, ADNOC, Posco International, Kazmunaigaz (KMG), Petro Vietnam, CNPC, Sinopec, PDVSA, Petronas and Ecopetrol.

OVL has highly skilled human resource with excellent technical and management capabilities. The company has built facilities for evaluation, interpretation, economic modeling, FEED, design and execution of oil and gas projects and enjoys the technical and human resource support from ONGC. ONGC Videsh has developed core expertise in due diligence, techno-commercial evaluations, bid negotiations and transaction documentations.

Presently, OVL has stake in 37 oil and gas projects in 17 Countries, viz. Azerbaijan (2 projects), Bangladesh (2 Projects), Brazil (2 projects), Colombia (7 projects), Iran (1 project), Iraq (1 project), Israel (1 project), Kazakhstan (1 project), Libya (1 project), Mozambique (1 Project), Myanmar (6 projects), Russia (3 projects), South Sudan (2 projects), Syria (2 projects), UAE (1 project), Venezuela (2 projects), and Vietnam (2 projects).

OVL adopts a balanced portfolio approach and maintains a combination of producing, discovered, exploration and pipeline assets. OVL has oil and gas production from 14 Assets, 4 Assets where hydrocarbons have been discovered and are at various stages of development, 16 Assets are under various stages of Exploration and 3 projects are pipeline projects. Through geographical spread of overseas investment, OVL has enhanced its annual production to the level of 14.981 MMToE during 2019-20. During the year 2020-21, the share of oil & gas production for OVL from its projects is 6.607 MMTOE till Sep 2020.

Highlights in 2020-21

- • ONGCVidesh Limited (OVL)signed definitive binding agreements with FAR Senegal RSSD SA (Seller), a wholly owned subsidiary of FAR Limited (FAR) on –10th November 2020 for acquiring 13.6667% participating interest in Exploitation Area (Sangomar Field) and 15% participating interest in Remaining Contract Area (Exploration Area) of Rufisque, Sangomar Offshore and Sangomar Deep Offshore (RSSD) Block, Offshore Senegal.
- ONGCVidesh Limited (OVL), made a significant strike of oil in its onshore block CPO-5, Colombia, in Llanos Basin. OVL is Operator in the block with 70% stake along with its Partner Geopark Ltd. (30% stake) an independent oil and gas company focused in Latin America.

Major Awards & Recognitions:

- **Golden Peacock National Quality Award – 2020**

  The "Golden Peacock National Quality Award" for the year 2020 has been conferred to ONGC in recognition of its robust Quality Management

Systems. The Golden Peacock National Quality Award is an annual award administered by the Golden Peacock Award Secretariat, as a part of the activities of "The Institute of Directors, New Delhi".

- **Rastriya Khel ProtsahanPuruskar; 4 ONGCians receive Arjuna, Dhyanchand Awards**

  The President of India conferred Rastriya Khel ProtsahanPuruskar in the category of "Encouragement to sports through Corporate Social Responsibility". Three ONGCiansMr VisheshBhriguvanshi (Basketball), Mr Ishant Sharma (Cricket) and Ms Madhurika Patkar (Table Tennis) received Arjuna awards &Mr Manpreet Singh received the Dhyanchand Award in Kabaddi.

- **Golden Peacock Environment Management Award for second consecutive year**

  ONGC has been conferred with the prestigious Golden Peacock Environment Management Award 2020. This is the second consecutive year that ONGC has bagged the Golden Peacock Award in this particular category.

- **ONGC in Forbes list of World Best Employers**

  ONGC has been ranked 377 in the Forbes Global list of 750 World Best Employers compiled in partnership with Statista, the market research firm. It came up in the fourth annual survey conducted across 58 countries covering 160,000 workers of companies operating in multiple regions. These surveys were rolled out anonymously in the June-July period for employee participants to willingly rate and recommend their employers among relatives and friends.

- **Apex India Green Leaf & CSR Awards 2019**

  ONGC's IPSHEM Goa has received the Apex India Green Leaf & CSR Awards 2019 from Apex India Foundation for its outstanding contribution towards environment excellence. Apex India Foundation is one of the prestigious global platforms for industry and academia.

- **Global Environment Award 2020**

  IPSHEM, Goa made another breakthrough in receiving prestigious "Energy And Environment Foundation Global Environment Award 2020" under Platinum category during an online ceremony on 16 December 2020, organized by The Energy and Environment Foundation.

- IPSHEM becomes first ONGC institute to get NABL Accreditation:

  The IPSHEM, on 29 July 2020, was accredited by National Accreditation Board for Testing and Calibration Laboratories (NABL) in accordance with ISO/IEC 17025: 2017 in the field of Testing.

14.1.3 GAIL (India) Limited

GAIL (India) Ltd. was incorporated in August, 1984 as a Central Public Sector Undertaking (PSU) under the Ministry of Petroleum & Natural Gas (MoP&NG), with the mission of "accelerating and optimizing the effective and economic use of Natural Gas and its fractions for the benefit of the national economy". Government of India now holds 51.76% shares of the company. GAIL became a Navratna in 1997 and Maharatna since February 2013, the highest status conferred to any PSU.

GAIL started as a Gas Transmission Company during the late eighties and has grown organically by setting up a large network of Natural Gas pipelines of approx. 12,800 Km; two LPG Pipeline systems of approx. 2000 Km; five Gas Processing plants for production of LPG and other liquid hydrocarbons with a combined production capacity of around 1.4 MMTPA and a gas based integrated petrochemical plant of capacity 810 KTPA of polymer. GAIL is 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. Petronet LNG, a JV of GAIL, operates two LNG regasification terminals at Dahej& Kochi. GAIL is also the promoter of Konkan LNG Private Limited which operates LNG regasification terminal at Dhabol for import of LNG. GAIL has renewable portfolio of 129 MW including 118 MW of wind and 11 MW of solar energy. GAIL has installed India's 2nd largest solar roof top of 6 MW grid connected captive solar power plant at Pata Petrochemical complex. GAIL is a pioneer in city gas distribution (CGD) business in India. It has presence in 61Geographical Areas across India with 10 JVs and one wholly owned subsidiary.

GAIL has overseas presence in five countries. It has a wholly owned subsidiary, GAIL Global (USA) Inc. (GGUI) in USA. GGUI has formed subsidiary, GAIL Global (USA) LNG LLC (GGULL) which has booked 2.3 MMTPA capacity in Dominion Cove Point LNG liquefaction project. GAIL has another wholly-owned subsidiary company viz. GAIL Global (Singapore) Pte. Ltd., for trading LNG, and for undertaking overseas investments.

GAIL has integrated into upstream business of Exploration & Production with participating interests in 9 blocks in India and 2 in Myanmar. Besides, GAIL has 4.17% equity partnership in South East Asia Gas Pipeline Company (SEAGP) which is transporting gas from Myanmar to China. GAIL has made investments in three companies in downstream business at Egypt and China.

GAIL has executed a long-term LNG Sale and Purchase Agreement with Sabine Pass Liquefaction LLC for purchase of 3.5 Million Tons per Annum (MMTPA) and Gazprom Marketing and Trading Singapore for supply of 2.5 MMTPA of LNG.

Physical and Financial performance

Physical

Parameters	Units	Performance in 2019-20	Performance in 2020-21 (Up to Sept 2020)	Projected Performance in 2020-21 (As per RE)
Gas Transportation	MMSCMD	108	98	103
Gas Marketing	MMSCMD	96	85	90
Liquid Hydrocarbon Production	TMT	1265	562	1178
Petrochemical Production	TMT	788	407	800
LPG Transportation	TMT	3975	2021	4229

Financial

Description	Units	Performance in 2019-20	Performance in 2020-21(Up to Sep 2020)	Projected Performance in 2020-21 (As per RE)
Turnover	Rs. Crore	71730	25730	73713
Gross Margin (EBDITA)	Rs. Crore	9887	2926	9337
Profit Before Tax	Rs. Crore	7943	1907	7542
Profit After Tax	Rs. Crore	6621	1495	5009

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)**

Jagdishpur-Haldia &Bokaro-Dhamra Pipeline (JHBDPL) (2,655 km) and Barauni- Guwahati Pipeline (729 km) section as an integral part of JHBDPL. This pipeline network shall pass through

the Eastern part of U.P., Bihar, Jharkhand, Odisha, West Bengal and Assam. The pipeline network shall have two gas sources, one at Phulpur (Allahabad, U.P.) and the other at Dhamra RLNG Terminal (Odisha). Recently, PNGRB has granted authorization for capacity expansion of JHBDPL network by laying Dhamra Haldia pipeline and increasing size of Paradip spur line. With this expansion capacity of integrated JHBDPL network is now 23 MMSCMD from earlier 16 MMSCMD. Construction of these two pipelines is under progress in phases. JHBDPL pipeline network of total length of 730 km including Phase-I from Phulpur to Dobhi to Barauni (585 km) with spur-lines to Varanasi and Patna has been completed during the year.

Status: Phulpur-Dobhi-Barauni (Section-1) with spurlines to Patna & Varanasi (585 Km) completed. Spurline to Gorakhpur (UP) of 165 KM length completed. Construction is in progress in Dhamra- Angul pipeline (Section- 2A) and spurlines to Paradip, Bhubaneswar & Cuttack after RoU handover. Section expected to be completed by December, 2021.Dobhi-Durgapur (2B) section of JHBDPL, Construction progress of 348km: Lowering completed and Pipeline expected to be commissioned by February 2021

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

Construction of Kochi – Koottanad- Bengaluru/ Mangalore Pipeline (Phase-II B) is underway in Tamil Nadu (435 Km). Kerala section of the pipeline is completed in January 2021whereas Tamil Nadu section will be completed within 30 months from availability of hindrance free RoU/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 Km) and further to Phulpur (315 Km) is under execution.

- **Coal Gasification**

GAIL is in the process of setting up a coal gasification-based Urea project through a JV-Talcher Fertilizers Limited (TFL), formed with Coal India Limited (CIL), Rashtriya Chemicals and Fertilizers Limited (RCF), each having 31.85% stake and Fertilizer Corporation of India Limited (FCIL) having 4.45% equity. The project, with an estimated cost of around Rs. 13,300 crore is envisaged for the production of 2,200 MTPD Ammonia and 3,850 MTPD Urea. The coal for the project shall be sourced from captive mine of North Arkhapal in Talcher region which has been allotted to TFL by Ministry of Coal. TFL has already signed the mine allotment agreement with the Ministry of Coal. Petcoke, which is the second feedstock, shall be sourced from IOCL's Paradip refinery for which TFL has already executed an MoU with IOCL. The project has received an investment approval from all the JV partners in August 2019 and project activities have already commenced with the award of 02 major LSTK tenders of coal gasification and ammonia/urea at a cumulative cost of approx. Rs. 8,000 crore.

Achievements

Kochi - Mangaluru Natural Gas Pipeline

Honorable Prime Minister Shri Narendra Modi dedicated the Kochi - Mangaluru Natural Gas Pipeline of 450 km to the nation on 5th January 2021. It was a milestone efforts towards the creation of 'One Nation One Gas Grid'. The pipeline has been built by GAIL (India) Ltd. It has transportation capacity of 12 Million Metric Standard Cubic Metres per day, and will carry natural gas from the Liquefied Natural Gas (LNG) Regasification Terminal at Kochi (Kerala) to Mangaluru (Dakshina Kannada district, Karnataka), while passing through Ernakulam, Thrissur, Palakkad, Malappuram, Kozhikode, Kannur and Kasaragod districts. The total cost of the project was about Rs. 3000 crore and its construction created over 12 lakh man-days of employment. Laying of the pipeline was an engineering challenge as the route of the pipeline necessitated it to cross water bodies at more than 100 locations. This was done through a special technique called Horizontal Directional Drilling method. The pipeline will supply environment friendly and affordable fuel in the form of Piped Natural Gas (PNG) to households and Compressed Natural Gas (CNG) to the transportation sector. It will also supply Natural Gas to commercial and industrial units across the districts along the pipeline. Consumption of cleaner fuel will help in improving air quality by curbing air pollution.

Dobhi - Durgapur Natural Gas Pipeline

GAIL has completed 348 km Dobhi - Durgapur Natural Gas Pipeline is part of the ambitious

Jagdishpur – Haldia & Bokaro – Dhamra Natural Gas Pipeline Project (JHBDPL), popularly known as the "Pradhan Mantri Urja Ganga" connecting Eastern India to the National Gas Grid. This 348 km pipeline passes through Bihar (18 km), Jharkhand (205 km) and West Bengal (125 km). covering nine districts namely, Gaya (Bihar), Chatra, Hazaribag, Giridih and Bokaro (Jharkhand), Puriliya, Bankura, Paschim Burdwan and Purba Burdwan (West Bengal).

The pipeline was constructed with an investment of ~ Rs 2,400 crore and has capacity to carry 16 MMSCMD of gas through the 30 inch diameter pipeline. It will help revive fertilizer plant and anchor customers such as Hindustan Urvarak&Rasayan Limited (HURL), Sindri fertilizer plant in Jharkhand and supply gas to Matix Fertilizer Plant at Durgapur. GAIL awarded the job to execute the Dobhi - Durgapur section in December 2017 and work began in January 2018. It passes through various waterbodies like rivers, streams, etc. which necessitated crossing of the waterbodies at 15 locations en-route the pipeline through a special technique called Horizontal Directional Drilling (HDD) method.

Jagdishpur-Haldia-Bokaro-Dhamra Pipeline

GAIL is executing around 2,600 Km long Jagdishpur-Haldia-Bokaro-Dhamra pipeline (JHBDPL) as a part of the 'Urja Ganga' Project. GAIL is also constructing approx. 720 Km long natural gas pipeline from Barauni to Guwahati as an integrated extension to the JHBDPL Project. The proposed pipeline up to Guwahati would inter-connect with the upcoming approx. 1600 Km 'Indradhanush' pipeline network conceived to operate in North-East by newly formed JV Indradhanush Gas Grid Limited (IGGL). GAIL also received authorization to lay the Srikakulam (Andhra Pradesh) - Angul (Odisha) pipeline.

GAIL has also executed agreements for LNG supply to the upcoming/revived Fertilizer units in the domestic market. GAIL has already executed gas sales agreement with upcoming fertilizer plants along JHBDPL i.e. Gorakhpur (Uttar Pradesh), Sindri (Jharkhand), Barauni (Bihar) and Matix (WB). Efforts are also on to market RLNG to other anchor customers like refineries and steel plants along upcoming and existing pipelines.

To expand its petrochemical portfolio, GAIL is in the process of setting up a 500 KTA propane de-hydrogenation and polypropylene (PDHPP) plant at Usar and one 60 KTA PP plant at Pata. GAIL also entered into JV with CIL, RFCL, FCIL to form Talcher fertilizer Limited (TFL) to produce surface coal gasification-based urea, taking a step forward to reduce import dependence of fertilizers. GAIL is also an equity partner in Ramagundam Fertilizers and Chemicals Limited.

GAIL has managed to deliver excellent performance over the years. During the last financial year 2019-20, GAIL registered Turnover& Profit of Rs.71,730 crore & Rs.6,621 crore respectively, with an Excellent MoU Rating for FY 18-19.

Major Accolades / Awards received during 2020-21

- GAIL won the Leaders Award in the Mega Large Business, Process Sector category in the 11th edition of Frost & Sullivan - MEASA and TERI - The Energy and Resources Institute's Sustainability 4.0 Awards 2020.
- GAIL (India) Limited' declared the Winner of 'Golden Peacock Award for Excellence in Corporate Governance' for the year 2020.
- GAIL' s wholly owned subsidiary GAIL Gas Limited has been awarded the 'City Gas Distribution – Established Company of the Year' by the Federation of Indian Petroleum Industry (FIPI).
- GAIL (India) Limited's Pata unit bagged 1st position in 16th National Awards for Excellence in Cost Management.
- GAIL (India) Limited, featured in the Forbes list of World's Best Employers 2020.

Brahmaputra Cracker and Polymer Ltd (BCPL)

- The Assam Gas Cracker Project (AGCP) was initiated in pursuance of the Memorandum of Settlement signed by the Central Government with the All Assam Students Union (AASU) and All Assam GanaSangramParishad (AAGSP) on 15thAugust, 1985. The AGCP, located at Lepetkata, Dibrugarh dist., was approved by the Cabinet Committee on Economic Affairs (CCEA) on 18th April, 2006, at a total project cost of Rs.5460.61 crore. A joint venture company, namely M/s Brahmaputra Cracker and Polymer Limited (BCPL), was incorporated on 8th January, 2007 to implement the project.

M/s BCPL has equity participation from GAIL (70%), Oil India Limited, NRL and Government of Assam (10% each).

- The Project was commissioned on 2nd January, 2016 at a cost of Rs. 9,965 crore and was dedicated to the Nation by the Hon'ble Prime Minister, on 5th February, 2016. The plant is the largest petrochemical complex in NER and has been operating at more than 100% capacity for last 3 years.
- The CCEA on 24.12.2019 approved the feedstock subsidy of Rs. 4600 crore for BCPL for 15 years of plant operation starting form commissioning date. The CCEA also approved transfer of administrative control from Department of Chemicals and Petrochemicals (DCPC) to Ministry of Petroleum and Natural Gas (MoPNG).

14.1.4 BHARAT PETROLEUM CORPORATION LIMITED (BPCL)

a) Activities and Performance 2019-20

Bharat Petroleum Corporation Limited, a Maharatna CPSE, is an integrated oil company in the downstream sector, engaged in exploration, production, refining and marketing of petroleum products. The Authorized Share Capital and Paid up Capital of the company as on 31.12.2020 is Rs. 2635 crores and Rs. 2,169.25 crores respectively.

BPCL has Refineries at Mumbai and Kochi with a combined refining capacity of 27.50 MMTPA as on 31st December 2020. The Mumbai and Kochi Refinery are certified for ISO 9001, ISO 14001 and OHSAS 18001, ran throughput of 9.07 MMT and 8.94 MMT, respectively during 2020-21 (up to December 2020).

BPCL with 9,401 employees as on 31st December 2020, has all-India presence through its extensive marketing networks. The Market Sales of BPCL is 27.65 MMT with market share of 24.20% with PSU (Apr.-Dec. 2020).

b) Marketing Profile

BPCL has a robust distribution network comprising of 40 POL depots, 15 major installations, 23 TOPs, 54 LPG bottling plants, 58 Aviation Service Stations, 17841 Retail Outlets, 6144 LPG Distributorships, 930 SKO Agencies, 4 lubricant blending/ filling plants and 2241 KM product pipelines as on 31.12.2020.

c) Financial Performance

The financial performance (RE) of the Corporation during April – September 2020: Gross Sales Turnover Rs 1,16,092.78 crores and Profit After Tax (PAT) Rs 4,323.92 crores.

d) Exploration and Production

Bharat Petro Resources Limited (BPRL) and its group companies have Participating Interests (PI) in 27 blocks in eight countries along with equity stake in two Russian entities, holding the license to 4 producing assets in Russia. Out of the twenty-seven blocks, sixteen are located in India and Eleven overseas. Seven of the sixteen blocks in India were acquired under different rounds of New Exploration Licensing Policy (NELP), four blocks were awarded under the recently concluded Discovered Small Fields (DSF) Bid Round – I and three blocks under the Open Acreage Licensing Policy Bid Round I. Out of overseas blocks, five are in Brazil, two are in UAE and one each in Mozambique, Indonesia, Australia. BPRL and its consortia have a total of 26 discoveries in respect of Blocks held in five countries i.e. Brazil, Mozambique, Indonesia, Australia and India. During the year 2018-19, a consortium of BPRL and IOCL was awarded the Onshore Block 1 concession in Abu Dhabi after emerging as the winning bidder in the Abu Dhabi 2018 Block Licensing Round. The award marks entry of BPRL as Operator of overseas assets for the first time in the prospective UAE region and is consistent with its stated strategic objective of balancing its portfolio by adding exploration assets in prolific basins to its existing E&P portfolio. BPRL through its subsidiary has 30% stake in the SPV of the Indian Consortium that holds 10% stake in the Lower Zakum Concession. The Concession, which has a term of 40 years with an effective date of 9th March

2018, was signed on 10th February 2018. The current production of this field is about 300,000 bopd and Indian Consortium annual share shall be about 1.5 MMT. BPRL's share of the equity crude has been lifted by BPCL group refineries.

The Madanam discovery in the block CY-ONN- 2002/2 in Cauvery basin, India where ONGC is the Operator and BPRL has a PI of 40% as non-operator, is currently under development and the commercial oil production has commenced.

BPRL has invested approx. Rs 27000 crores till December 2020.

e) Completed / Ongoing Projects

Refinery Projects

BS VI Motor Spirit Block Project (MSBP) at Kochi Refinery

BS VI Motor Spirit Block Project (MSBP) at Kochi Refinery

The objective of Motor Spirit Block Project (MSBP) at Kochi Refinery is to maximize BS-VI grade Motor Spirit production by upgrading Naphtha. The approved cost of the project is Rs.3288.96 crore and is currently on going.

Setting up of facilities for production of Polyol, Propylene Glycol, and Mono Ethylene Glycol at Kochi Refinery

The project envisages production of value added petrochemical such as Polyols/ Propylene Glycol/ Mono Ethylene Glycol from Polymer grade Propylene and enhance petrochemical portfolio.

Approval for firmed up cost and schedule from Board will be obtained after detailed design and engineering. The project is currently on going.

Enhancing production of Lube Oil Base Stock (LOBS) at Mumbai Refinery

The objective of Revamp of Lube Oil Base Stock (LOBS) unit at Mumbai Refinery is to enhance capacity from 300TMTPAto450TMTPA.Theapproved cost of the project is Rs.640.00 crore and is currently on going.

Installation of new Kerosene Hydrotreater (KHT) unit integrated with Diesel Hydrotreater (DHT) unit at Mumbai Refinery

The objective of the project is to install new Kerosene Hydrotreater (KHT) of 1.5 MMTPA capacity integrated with existing Diesel Hydrotreater (DHT), to produce ATF and Kerosene meeting Sulphur specification of max 10 ppmw. The approved cost of the project is Rs.697.00 crore and is currently on going.

2G Ethanol Bio Refinery at Bargarh, Odisha

The project envisages setting up 2nd Generation Bio Ethanol Refinery to produce 100 KLPD Ethanol. Ethanol produced will be used for blending in Motor Spirit (MS). The approved cost of the project is Rs.1607 crore and is currently on going.

Marketing Projects

LPG Import Facility at Haldia

The objective of the project is to cater the growing demand of LPG in Eastern Region and to meet the vision of Govt. of India to provide LPG to every household as Clean Cooking Gas. The approved cost of the project is Rs.1097.54 crore. This Terminal was made operational on 22nd Nov 2020 by unloading first Ocean Tanker Nanda Devi containing Propane and Butane.

POL Terminal with Railway siding at Haveli, Pune

The objective of this project is to construct new POL Terminal with Railway Siding at Pune to mitigate the supply limitation and infrastructure constraint to meet current & projected demand of Pune Territory

and up to Solapur. The approved cost of the project is Rs.282.64 crore and is completed in August 2020.

Resitement of Raichur Depot to Gulbarga

The objective of this project is to resite the existing Raichur depot to Gulbarga to meet the growing market demands of petroleum products in north east districts of Karnataka. The approved cost of the project is Rs.206.26 crore and completed in December 2020.

Mumbai Manmad Pipeline Re-routing Project

The existing pipeline in Mumbai Manmad section is highly vulnerable and inaccessible for repair due to rapid infrastructure development in this area. The objective of this project is, laying of 50 km pipeline Mumbai Manmad section along with associated facilities as re-routing of existing old pipeline. The approved cost of the project is Rs.449.58 crore and is currently ongoing.

Product pipeline from Irugur to Devanagonthi (Bengaluru)

The project envisages laying of 315 Km long product pipeline line from Irugur (Coimbatore) to Devanagonthi (Bengaluru) for economic and safe evacuation of products from the Kochi refinery. The estimated cost of the project is Rs.1472 crore.

Project is on hold from December 2014 due to RoU clearance in Tamil Nadu.

Multiproduct Pipeline from Bina Dispatch terminal to POL Terminal at Kanpur

The project envisages laying of 355 Km long product pipeline for a throughput of 3.5 MMTPA. The objective of the project is to strengthen BPCL marketing infrastructure, moving the products safely, reducing dependency on rail network, increasing overall competitiveness in market and easy evacuation from Bina dispatch terminal to POL terminal at Panki, Kanpur. The estimated cost of the project is Rs.1524.06 crore and is currently ongoing.

POL depot at Bokaro (Radhanagar)

The project envisages resitement of existing Ranchi & Dhanbad depot to a new site at Radhanagar (Bokaro) in Jharkhand to meet the increasing market demands. The estimated cost of the project is Rs.248.55 crore and is currently ongoing.

Coastal Terminal at Krishnapatnam

The project envisages development of a coastal terminal on lease land from Krishnapatnam Port Company Ltd. with coastal input and dispatches by rail and road. The estimated cost of the project is Rs.580.20 crore and is currently ongoing.

f) Corporate Social Responsibility

In alignment with the vision of the organisation, the CSR initiatives strive to 'energise lives' of the marginalised/ underprivileged communities. BPCL continues with a strong commitment to the 5 thrust areas for CSR projects/ activities which are Education, Water Conservation, Skill Development, Health & Hygiene and Community Development. In keeping with the huge demands for support towards COVID relief activities, BPCL spent Rs.138.66 Cr (as on 31.12.2020) for COVID and related hygiene initiatives since the pandemic occurred. BPCL is also providing cold chain equipment for the transportation and storage of Covidvaccines. With renewed efforts, BPCL has participated in the "Swachha Bharat Mission" of the Government of India and undertaken a whopping 79,000 activities during

the Swachhata Pakhwada including awareness on sanitation, distribution of PPE and other sanitization related programs. The company is persevering in its support of the Swachha Iconic Places i.e. Madurai Meenakshi Temple and Sri Adi Shankaracharya Janmabhoomi Tirth in Kalady.

CSR expenditure by BPCL stands at Rs. 84.52 Cr during the current financial year till Dec 2020 and during 2019-20 was Rs. 345.57 Cr (which includes a contribution of Rs.100 Cr to the PM CARES Fund).

g) Contribution to Exchequer

BPCL has contributed to the Government exchequer in the form of duties, taxes and dividend. During the year 2019-20, Rs. 97,673 crore was paid to the exchequer as against Rs. 95,035 crore paid in 2018-19. An amount of Rs. 51,647 crore was paid to the Central Exchequer and Rs. 46,026 crore to the State Exchequer in 2019-20 as against Rs. 48,562 crore and Rs. 46,473 crore paid in 2018-19 respectively.

h) Major Accolades / Awards received:

- In the prestigious Fortune Global 500 list for 2020, BPCL's rank is 309. BPCL's rank is 601 in the Forbes Global 2000 list for 2020, a considerable rise from the rank of 628 in the 2019 list. For its outstanding global, financial and industry performance, BPCL has been ranked among the top 20 Oil and Gas Refining and Marketing companies in the Platts Top 250 Global Energy Company Rankings for 2020. BPCL ranks 5th in Oil & Gas Refining and Marketing in the Asia/Pacific Rim, 11th in Oil & Gas Refining and Marketing globally and 36th in overall performance in the Asia/Pacific Rim. On an overall global performance, Bharat Petroleum has been ranked 114th.
- BPCL received the prestigious ASSOCHAM Innovators' Excellence Awards 2020 under the category 'Innovation in Environment and Sustainability' for the Digital Twin Refinery Emission Model developed by Kochi Refinery.
- BPCL won Awards for its In-house magazine - Petro Plus and Corporate Intranet – I-Connect at the 59th Annual Awards of the Association of Business Communicators of India (ABCI).
- BPCL bagged several awards at the Public Relations Society of India (PRSI) National Awards 2020 for Excellence in the field of Communications and Public Relations – Best Use of Social Media in Campaign, Public Relations in Action, Award for Innovation in Customer Care during Corona Times (LPG), E-Newsletter (ESE), Excellence in Covid-19 Management in Public Enterprises, Best Communication Campaign (Internal Publics) – BPC Tarang, Best House Journal (Hindi), Best PSU Implementing RTI, Innovation in Marketing Strategy – Bharatgas, Best Employee Communication Campaign (ESE) and Best Communication Campaign (External Publics) – MAK Chala Gaon Ki Or.
- BPCL has also been awarded the First Prize by SCOPE for the Best Corporate Communication Campaign & Program – Internal Communication at the SCOPE Corporate Communication Excellence Awards 2020.
- Bharat Petroleum Learning Centre (BPLC) won the **'Special Recognition Award'** for Excellence in Learning & Development – PSU Category in the Society of Human Resources Management (SHRM) Awards in recognition of the innovative L&D practices of the Corporation.
- Corporate Health, Safety, Security and Environment (HSSE) won the Platinum Award in the category of Global Sustainability in the Energy

and Environment Foundation Global Awards 2020 and was adjudged as the best among the participating industries.

- BPCL's excellent performance during the Swachhata Pakhwada in July 2020 won the Second place among Oil & Gas PSUs for reaching out to over 62 lakh persons, through a whopping 79,000+ activities. BPCL was also awarded Second place for their exceptional performance in the 'Swachhata hi Seva' campaign from 11th September to 27th October 2019.
- Corporate HSSE won the Responsible Business of the Year Award from Grand Thornton and SABERA in the category of 'Sustainability' and was adjudged the best among the industries in the energy sector.
- BPCL secured the 10th position among Responsible Business Rankings on Sustainability and CSR in India. In a survey conducted by M/s Future Space (group of IIM Ahmedabad Alumni) on the Environment, Social and Governance (ESG) parameters, BPCL has secured the 10th position among the top companies in India, who map their business goals with Sustainable Development Goals (SDGs) of the United Nations.
- BPCL excels on the CDP platform of sustainability and climate change, with its performance improved to management level amongst the four consecutive levels of environmental stewardship - 1) Disclosure; 2) Awareness; 3) Management; 4) Leadership. BPCL's rating is the best amongst the Oil and Gas sector in India.
- Corporate Research and Development Centre (CRDC) bagged two Awards during the Frost & Sullivan Project **Evaluation** & Recognition Program (PERP) 2019 under the category 'Environment Leadership' in the Manufacturing Sector. These were the **First Runner Up Award** for **'Improving Thermal Efficiency of Domestic LPG Cooking Stove'** and a **Certificate of Merit for 'Efficient Vapour Recovery System to Meet Environmental Emission Norms at Retail Outlets'.**
- BPCL Quality Assurance Proficiency Test Providers and Reference Material Producers Team (QA PT & RMP) bagged the 3rd Prize in the National Accreditation Board for Testing and Calibration Laboratories (NABL) National Conclave for the uniqueness of BPCL PT & CRM, capabilities and future plans.
- Mumbai Refinery is conferred with the prestigious 'Excellence in Crisis' Award by IMC Ramkrishna Bajaj National Quality Award (RBNQA) Trust, in recognition of its laudable role of ensuring uninterrupted production & supply of petroleum products during the pandemic.
- BPCL received recognition for significant contributions in the field of 'Waste Management & Sanitation' for presenting the Best Case Study for Plastic Waste Management developed by Corporate Research and Development Centre (CRDC) at the India International Science Festival 2020 organised by Ministry of Science & Technology, Ministry of Earth Sciences and Ministry of Health & Family Welfare, GOI in collaboration with Vijnana Bharati (VIBHA) & Council of Scientific & Industrial Research (CSIR).
- BPCL HSSE has presented information on the Environment, Social and Governance (ESG) parameters on Sustainability on the Dow Jones Sustainability Indices (DJSI) platform for the first time and BPCL has demonstrated excellent performance on Sustainability. BPCL is the 10th best company all over the world in the Oil and Gas Sector with respect to Sustainability Benchmarking, their Percentile

score having improved from 45 to 72, way ahead of the average score of 38.

- The Gasoline Hydro Treatment Unit (GTU) Project at Mumbai Refinery was envisaged to produce 100% BS VI MS in line with the Government mandate, as per the Auto Fuel Vision and Policy 2025 at a cost of Rs.554 crores. Completed in June 2019, ahead of the schedule of 1st April, 2020, it was awarded the 'Project of the Year 2020' – Medium Category from the prestigious Project Management Institute (PMI).

14.1.5 Hindustan Petroleum Corporation Limited (HPCL)

HPCL is a Maharatna Central Public Sector Enterprise (CPSE) and a S&P Global Platts top 250 Global energy company ranked at 54 with Annual Sales of Rs. 2,86,250 Crore during FY 2019-20. HPCL has a strong presence in Refining & Marketing in India with about 21% Market share in the PSU category. HPCL has been conferred with 'Maharatna' Status in October 2019

Physical Performance

The provisional total sale of products for HPCL during Apr-Dec'20 was 25.45 million metric tonnes (MMT). During Apr-Dec'20, HPCL processed 12.03 million metric tonnes of crude at refineries and recorded Pipeline throughput of 13.76 million metric tonnes.

Financial Performance

During Apr-Dec'20, HPCL has achieved Profit After Tax (PAT) of Rs. 7,646 Crore as compared to Rs. 2,610 Crore of the same period in 2019-20 with a significant growth of 192% over historical.

Infrastructure

HPCL owns and operates Refineries at Mumbai & Visakhapatnam with designed capacities of 7.5 MMTPA & 8.3 MMTPA respectively. HPCL also owns the largest Lube Refinery in the country at Mumbai for producing Lube Oil Base Stock with a capacity of 428 TMTPA (installed capacity)

In addition, HPCL holds 48.99% equity stake in JV Company, HPCL-Mittal Energy Limited (HMEL), which operates 11.25 MMTPA capacity refinery at Bathinda in the state of Punjab and has 16.96% equity stake in Mangalore Refinery and Petrochemicals Limited (MRPL), which operates 15 MMTPA capacity refinery at Mangalore in the state of Karnataka.

HPCL has the second largest network of petroleum product pipelines in India with network length of about 3,775 km.

HPCL has avast marketing network consisting of 14 Zonal Offices in major cities and 133 Regional Offices facilitated by a supply and distribution infrastructure comprising 41 Terminals, 44 Aviation Service Facilities, 50 LPG Bottling Plants, 6 Lube Blending Plants, 39 Inland Relay Depots and 31 Exclusive Lube Depots. The customer touch points constitute of 17,837 Retail Outlets, 620 retail outlets with CNG facilities, 1,683 SKO/LDO dealers, 245 Lube distributors, 116 Clearing & Forwarding Agents,153 Door-to-Door Mobile dispensing equipment for delivery of Diesel, EV charging facilities at 44 retail outlet and 6,151 LPG Distributorships with a customer base of over 8.6 crore domestic LPG consumers as of December 2020.

Exploration & Production

HPCL undertakes Exploration & Production (E&P) of hydrocarbons through its wholly owned subsidiary company Prize Petroleum Company Limited (PPCL). During 2019-20, PPCL achieved total production of 38,202 barrels of crude oil from domestic oil field at Hirapur, Gujarat.

PPCL has a wholly owned subsidiary namely Prize Petroleum International Pte Ltd. (PPIPL), incorporated in Singapore. PPIPL has 11.25% and 9.75% participating interests in two E&P Blocks, T/L1 and T/18P respectively in Australia. PPIPL has achieved its share of production of 1,36,490 BoE (Barrels of Oil Equivalent) from Yolla producing field (T/L1) in Australia.

Projects

HPCL along with its JVs are executing various projects towards strengthening of the strengthening & expansion of refineries and marketing infrastructure.

Projects Completed

Toward meeting the growing demand of LPG in the country, capacity of Gandhinagar and Jabalpur LPG plants has been increase from 60 to 120 TMTPA. With the completion of additional mounded storage facilities in Unnao, Kota & Kondapalli plants, the overall LPG storage capacity of HPCL has been enhanced by 4,050 MT

On-Going Projects

Refinery Projects

HPCL has undertaken capacity expansion projects at both the refineries to increase the installed capacity of Mumbai Refinery from 7.5 MMTPA to 9.5 MMTPA and of Visakh Refinery from 8.33 MMTPA to 15. Both the projects are in advance stages of completion.

In addition, HPCL is setting up a new 9 MMTPA capacity greenfield refinery-cum-petrochemical complex at Barmer District of Rajasthan through a joint venture company, HPCL Rajasthan Refinery Ltd.(HRRL).

HPCL is also participating in setting up of 60 MMTPA Integrated greenfield refinery-cum-petrochemical complex at Ratnagiri district of Maharashtra through a Joint venture company, Ratnagiri Refinery and Petrochemicals Ltd. (RRPCL).

The HP Green R&D Centre is being expanded with construction of labs for Petrochemicals & Polymers; Engine & Battery labs and Tribology lab along with associated facilities.

Marketing Projects

To cater to the growing demand of petroleum products in country in a cost effective and environment friendly manner, HPCL has undertaken a number of pipeline projects. The major ongoing pipeline infrastructure projects of HPCL include:

(i) Extension of VVSPL from Vijayawada to Dharmapuri and construction of marketing terminal at Dharmapuri

(ii) Extension of the existing LPG pipeline from Hassan in Karnataka to Cherlapalli in Telangana

(iii) Pipeline from Barmer in Rajasthan to Palanpur in Gujarat

HPCL is also participating in development of India's longest LPG pipeline from Kandla to Gorakhpur (2,757 km) along with IOCL and BPCL.

To meet the growing requirement of LPG in the country and for enhancing the import capacities, construction of 80 TMT LPG cavern at Mangalore is in progress. New LPG plants are being set up at Patalaganga (Maharashtra), Barhi (Jharkhand), Sitarganj (Uttarakhand), Gonda (Uttar Pradesh), Abu Road (Rajasthan), Rayagada(Orissa) and Golpada (Assam).

To strengthen the supply infrastructure a new POL depot is being constructed at Hissar District in the state of Haryana.

To expand presence in Natural Gas business, HPCL is constructing a 5 MMTPA LNG regasification terminal at Chhara Port in Gir Somnath District of Gujarat through a Joint venture company HPCL Shapoorji Energy Pvt. Ltd. (HSEPL). HPCL is also participating in two separate Joint Venture companies viz. GSPL India Gas Net Limited (GIGL) and GSPL India Transco Limited (GITL) for laying, building and operating three (3) natural gas pipelines. To expand the CGD Business, HPCL is setting up CGD networks in GAs of Ambala –Kurukshetra (Haryana) and Kolhapur (Maharashtra) districts through a joint venture company HPOIL Gas Pvt. Ltd. (HPOIL). In addition, HPCL is also setting up CGD network on a standalone basis in 10 Geographical Areas in the States of Haryana, Uttar Pradesh, Uttarakhand and West Bengal.

HPCL Middle East FZCO (HMEF)

'HPCL Middle East FZCO', a wholly owned subsidiary of HPCL is in operation for marketing of lubricants and other petroleum products across various markets of Middle East ,Africa and in region of Commonwealth of Independent States (CIS).

Major Accolades / Awards received

For outstanding performance across various spheres of business, HPCL wasrecognized with several prestigious International and National awards during thequarter. HPCL was conferred with:

- 'Oil Marketing Company of the Year' award by FIPI (Federation of Petroleum Industry)
- "Company of the Year for Excellence in Human Resource Management" awardby Federation of Indian Petroleum Industry (FIPI)
- "Best Navratna" award in 'Manufacturing Sector' category by M/s Dun & Bradstreet
- "National Corporate Social Responsibility (CSR) Award under the category 'Contribution to National Priority Areas: Education' by Government of India andHonorable Mention in the category 'Contribution to National Priority Areas:

  Support to Differently Abled' for Project ADAPT.

14.2. NAVRATNA PSUs

14.2.1 Oil India limited (OIL)

1. Preamble

Oil India Limited (OIL), a Government of India Enterprise, and 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 Rs. 2,000 Crore and the paid up capital is Rs. 1,084.41 Crores. As on 31.12.2020, Government of India's shareholding is 56.66% of the paid-up equity share capital of OIL.

2. Domestic Portfolio

The domestic operations of the Company 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, the Company has also ventured into shallow water in Krishna Godavari (KG) Basin.

OILs domestic acreage includes 3 (three) Petroleum Exploration License (PEL) covering an area of about 331.75 sq.km granted on nomination basis and 25 (twenty five) Petroleum Mining Leases (PMLs) spread over an area of about 4800 sq.km. These acreages are in the states of Assam, Arunachal Pradesh and Rajasthan.

The Company also has acreage under NELP as Operator comprising of 4 (four) onshore blocks with an area of 3909 sq. km. in the states of Assam, Mizoram and Andhra Pradesh / Puducherry. OIL has 2 (two) blocks under NELP as non-operator with 5301 sq.km. in Gujarat-Kutch (Shallow Offshore), West Bengal (Onshore). OIL has 2 (two) blocks with 121 sq.km. in Assam & Arunachal Pradesh under Pre-NELP JVs as non-operator viz Kharsang PSC (PI-40%) & Block AAP-ON-94/1 (Dirok - PI-44.086%). The company also holds Non-operating participating interest (40%) in AA/ONDSF/Kherem/2016 awarded under DSF-I Bid round.

The Company also has acreage under OALP-I to V Bid Round as Operator comprising of 25 (twenty five) blocks with an area of 49,160 sq. km. in the states of Assam, Arunachal Pradesh, Tripura, Nagaland, Odisha, Rajasthan and offshore parts of Andaman and Kerla-Konkan. OIL has also been holding 2 (two) nos. of blocks in Tripura and Krishna-Godavari Offshore areas covering an area of 141 sq.km under DSF-II Bid round as an Operator.

3. Exploration Activities

The present exploration activities of Oil India Limited is in progress in the states of Assam, Mizoram, Andhra Pradesh (KG Basin), Rajasthan. Moreover, exploration activities for OALP-I,II & III & DSF-II Block in Assam, Arunachal, Tripura, Rajasthan, Odisha, & Andaman, Kerala-Konkan in Kerala offshore & GSKW in KG offshore areas are in progress.

Additionally, OIL has been allotted a total of 6032 LKM (Revised) for Acquisition, Processing and Interpretation (API) of 2D seismic data under the National Seismic Programme (NSP) campaign of DGH. The state-wise break-up of 2D seismic API is as under:

Area / Sector	Name of the Area	Revised Target in LKM	Achievement in LKM
Area – 1, Sector – I	Assam - Arunachal Pradesh	2,414	2416.20
Area-1, Sector – II	Assam- Arunachal Pradesh	738	743.70
Area-2, Sector – IV	Mizoram – Tripura	1,125	1143.48
Area – 2, Sector – II	Manipur	870	4.74
Area – 2, Sector – III	NC Hills	885	329.16
Area – 2, Sector – I	Nagaland	0	0
Total		**6032**	**4637.28**

4. Physical Performance

Parameter	Unit	2019-20 (Actual)	2020-21	
			Target (BE)	Actual (Upto Dec'20)
Seismic survey				
2D	GLKM	1,389.45	4,500	11,157.80
3D	SQKM	263.00	2,025	826.51
Drilling				
Exploratory	'000Mtr	57.297	78.740	25.790
	Wells	11	18	10
Development	'000Mtr	65.040	112.600	42.117
	Wells	25	35	14
Total (Exp+Dev)	'000Mtr	122.337	191.340	67.907
	Wells	36	53	24
Crude Oil Production *			(MoU Target)	Actual (Upto Dec'20)
Assam	MMT	3.0753	3.088	2.2019
Arunachal Pradesh		0.0234	0.026	0.0181
Rajasthan (Heavy Oil)		0.0079	0.007	0.0067
Total		3.1066	3.121	2.2267
Natural Gas Production*			(MoU Target)	Actual (Upto Dec'20)
Assam	MMSCM	2,379.03	2,482	1,695.09
Arunachal Pradesh		38.22	40	37.54
Rajasthan		251.00	240	137.19
Total		2,668.25	2,762	1,869.82
LPG Production	'000T	28.990	33.000	25.199

* Excluding JV shares

4.1 Discoveries made (2020-2021)

The Company has made 1 (one) gas discovery during the 2020-21 upto December, 2020 in the Tinsukia PML (nominated) in the state of Assam.

4.2 Reserves Position (2P) as on 01.04.2020

As a result of exploration and development activities, as on 01.04.2020 OIL has established 2P / BE in-place volume of 809.75 MMT (oil) & 392.83 BCM (Gas) (1152.44 MMTOE O+OEG) in the domestic sector. The 2P/BE remaining producible oil & gas volume of the company stand at 74.69 MMT and 132.26 BCM respectively (189.95 MMTOE O+OEG).

5. Crude Oil Transportation

OIL operates a total network of 1243 km of Crude Oil Pipeline and 654.3 km of Product Pipeline. The Duliajan-Bongaigaon sector of NBPL (NahorkatiyaBarauni Pipeline) with a length of 557 km having 6.0 MMTPA capacity transports crude oil produced from oilfields in Upper Assam to the public sector refineries at Numaligarh, Guwahati and Bongaigaon. The 600 km pipeline segment between Bongaigaon and Barauni which has capacity of 2.3 MMTPA with Drag Reducing Agent (DRA) has been re-engineered to enable oil flow in either direction and is now transporting imported crude oil from Barauni to Bongaigaon. The 35.3 km pipeline segment between Duliajan and Digboi having 0.65 MMTPA capacity transports crude oil from Duliajan to Digboi Refinery. The NBPL runs through the states of Assam, West Bengal and Bihar traversing hostile terrain, dense forests and cuts across 78 rivers including the mighty river Brahmaputra. During the FY 2020-21 (till third quarter) OIL transported 4.46 MMT of crude oil with pipeline utilization of 66.17 % and 1.30 MMT of products with pipeline utilization of 100%."

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 VidyoutUtpadan Nigam Limited (RRVUNL).

OIL also produces Liquefied Petroleum Gas (LPG) in its plant at Duliajan, Assam.

6. 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 2020 has established Commercial nature Renewable Energy (RE) projects of 188.10 MW comprising of 174.10 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 & Assam.

7. Diversification

OIL has undertaken selective diversification of its portfolio, mainly by acquiring stakes in downstream business. OIL holds 26% stake in Numaligarh Refinery Limited, 10% stake in Brahmaputra Cracker and Polymer limited and 23% stake in DNPL (DuliajanNumaligarh Pipeline Limited).

OIL acquired 49% equity stake in 500 TPD Methanol and 200 TPD Formaldehyde project of Assam Petrochemical Limited.

OIL has also ventured into the arena of City Gas Distribution (CGD) in consortium with M/s HPCL. Based on the bids submitted under 8th round of CGD bidding, PNGRB issued letter for grant of authorization to the Consortium of HPCL & OIL for development of CGD network in the Geographical Area of Ambala-Kurukshetra and Kolhapur. A Joint Venture Company (JVC), namely HPOIL Gas Private Limited (HOGPL), has been incorporated and on field execution is in progress at both the GAs. The company has commissioned 10 numbers of CNG stations, 6 numbers in Ambala-Kurukshetra GA & 4 numbers in Kolhapur GA.

The Consortium of Assam Gas Company Ltd (AGCL), Oil India Ltd(OIL), and GAIL Gas Ltd(GAIL Gas) won the bids for development of CGD network in Kamrup&Kamrup Metropolitan Districts GA and Cachar, Hailakandi and Karimganj Districts GA under 9th round of CGD bidding. The participating interests of AGCL, OIL and GAIL Gas are 48%:26%:26% respectively. Letter for grant of authorization from PNGRB received in September, 2018. Joint Venture Agreement signed in July,2019. A Joint Venture Company (JVC), namely Purba Bharati Gas Private Limited (PBGPL), has been incorporated and on field execution has already been started at both the GAs.

8. Overseas Portfolios

OIL's overseas E & P portfolio is spread over 09 countries covering Libya, Gabon, Nigeria, Venezuela, USA, Mozambique, Bangladesh, Russia and Israel. The portfolio includes 5 (five) producing assets spread across Russia, USA & Venezuela, 2 (two) discovered and development assets in Mozambique and Nigeria and 5 (five) exploratory assets in Libya, Gabon, Bangladesh and Israel.

As on 31.03.2020, 2P oil & gas reserves position corresponding to OIL's stake in 6 overseas producing and discovered assets namely, License-61, Vankorneft&Taasyurah in Russia, Niobrara Shale Oil in USA, Carabobo in Venezuela and Rovuma Area1 in Mozambique stood at 56.8197 MMTOE. During 2019-20, production from overseas assets corresponding to OIL's Participating Interest was 2.176 MMTOE. During the current financial year for the period covering April–December 2020, OIL's share of cumulative production from overseas assets stood at 1.580 MMTOE.

The status of the major developments in the blocks is as under:-

8.1 Producing Assets

i. JSC Vankorneft, Russia (Rosneft: 50.1%, OIL/IOCL/ BPRL: 23.9%, OVL: 26%)

OIL along with Indian Consortium partners IOCL and BPRL has acquired 23.9% stake in JSC Vankorneft, Russia w.e.f 5th October 2016. The asset is held through an SPV Vankor India Pte. Ltd. incorporated jointly by wholly owned subsidiaries of OIL, IOCL and BPRL in Singapore. Vankorneft has two licenses Vankor and North Vankor. It is a giant producing oil & gas field located in Eastern Siberia. Vankorneft started commercial production since 2009 and all infrastructures are in place. As on 31.03.2020, the 2P reserve position corresponding to OIL's Participating Interest in this asset has been estimated at 15.35 MMT of oil and 6.05 BCM of gas. During 2019-20, OIL's share of production in asset stood at 1.54 MMTOE. During the current financial year for the period April–December 2020, OIL's share of production from this asset stood at 0.99 MMTOE.

ii. LLC Taas-YuryakhNeftegazodobycha (TYNGD): Russia (Rosneft: 50.1%, OIL / IOCL/ BPRL: 29.9%, British Petroleum: 20%)

OIL along with Indian Consortium partners IOCL and BPRL has acquired 29.9% stake in LLC Taas-YuryakhNeftegazodobycha (TYNGD), Russia w.e.f 5th October 2016. The asset is held through an SPV Taas India Pte. Ltd. incorporated jointly by wholly owned subsidiaries of OIL, IOCL and BPRL in Singapore. TYNGD holds two licenses Central Block &Kurungsky. It is one of the largest green fields located in Eastern Siberia. As on 31.03.2020, the 2P reserve position corresponding to OIL's participating interest in this asset has been estimated at 11.52 MMT of oil. During 2019-20, OIL's share of production in asset stood at 0.54 MMTOE. During the current financial year for the period April–December 2020, OIL's share of production from this asset stood at 0.55 MMTOE.

iii. Russia: License 61 [OIL-50% and PetroNeft Resources Limited-50% (Operator)]

OIL acquired 50% share in License 61, Russia (Area: 4991 sq km) on 3rd July 2014 from PetroNeft Resources Plc (PR). Till date, Lineynoye, West Lineynoye, Arbuzovskoye and Tungolskoye fields have been developed. Two wells are producing from Sibkrayevskoye field. As on 31.03.2020, OIL's share of 2P hydrocarbon reserve position in the asset is 6.27 MMT. During 2019-20, OIL's share of production in asset stood at 0.036 MMTOE. During the current financial year for the period April–December 2020, OIL's share of production from this asset stood at 0.026 MMTOE.

iv. USA: Liquid rich Shale Asset [Verdad Resources Acquisitions LLC-60%; OIL-20%, IOCL-10%, Haimo Oil & Gas LLC- 10%]

OIL acquired 20% 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. M/s Carrizo sold its entire stake of 60% in the Niobrara asset to Verdad Resources Acquisitions LLC ("Verdad") on 19th January, 2018. As a result, Verdad became the new operator of the asset. As on 31.03.2020, the 2P reserve position corresponding to OIL's participating interest in this asset has been estimated at 0.47 MMT of oil and 0.12 MMTOE of gas. During 2019-20, OIL's share of production in asset stood at 0.024 MMTOE. During the current financial year for the period April–December 2020, OIL's share of production from this asset stood at 0.019 MMTOE.

v. Venezuela: Project Carabobo [Corporation Venezuelan del Petroleo (CVP)-71%, INDOIL Netherland BV 7% (IOCL-3 .5%, OIL-3.5%), OVL-11%, Repsol YPF (Spain)- 11%]

The project is located in the northern central part of Venezuela in the world-famous Orinoco Heavy Oil Belt. The project involves production of heavy crude, setting up of upgrader and market for the upgraded crude for a period of 25 years with a possibility of 15 years' additional extension. The mixed company contract was signed on 12th May 2010 and the mixed company got incorporated as Petrocarabobo SA on 29th July 2010. As on date, 76 wells have been drilled in the block. The Project owns and operates 30 KBD crude treatment plant. Currently, the project activities are delayed due to economic & political crisis in Venezuela.

As on 31.03.2020, the 2P reserve position corresponding to OIL's Participating Interest in Project Carabobo has been estimated at 0.37 MMT. During 2019-20, OIL's share of production in asset stood at 0.027 MMTOE. Adverse geo-political situation (US sanctions) affected all operations during 2020-21. Production was highly restricted from 1st April to 17th November 2020 due to high inventory (lack of off-taker), and there was no production from 18th November 2020 to 31st December due to supply issues of adequate quality and quantity of diluent. During the current financial year for the period April–December 2020, OIL's share of production from this asset stood at 0.0035 MMTOE.

8.2 Development Assets

i. Mozambique: Rovuma Area1 (TOTAL (Operator - 26.5%), Mitsui - 20%, ENH - 15% (Carried), BPRL - 10%, BREML - 10%, OVL - 10%, PTTEP - 8.5%)

OIL along with OVL acquired 10% participating interest in Area 1 Mozambique through acquisition of 100% shares in Videocon Mozambique Rovuma 1 Limited [since renamed as Beas Rovuma Energy Mozambique Limited (BREML)- OVL 60%, OIL- 40%] on 7th January, 2014. OVL also acquired 10% participating interest in the project from Anadarko on 28th February, 2014.The project has recoverable resources ranging between 50-75 TCF with certified reserves (2P) of 31.90 TCF in Golfino - Atum and Prosperidade.

On 30th September 2019, TOTAL completed acquisition of 26.5% PI from Occidental (Oxy), post corporate acquisition of Anadarko Petroleum Corporation by Oxy, thereby becoming the Operator of Area 1 Block.

The joint venture partners of Area 1 Mozambique Project have announced Final Investment Decision for the two trains Golfinho / Atum Mozambique LNG Project on 18th June 2019. The onshore LNG development will initially be consisting of two LNG trains with total nameplate capacity of 12.88 million tonnes per annum. The joint venture has successfully secured 11.1 MTPA of long-term LNG sales with key LNG buyers in Asia and Europe including India. The first LNG production from the project is expected in 2023-24.

As on 31.03.2020, the 2P reserve position

corresponding to OIL's participating interest in this asset has been estimated at 0.46 MMTOE of oil/Condensate and 16.21 MMTOE of gas.

The Area 1 JV have achieved the Project Finance Phase 1 (Dry Close) on 15th July, 2020. The construction of Onshore Facilities (2 LNG Trains, LNG and Condensate Tanks, Near Shore Facilities, etc.) and Offshore Facilities are under progress.

ii. Nigeria: Block OML 142 (Formerly OPL 205) [OIL-17.5%, IOCL-17.5%, and Suntera Resources-35% in JV Suntera Nigeria 205 (70% interest in block), Summit Petroleum - 30% (Operator)

The Block OML-142 is located towards the east of Benin city in the Edo state of Northern Nigeria. The block lies towards the South-West of Anambra basin and falls within the Northern depositional belt of the Niger Delta Basin. The Block was originally awarded to Summit Oil International as OPL 205 (Oil Prospecting License) in September 1990 with an area of 2,094 sq. km. 1st Exploration Well (Otien #1) drilled during year 1991-92 resulted in Condensate discovery. OIL entered the project in 2006 through its acquisition of a 25% interest in a joint venture company, Suntera Nigeria 205 Limited, which owns a 40% participating interest and 30% economic interest in the block.

OPL 205 was converted to OML (Oil Mining License) in June 2009 for a period of 20 years, with an effective area of 1,295 sq. km. In 2013, 125 sq. km of full fold 3D seismic data were acquired covering Otien field (discovery area) and surrounding prospects. Processing and interpretation of 3D seismic data was completed in 2016. Based on interpreted results, re-entry operations were undertaken in the Otien #1 well (Discovery Well). Extended well testing (EWT), re-workover operations and well deliverability test have been carried out in the well. Up to 31st December 2020, 143,129 bbl of condensate has been produced from this well.

8.3 Exploratory Assets

i. Bangladesh: Blocks SS-04 and SS-09 [OIL-45%; OVL-45%; Bapex:10% (Carried)]

The OIL-OVL consortium was awarded the shallow offshore Blocks SS-04 and SS-09 in the Bangladesh Bid Round-2012. The total area of the two blocks is 14,295 sq. km with Block SS04 spread over 7,269 Sq km. and Block SS-09 spread over 7,026 sq. km. The Production Sharing Contracts for both blocks were signed on 17th February, 2014 in Dhaka, Bangladesh.

The location of one exploration well in Block SS04 has been released. Necessary civil works are being undertaken prior to spudding of well in the block. With respect to Block SS09, location of one exploratory well has been released. Activities in the Blocks got delayed due to Pandemic related restrictions. Initial Exploration Period (IEP) has been extended by two years upto 16.02.2023 for both the blocks.

ii. Libya: Area 95/96 ~4 Blocks [SIPEX (Operator)- 50%, IOCL-25%, OIL-25%]

The consortium has completed drilling of five wells against MWP of commitment of drilling 08 (Eight) wells. All the drilled wells struck oil and gas. Drilling of sixth well was in progress when the unrest began and all operations in Area-95/96 were suspended since May, 2014. The consortium signed an Interim Arrangement Agreement to continue in the block till May 2018. Further extension of the Interim Arrangement Agreement beyond May 2018 has been agreed upon by all parties concerned. The block is currently under Force Majeure due to hostile law and order situation in Libya.

iii. Gabon: Block Shakthi-II [OIL (Operator)-50%, IOCL-50%)

An oil discovery was made in the third well (Lassa-1). It was First discovery in Overseas as Operator of your company's. Two appraisal wells (Lassa-2 & 3) were

drilled as per the MWP of Phase-1 of New PSC (G4-245). The JV consortium has acquired 1213.04 LKM of new 2D seismic API in Phase-I to assess the prospectivity in the remaining part of the Block. Based on the integrated interpretation and prospect evaluations, the Consortium has entered into Phase -II exploration period of the PSC during which two wells are to be drilled as per MWP commitment. Environmental Impact Assessment (EIA) carried out and environmental clearance (EC) certificate received from government of Gabon, and Topography Survey Completed for the locations to be drilled. Tendering process for hiring of Rigs& other drilling related Services is in progress.

iv. Block 32, Israel (OIL: 25%; IOCL:25%; BPRL: 25%, ONGC Videsh Ltd: 25%-Operator)

OIL as part of a consortium of Indian Public Sector companies, viz., ONGC Videsh Ltd. (OVL), Bharat Petro Resources Ltd. (BPRL) and Indian Oil Corporation Limited (IOCL) was awarded an offshore exploratory Block - License 412/32. The license has been granted w.e.f 27th March 2018 and is valid till 26th March 2021.The Block with a total area of 357 sq km is located in Levant Basin, Mediterranean Sea, Israel towards south of Tamar Block. Reprocessing of raw seismic data and re-interpretation job has been completed within committed timeline. Partners have unanimously agreed to relinquish the Block in view of the absence of any economically exploitable prospectivity. The block is currently under relinquishment.

8.4. Pipeline

i. Sudan: Product Pipeline[OIL-10% PI and OVL-90% PI]

The Project involved construction of 12" X 741 Km long Cross country Multi Product Pipeline from Al-Rawyan to Port Sudan. The Pipeline has been built on Build, Operate, Lease and Transfer basis. The consortium engaged M/s Dodsal Pte Ltd. as EPC contractor for the project. Project was completed in record time of 15 months (Target was of 16 months). The pipeline got commissioned in 2005.

9.0 Financial Performance

Rs / Crores

Parameters	2019-20 (Actual)	2020-21	
		Target	Actual upto 30.09.2020
Plan Outlay	4,247.21	3,877.00	1,517.38
Total Income	13,648.71	NA	4,154.60
Net Profit / (Loss)	2,584.06	NA	(9.66)

10. Corporate Social Responsibility

Oil India Limited is a Responsible Corporate Citizen with full commitment to the principles of Corporate Social Responsibility (CSR), towards achieving the inclusive and holistic development of its areas of operation and the society as a whole. OIL's CSR & Sustainability Policy and its Social Vision "Oil India is Responsible Corporate Citizen deeply committed to the socio-economic development in its areas of operation,", have been the strong guiding force behind its CSR initiatives, all with the larger purpose of making a difference to the lives of the people and local communities in meaningful ways. As specified under Schedule VII of the Companies Act, 2013, the company has embarked upon various CSR projects under key thrust areas as follows:

a) 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 health camps.
- Health camps by NGOs.

b) Swachh Bharat Abhiyaan

- Swachh Iconic place initiative: Adoption of Kamkhya Temple for cleanliness, maintenance and

upkeep.

- Construction of School Toilets, Community Toilets and Individual Household Latrines in OIL's Operational areas and in Aspirational Districts (Dhubri & Goalpara in Assam and Namsai in Arunachal Pradesh).
- Supply of clean drinking water to rural pockets in OIL's operational areas and to schools in Aspirational Districts (Dhubri &Goalpara in Assam and Namsai in Arunachal Pradesh).
- Other activities include organizing seminars, walkathons, competitions and **Shramdaans** by OIL employee across OIL spheres under Swachh Bharat Pakhwada for awareness.

c) Education

- **OIL Super 30** project- 11 months free residential coaching for JEE and NEET with centres at Guwahati, Jorhat, Dibrugarh and Nagaon 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**- To 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 Divyangjans
- Assistance towards augmentation of educational infrastructure

d) Sustainable Livelihood Generation

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

e) Skill / Capacity Building

- Project **Swabalamban** on Skill/ Capacity Building Project under which placement linked skill training is provided to unemployed youth / women of OIL operational areasto enhance their employability.
- OILhas set up **Skill Development Institute, Guwahati** with support from other Oil & Gas PSUs to cater the skilling need of youth of North East region to enhance their employability in hydrocarbon and other sectors.

f) Projects on Women Empowerment

- **OIL Nursing School and Handicrafts Training and Production Centre** are being run by OIL for capacity building & empowerment of women in its operational area.

g) Environment and Sustainability

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

h) Promotion of Art, Culture and Heritage

- OIL conduct and sponsors projects for promotion and preservation of Art, Cultural & other Heritage and eco-tourism projects and Support to socio-cultural activities-Drama, theatre, Dance etc.

i) Development of Sports

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

j) Augmentation of Rural Infrastructure

- Construction of Roads & bridges

- Construction of community halls and waiting sheds etc.

k) Relief & Rehabilitation

- Contribution of Rs. 25.00 Crores is made towards Prime Minister Citizen Assistance and Relief in Emergency Situation (PM-CARES) Fund in Financial Year 2020-21, contribution of Rs. 13.00 Crores was made in FY 2019-20 in order to strengthen India's fight against COVID 19.

11. List of Awards and Accolades for the year 2020 by OIL (Till December 2020) :

1. Oil India Limited (OIL) won the coveted Federation of Indian Petroleum Industry (FIPI) Award 2020 in the category Exploration & Production-Company of the Year and Excellence in Human Resource Management in a award ceremony held at New Delhi, on 27th Jan, 2021. The awards were presented by Shri Dharmendra Pradhan, Hon'ble Minister of Petroleum and Natural Gas and Steel and Shri Tarun Kapoor, Secretary, MoP&NG.

2. 7th Annual CSR INDIA 2020 Award was presented to Oil India Limited in recognition of outstanding CSR practices and achievements. Award presented virtually on 1st October 2020 in the presence of Hon'ble Shri Dipak Misra, Former Chief Justice of India.

3. Oil India Limited (OIL) was conferred with the Apex India Foundation Award, 2019 "Platinum Award" under Livelihood Creation for project OIL Jeevika and "Gold Award" under Woman Empowerment for Project OIL Arogya in Petroleum Exploration Sector.

4. Oil India Limited (OIL) bagged Mahatma Award 2020 for CSR excellence for its Corporate Social Responsibility (CSR) initiatives in an award ceremony held on 30th January 2021 in New Delhi.

5. Oil India Limited (OIL) was conferred with the CSR Times Award 2020 as the Best PSU for its Corporate Social Responsibility (CSR) projects OIL SWABALAMBAN on Skill Development and OIL DIKHYA on Education at the 7th National CSR E-Summit in a virtual summit & awards ceremony held on 10th December 2020.

6. Oil India Limited (OIL) won prestigious Grow Care Safety Award 2020 (Gold Award) for

- Outstanding achievement in Safety Management in Petroleum Storage and Transportation Sector.
- Outstanding achievement in Environment Management in Petroleum Exploration Sector.

7. OIL's HSE department won "Greenentech Safety Award 2020" award for outstanding achievements in "Industry Sector Safety Excellence "category.

8. Oil India Limited has bagged the prestigious 'National Awards of Excellence in PSU' in the category of 'Reskilling of Employees (Training & Development)' on 14th October 2020.

14.2.2 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 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 & Urban Development

Since its foray in infrastructure sector, EIL has secured several noteworthy and significant assignments related to modernization/ development of international airports, intelligent buildings and water management.

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 has a joint venture company, Ramagundam Fertilisers and Chemicals Limited, with National Fertilizer Limited (NFL) and Fertilizer Corporation of India (FCIL) for setting up a new Urea and Ammonia plant at Ramagundam, Telengana.

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 selection
- 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 was2835 as on 31.12.2020.

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.

A. PERFORMANCE HIGHLIGHTS of 2020-21 (up to December, 2020)

A.1 Business Secured

During the current financial year (up to December, 2020), EIL secured new business worth Rs 863.57 crores.

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

Domestic Jobs

- Engineering, Procurement and Construction Management (EPCM) Consultancy Services for 500 KTA PDH-PP Project at Usar, Maharashtra for GAIL
- EPCM Services for Coker- B Revamp Capacity Expansion at Barauni Refinery for IOCL
- PMC / EPCM Services for Part-B (Nagpur-Jharsuguda & NTPC Korba Spur Section) of Mumbai-Nagpur-Jharsuguda Pipeline (MNJPL) for GAIL
- Project Management Consultancy (PMC) Services for Dhamra-Haldia Pipeline Project for GAIL
- Provision of manpower to assist the Engineer with Contract Packages of Mumbai-Ahmedabad High Speed Rail Project for NHSRCL
- Detailed Engineering Consultancy and Construction Supervision for Setting Up Nuclear Fuel Complex (Variation Order) in Rajasthan for Department Of Atomic Energy
- Supply of License, Basic Engineering Design Package, Catalyst and Other related services for Sulphur Recovery Unit for Numaligarh Refinery Expansion Project, NRL Assam
- Owner's Engineer Services for 6.0 MMTPA Mechanized Production and Evacuation Facilities at Kurmitar Iron Ore Mines for OMC, Odisha
- Coker block of Resid Upgradation project (Variation Order) for CPCL, Chennai
- Project Management Consultant for Construction of New Domestic Terminal Building and associated works at Leh Airport, J&K (Variation Order) for Airports Authority of India
- Know-How, Basic Design Engineering Package (BDEP) and Detailed Engineering of Coke Drum & Heater for Revamp of Coker - B Unit at Barauni Refinery (Phase-II) (Variation Order) for IOCL
- Project Management Consultancy Services for the development of Effluent Treatment and Infrastructure Facility at Jhagadia Pumping Station for NCT, Bharuch
- Licensor Selection, Preparation of Detailed Feasibility Report and Review of Licensor's BDEP for Poly-Propylene Unit of Numaligarh Refinery Expansion Project, NRL, Assam
- EPCM Services for Western Gateway Project Early Production facilities (Variation Order) for WCPL
- Consultancy Services for Techno-Commercial Feasibility Study of "Naphtha Cracker Expansion Phase-II and New Ethylene / Propylene Derivative Project" for IOCL, Panipat Refinery
- Adequacy Studies of ETP-1 & ETP-2 for IOCL's Haldia and Panipat Refineries
- Troubleshooting of DCU heater short run length for IOCL, Digboi Refinery
- Study of Current Hydrotreatment Facilities for BS-VI Quality Fuel Production for Nayara Energy Limited in Gujarat

Overseas Jobs

- Project Management Consultancy Services for "Installation of ERL Unit-2" (Variation Order) for Bangladesh Petroleum, Bangladesh
- 650,000 BPSD Refinery and 600,000 TPA Polypropylene Plant at Lekki Free Trade Zone, Nigeria (Variation Order-12) for Dangote Refinery, Nigeria
- Zirku Island Facilities Studies / Engineering Packages under ESA for ADNOC Offshore, UAE
- AL NASR Super Complex and Field Plant

Modification Request and Engineering work (under ESA) for ADNOC Offshore, UAE

A.2 Financial Performance

The turnover and profit before tax of the company for FY 2020-21 (up to December 2020) was Rs 1988 crore and Rs 307 crore, respectively.

A.3 Policy Initiatives Undertaken (up to December, 2020)

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:

- Work Life Balance and Leadership Development Initiatives designed/ organised specifically for women to bring inclusivity at the work place
- Leadership development program – AAROHAN organized which is aimed at building best in class leaders, across levels (business leaders, functional leaders & young leaders)
- Continuous upgradation of HR Software for seamless integration with special focus on Finance & Accounts system by leveraging the use of Information Technology in Human Resource
- Revisit & Review of HR policies to bring in better Work life Balance and Employee Engagement
- HR Audit conducted to build robust systems and processes.
- Creation of a Learning Culture through regular Knowledge Sharing Sessions
- Recognition of employees by presentation of Awards during Annual Award Ceremony.
- Extensive efforts were undertaken during Covid-19 pandemic to ensure employee welfare and smooth functioning of operations. Various provisions of existing policies were reviewed and new provisions were created to enable work from home and enhanced safety regulations were put in place for resuming work from office.

(ii) Technology & Sustainable Development

Technology development projects initiated:

- Process development and Basic Design and Engineering Package for an Efficient and Cost Effective Commercial Scale Amine Purification Process and Offering it to Customer
- Development of technology for conversion of Methanol to Di-methyl Ether through dehydration route
- Process Development for Divided wall column technology
- Hydrogen production from photosis/ Photocatalytic water splitting
- Development of process scheme for reference fuel CHT
- Development of a Novel process for recovering Anhydrous ammonia from refinery sour gases with experimental data based simulation modeling.

Technology commercialization efforts made up to December 2020

- Start up and successful commissioning of SRU (1 x 19.3 TPD) at NRL
- Design and preparation of BEDP for Sulphur Recovery Unit (SRU) & EngDEGAS at NRL as part of Numaligarh refinery expansion project (NREP) (2 x 240 TPD)
- Design and preparation of BEDP for Tail Gas Treating Unit at NRL as part of NREP (NREP) (1 x 480 TPD)
- Preparation of Technical proposal for feasibility study of SRU configuration

to improve reliability for IOCL, Guwahati refinery

- Base line energy audit of six petrochemical plants and submission of report to BEE
- Development of process scheme for reference fuel CHT
- Preparation of BDEP for implementation of DWC in NSU of MRPL
- Technical Proposal for performance improvement of Desalter systems submitted to IOCL JR & BPCL-KR

R&D activities likely to be initiated in the remaining three months of FY2020-21

- Development of process for reducing overall SO2 emission from the Sulphur recovery unit
- Setting up of in-house bench scale and pilot scale units of catalyst testing facility.
- Development of Effluent Treatment Process based on Hydrodynamic Cavitation Technology

Initiatives taken for strengthening technology tie ups

i) Renewal of memberships for FY2020-21 for:

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

ii) MOU between IIT Bombay and PSU Oil companies for Centre of Excellence in Oil, Gas and Energy operationalized.

Patents filed / granted up to December 2020

i) The following Patents filed earlier were granted this year:

- An improved water cooled flat plate type distributor with integrated fines capturing system for fluidized bed coal gasifier
- An Apparatus and a process for low pressure Hydrogen Sulphide Absorption
- Process and apparatus for enhancing recovery of liquefied petroleum gas (LPG) from natural gas at lower condenser duty
- Low pressure system and process for recovering anhydrous ammonia from sour gas

ii) The following new patents have been filed till December, 2020:

- • Water conditioning device and method by virtue of hydrodynamic cavitations in presence of magnetic field
- Novel arrangement for burner air distribution duct in VC Heaters to take care of thermal expansion
- Coke drum with optimum combination of vertical and horizontal plate arrangement
- An apparatus and process for production of specialty gasoline fuels
- A structure for supporting a large stack (chimney) on a small vertical cylindrical Fired heater
- A vertical tube box type heater with twin convection section
- Decoupled twin cell arrangement for Delayed coker heaters for longer run length And improved turn-down capability
- A visibly leak tight fired heater Explosion door arrangement

- Single fired multiple pass vertical cylindrical heater configuration for low pressure drop application
- Air pre-heater system with separate cast and glass modules for increased availability of heat recovery

iii) One additional patent is likely to be filed by March, 2021

14.3 MINIRATNA CATEGORY - CPSE

14.3.1 Balmer Lawrie & Co. Limited (BL)

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 authorized and paid up capital of the Company were Rs. 300 crores and Rs. 171 crores respectively as on 31st March, 2020.Balmer Lawrie Investments Ltd., a Government Company holds 10,56,79,350 equity shares of Rs. 10 each (totaling to about 61.80% of paid-up equity capital) of the Company. The Company achieved Net Turnover of Rs. 1612.16 crores during 2019-20 as against Rs.1853.75 Crores in 2018-19, registering a decrease of approximately 13% over the previous year. The Profit before Tax of Rs. 232.44 Crores in 2019-20 as against Rs.280.10 Crores in 2018-19, the decrease is primarily attributable to the impact of onset of COVID-19 pandemic in the last quarter of the financial year on the performance of various SBUs, particularly SBU Logistics and Ticketing.

14.3.2 Chennai Petroleum Corporation Limited (CPCL) Refineries

Chennai Petroleum Corporation Limited (CPCL) Refineries

(i) Manali Refinery (Tamilnadu)

Chennai Petroleum Corporation Limited (CPCL), formerly known as Madras Refineries Limited (MRL) was formed as a joint venture in 1965 has become a subsidiary of IOCL in 2001 and the shareholding details are given subsequently. CPCL's Manali Refinery is one of the most complex refineries in India with Fuel, Lube, Wax and Petrochemical feedstock's production facilities. Sea Water Desalination plant of 5.8 MGD Project to augment the water requirements of its refinery was first of its kind and the power requirement for this plant met through the windmill farm, again first of its kind in the industry.

CPCL has a Wax Plant of 30,000 metric tons (MT) 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 MT per annum to supply petrochemical feedstock to neighboring downstream industries. The unit was revamped to enhance the propylene production capacity to 30,000 MT 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, Petrochemical feed stocks and Petroleum Coke. CPCL also supplies Linear Alkyl Benzene Feedstock (LABFS) to a downstream unit for manufacture of Linear Alkyl Benzene.

The present crude refining capacity is 10.5 MMTPA & the refining capacity utilisation was 96.5% in 2019-20.

(ii) Cauvery Basin Refinery (Nagapattinam-Tamil Nadu)

CPCL's second refinery, at Nagapattinam was commissioned in 1993 with a refining capacity of 1.0 MMTPA.This Refinery is not in operation since April 2019, as the Refinery cannot produce BS IV specification fuel products. It is planned to construct a new, state of the art, 9 MMTPA Refinery in place of the 1.0 MMTPA obsolete refinery.

The combined Refining Capacity has come down from 11.5 MMTPA to 10.5 MMTPA since April 2019 as the CBR refinery of

capacity 1 MMTPA is not in operation since then.

2. Shareholding pattern:

CPCL's SHAREHOLDING PATTERN AS ON 31.12.2020

DESCRIPTION	% SHARES
Indian Oil Corporation Limited	51.89
Naftiran Inter-trade Co. Ltd.	15.40
Public (including Employees)	18.77
NBFC	0.00
Bodies Corporate	1.05
Banks	0.00
Mutual Funds and UTI	4.91
Foreign Institutional Investors	0.00
Qualified Institutional Buyer	4.54
IEPF	0.34
Non-Resident Indians/OCBs/Foreign Portfolio-Corp/Non-Resident Indians (Non Repatriable)/Foreign Nationals	3.09
Total	**100.00**

3. Details of Backlog Vacancies in respect of SC, ST, OBC, PWD in PSUs/Organizations under this Ministry as on 31st December, 2020:

	Group A				Group B				Group C				Group D			
	SC	ST	OBC	PWD	SC	ST	OBC	PWD	SC	ST	OBC	PWD	SC	ST	OBC	PWD
CPCL	Nil	Nil	Nil	Nil	Nil	1$	Nil	1	3	Nil	7#	6	Nil	Nil	Nil	Nil

$ - Also reserved for PwBD

- Out of 7, 2 posts are reserved for PwBD

4. Women Employees

The number of women employees' vis-à-vis total number of employees as on 31st December, 2020 in CPCL is tabulated as below:

Total no of Employees	Total no of Women Employees
1603	86

5. Performance data

i) Physical Performance

The company processed 10161 Thousand Metric Tonnes (TMT) of crude oil in the year 2019-20 and processed 5604 TMT of crude oil for the period April to December, 2020.

CPCL achieved Total Distillates of 76.8% in 2020-21 (Up to December, 2020). The MBN during the period is 89.9

Parameter	2019-20 Actuals	2020-21 (Up to Dec '20)
Crude Throughput (MMT)	10.161	5.604
Distillate Yield (%)	77.6	76.8

ii) Financial Performance

During the FY 2019-20, CPCL achieved a turnover of Rs 48624 Cr. For the current FY 2020-21, the turnover up-to December 2020 is Rs. 27122 Cr. The details of financial performance are given below:

Rs.in Cr

Parameter	2020-21 (up to Dec 20)	2019-20 Actuals
Turnover	27122	48624
Profit Before Tax	943.59	-3016
Profit After Tax	5.77	-2078

iii) Projects

a) Major Projects completed:

Auto Fuel BS VI project - DHDT Revamp:

To produce 100% BS VI quality Diesel, the existing DHDT unit was revamped and the capacity was also enhanced from 1.8 MMTPA capacity to 2.4 MMTPA. The revamped unit was commissioned on 22nd November, 2019.

b) Major Projects under implementation:

Auto Fuel Quality Up gradation (BS–VI) Project:

(i) Gasoline Desulphurization unit (GDS):

A new FCC Gasoline Desulphurization unit of 0.6 MMTPA capacity and other associated facilities are being installed to meet BS-VI quality norms for MS. The mechanical completion is achieved on August 2020.

(ii)) Re-Gasified Liquefied Natural Gas (RLNG):

Usage of RLNG as Feed & Fuel in Hydrogen Reformers in place of Naphtha, as Fuel in place of Naphtha in Gas Turbines and as fuel in Process Heaters and Utilities Boilers in place of Fuel Oil, is under implementation at an estimated cost of Rs.421 Cr.

Implementation of RLNG usage in one HGU (Plant 214), Process Heaters, ALL GTs and four out of six Boilers has been completed. Remaining facilities will be completed by II quarter of 2021-22 in a phased manner.

c) Future Projects

Refinery Expansion Project at CBR: CPCL is planning for a new 9 MMTPA Refinery cum Petrochemical complex at CBR. Detailed Feasibility Report has been prepared. Investment approval for 9MMTPA CBR refinery has been accorded in the 337th CPCL Board meeting dated 03.06.2020. The estimated cost of the project is Rs. 28983 Cr. ± 10% and the anticipated completion is by 2023 - 24. The Project proposal is under consideration by Indian oil corporation Ltd Board for approval. Environmental Clearance is granted by MoEF &CC on 13.10.2020.

6. 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 focus on health, education, women empowerment, Swatch Bharat activities, infrastructure development, etc., for ensuring sustainable development of the society to which it belongs. CPCL has spent Rs .16.72 Cr. during 2019-20 for various CSR initiatives. During 2020-21, CPCL has spent an amount of Rs 3.72 Cr. towards various CSR activities upto December, 2020.CPCL actively engages itself for development of two aspirational districts namely Virudhunagar and Ramanathapuram through CSR activities. CPCL has CER Budget of Rs.3.67 Cr. for the year 2020-21 and focused on the areas of Education & Skill Development and Health.

14.3.3 Mangalore Refinery and Petrochemicals Limited (MRPL)

a. A brief of the Company:

- Mangalore Refinery and Petrochemicals Limited (MRPL) is a "Schedule –A" CPSE and a subsidiary of Oil and Natural Gas Corporation Limited (ONGC).
- The Refinery has a versatile design with high flexibility to process Crude with 24 to 46 API gravity and has high degree of Automation. The Refinery including the Aromatic Complex has a Nelson Complexity number of 10.63. The present capacity of the Refinery is 15 MMTPA.
- Products of MRPL are mainly sold in the domestic market to the PSU Oil Marketing Companies (OMC's) and balance products are exported. MRPL has a small but increasing Retail presence currently.

b. Performance:

- A Gross Crude throughput of 13.95 MMT was achieved in FY 2019-20. The Company earned Rs. 51002 Cr(Net) from Revenue from Operations and posted a PAT of minus Rs. 2708 Cr which was contributed significantly by Inventory loss and ERV loss. The occurrence and spread of Coronavirus disease across the world impacted the Global and Indian Economy since Jan 2020. Shrinkage in product cracks have been observed post Dec 2019. This had a cumulative effect on the financials.
- In the present year FY 20-21, Refinery Operations have been severely affected by COVID pandemic. There has been demand destruction. The impact has been both on the Capacity Utilization and the Financials. For the first 9 months ended 31st Dec 2020 the Capacity Utilization was only 65% and the Revenue from Operations(Net) and PAT were Rs. 18606 Cr and minus Rs. 555 Cr respectively.

c. Projects:

- BS-VI Project- MRPL commenced production of BS-VI grade MS/HSD in Sep 2019. The company has been selling the BS-VI grade since then. In order to maximize the production of BS-VI grade MS, an additional Unit (FCC Gasoline Treatment Unit) is being installed and is in the pre-commissioning stage. The unit is expected to be commissioned by the end of Mar 2021.
- To mitigate the risk of dependence on River Water a Desalination Plant is being set up which is in an advanced stage of Mechanical Completion. The plant is expected to be completed by Mar 2021.
- MRPL is in the process of setting up a 60KLPD 2G Ethanol plant. Presently the DFR is being carried out.

d. Integration of RLNG for Refinery Operations:

- MRPL has set up the systems to take gas from the GAIL pipeline and has entered into necessary agreement with GAIL for Gas Transmission in May 2020. Gas is expected to be taken into the refinery by mid-February 2021, as soon as GAIL commissions the spur line to MRPL.

e. Marketing

- Products of MRPL are mainly sold in the domestic market to the PSU Oil Marketing Companies (OMC's) and balance products are exported. MRPL has a small but increasing Retail presence currently. MRPL expects to expand its retail presence by adding 50 new retail outlets every year for the next 5 years in the states of Karnataka, Kerala and Goa. MRPL retail presence will be further expanded to Tamil Nadu, Andhra Pradesh and Telangana in the long term.

  MRPL continues to maintain major share of the direct sales segment of petroleum products market in Karnataka. The Company maintained leadership position in its marketing zone for all direct sales products such as Bitumen, Diesel, Sulphur, Petcoke, ATF, Polypropylene, Xylol (Xylenes) etc. MRPL has been continually enhancing market share for Polypropylene with introduction of new and niche grades. It expanded its grade basket by stabilizing PP Yarn Grade (35 MI) which is used in medical applications in manufacturing of masks &PPE . The company supported the nation in its fight against COVID pandemic

by maximizing the production and sale of PP Yarn Grade (35 MI).

f. Subsidiaries and Joint Ventures

MRPL has one subsidiary in ONGC Mangalore Petrochemicals Limited which produces Paraxylene and Benzene. The Company has a joint venture in SHELL MRPL Aviation Fuel Services Limited which has presence in 12 Airports for supply of ATF.

14.3.4 Numaligarh Refinery Limited (NRL)

A. 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 petroleum refinery at Numaligarh in Golaghat district of Assam. NRL is a Category-I Miniratna PSU. NRL's commercial operations commenced from 1st October, 2000. Present shareholding pattern of NRL is BPCL – 61.65%, Oil India Limited (OIL) – 26%, Govt. of Assam (GoA) – 12.35%.
- Product slate of NRL comprises LPG, Naphtha, Motor Spirit, Aviation Turbine Fuel, High Speed Diesel, Superior Kerosene Oil, Paraffin Wax, Raw/ Calcined Petroleum Coke and Sulphur. NRL has the largest Wax producing unit in the country. Post commissioning of the DHDT plant in January 2018, NRL is now producing HSD of BS-VI grade.
- NRL has an LPG Bottling Plant at Numaligarh (capacity 42 TMTPA) besides two marketing terminals at Numaligarh and Siliguri. White Oil products, viz. MS, SKO and HSD are transported from Numaligarh to Siliguri through the Numaligarh-Siliguri product pipeline (NSPL) of Oil India Limited.
- NRL is certified under ISO 9001 for Quality Management, ISO 14001 for Environment Management, OHSAS 18001 for Occupational Health & Safety, ISO 27001 for Information Security Management System and ISO 50001 for Energy Management.

B. Performance Highlights

Physical and financial performance of NRL during last five years is as follows:

i. Physical Performance:

Parameter	2016-17	2017-18	2018-19	2019-20	2020-21 Apr-Dec
Crude Receipt (TMT)	2,751	2,849	2,820	2,409	1,945
Crude Throughput (TMT)	2,683	2,809	2,900	2,383	1,991
Capacity Utilisation (%)	89.44	93.63	96.67	79.00	88.49
Distillate Yield (%) (CHT method)	86.49	86.68	87.1	83.0	85.8
Specific Energy Consumption (MBN)	72.3	64.9	66.6	65.0	65.43
Energy Intensity Index	95.2	88.3	87.9	86.3	89.06

NRL's capacity utilization is primarily dependent on availability of domestic crude oil in the North East region. Due to inadequate availability of crude oil, NRL has so far not been able to operate its refinery at 100% capacity.

NRL's Distillate Yield and Specific Energy Consumption (SEC) performance over the past few years has been among the best in PSU refineries.

ii. Financial Performance:

Parameter	2016-17	2017-18	2018-19	2019-20
Sales Turnover (Rs./Crs)	13,945	15,922	18,511	14,072
Profit Before Tax (Rs./Crs)	3,148	3,142	3,052	1,735
Profit After Tax (Rs./Crs)	2,101	2,045	1,968	1,381
Net worth (Rs. Crs)	5,181	5,044	5,551	5,240
GRM ($/bbl)*	8.50	11.43	11.80	7.99

*Above GRM is excluding excise duty benefit applicable for North East refineries.

NRL's GRM in 2019-20 at $7.99 per barrel is amongst the highest in the industry.

Since commissioning of the refinery in 2000-01, NRL's net worth has increased more than five-fold from Rs. 840 crores to Rs. 5,240 crores in 2019-20.

iii. MoU Performance:

NRL's excellent performance in both physical and financial front has also reflected in its MoU ratings. The Company has achieved 'Excellent' MoU rating in every year since signing of the first annual performance MoU in 2003-04.

iv. Refinery Benchmarking Study

Centre for High Technology (CHT) has been carrying out a benchmarking study of Indian / Asia-Pacific refineries since 2010 through M/s Solomon Associates, a leading international management consulting firm specializing in performance improvement benchmarking.

There is a marked improvement in the refinery's efficiency in 2016 study compared to the study carried out in 2010. Out of the five key areas of Net Cash Margin (NCM), Operational Availability (OA), Process Utilisation (PU), Energy Intensity Index (EII) and Volumetric Expansion Index (VEI); NRL's performance is in the first quartile against two key parameters in two consecutive study years (2014 and 2016). The parameters in first quartile are NCM and VEI which signifies top performance level of NRL among peers in the Asia / Pacific region. It may be noted that NRL is the only refinery among 15 PSU refineries under the purview of this study which has achieved first quartile performance in two out of five key areas.

In the 2018 study report published by Solomon, NRL has improved its Energy Intensity Index (EII) to 85 which is acknowledged by Solomon as significant improvement over five biennial study cycles starting with EII of 116 in 2010. It is worthwhile to mention that worldwide, the average refinery improves energy efficiency by one EII point per year.

C. Contribution to Exchequer:

Since commencement of commercial operation of the refinery, NRL has made a total contribution of Rs. 31,004 crores, out of which contribution to Central Exchequer was Rs. 24,690 crores and State Exchequer was Rs. 6,314 crores. Break-up of contribution to exchequer during the last five years is as follows:

Contribution to Exchequer	15-16	16-17	17-18	18-19	19-20	20-21 Apr-Dec
Central Exchequer (Rs./Crs)	2,758	3,747	4,212	3,751	2,971	3,816
State Exchequers (Rs./Crs)	327	606	459	405	389	306
Total (Rs./Crs)	**3,085**	**4,353**	**4,672**	**4,155**	**3,360**	**4,122**

D. Capital Expenditure:

Over the years since commissioning of the refinery, NRL has made total capital expenditure of Rs. 4,066 crores on strategic projects and additional facility requirements in the refinery. Break-up of capital expenditure during the last five years is as follows:

Parameter	15-16	16-17	17-18	18-19	19-20	20-21 Apr-Dec
Capital expenditure (Rs.Crs)	239	503	419	418	529	624

E. International Operations:

F. Product export:

- NRL exports High Speed Diesel (HSD) and Paraffin Wax. HSD is primarily exported to geographically contiguous countries of Bangladesh, Myanmar and Bhutan. Paraffin Wax is exported to many countries across the globe.
- NRL has signed a Sale-Purchase agreement with Bangladesh Petroleum Corporation Limited for supply of 1 million tons of HSD annually. Towards this, NRL is constructing a product pipeline (India-Bangladesh Freindship Pipeline) from Siliguri (India) to Parbatipur (Bangladesh) to ensure continuous and uninterrupted product export. This project is a strategic initiative of the Govt. of India to strengthen ties with neighboring Bangladesh and as such has provided a 'grant-in-aid' of Rs. 285 crores for Bangladesh portion of the pipeline.
- NRL is also exploring neighboring Myanmar as a potential export market for HSD. The northern Myanmar region is only about 400 kilometer away by road from Numaligarh Refinery and hence gives a competitive advantage vis-à-vis suppliers from southern port city of Yangon. Towards this, NRL has sent few trial export consignments by road in 2018-19 and 2019-20.
- Details of HSD export by NRL in the last five years are as below:

Product: HSD	15-16	16-17	17-18	18-19	19-20	20-21 Apr-Dec
Quantity (TMT)	2.28	2.29	25.22	79.77	40.76	29.62
Value (Million USD)	0.87	1.15	14.46	52.16	23.02	11.50

Details of Paraffin Wax export by NRL in the last five years are as below:

Product: P. Wax	15-16	16-17	17-18	18-19	19-20	20-21 Q1
Quantity (TMT)	0.01	3.02	2.94	1.77	0.53	0.02
Value (Million USD)	0.02	2.90	3.01	2.16	0.51	0.02

Some of the countries where NRL had recently exported wax are – Bangladesh, Saudi Arabia, Ethiopia, Venezuela, Kenya etc.

G. International Project "India – Bangladesh Freindship Pipeline (IBFPL)":

NRL is constructing a 130 km long and 1 MMTPA capacity product pipeline from Siliguri in West Bengal to Parbatipur in Bangladesh. The total project cost for construction of the Indo-Bangla Friendship Pipeline from (IBFPL) from Siliguri to Parbatipur (Bangladesh) is Rs. 346.06 crores. Out of the above, NRL's investment in the project will be Rs. 60.80 crores for the India portion of the pipeline. The remaining amount of Rs. 285.24 crores for Bangladesh portion shall be funded by Govt. of India as grant-in-aid. Scheduled progress as on 30.06.20 is 31.8%. The project is targeted to be completed by September, 2021.

H. Major Projects:

I. Ongoing Projects:

Refinery Expansion from 3 to 9 MMTPA:

- The Cabinet Committee on Economic Affairs (CCEA) of the Government of India has accorded investment approval for NRL's 3 to 9 MMTPA expansion project on 16.01.2019. The approved cost of the project is Rs. 22,594 crores. Govt. of India has also approved an amount of Rs. 1,020 crores as capital subsidy for the project. The integrated refinery expansion project has three components –

  (i) Setting up a new 6 MMTPA refinery at Numaligarh, Golaghat, Assam;

  (ii) Construction of Paradip-Numaligarh Crude Oil pipeline of 1398 km in length and 9 MMTPA capacity;

  (iii) Numaligarh-Siliguri Product Pipeline of 654 km in length and 6 MMTPA capacity

- NRL has recently been accorded the Environmental clearance from the Ministry of Environment, Forest & Climate Change for the Refinery Expansion Project on 27th July 2020. M/s SBI Capital Markets Limited, Mumbai has been appointed for Debt syndication of Rs. 15,102 Crore for Refinery Expansion Project.

- Moreover, Licensor selection process for SRU, DHDT, GDS& MSU have been completed. & PMO consultancy job has been awarded.

J. JV investment:

K. Bio-refinery Project (JV investment):

- NRL, in collaboration with two other foreign investors, have formed the Joint Venture Company - "Assam Bio-refinery Private Limited (ABRPL)' which will set up a second generation bio-refinery at Numaligarh, Assam to produce ethanol from non-food grade feed stock bamboo. The shareholding pattern of the JV Company is NRL 50% and remaining 50% between Fortum BV3 and Chempolis Oy of Finland.

- The capacity of the proposed plant is 6 crore litres of ethanol per annum using 5 lakh tons of bamboo as feedstock, which will be blended into petrol. The bio refinery project aims to reduce greenhouse gas emissions, reduce crude oil import dependency and achieve forex savings, provide remunerative income to farmers, and create employment opportunities by way of engagement of local population in the region. It is envisaged that Ethanol will substitute petrol to the same extent and thereby reduce import of crude required for production of petrol in the country.

- The construction activity at the site was stopped during lockdown from March 25 to April 20. Construction at the site has again started since April 21 following all necessary guidelines by the Ministry of Home Affairs (MHA) and the State authorities. Currently, around 450 workers are engaged at the construction site and all necessary arrangements are being done to bring project back to its schedule.

- The project has received sanction of Rs 150 crore from the Central government under viability gap funding.

L. North East Gas Grid (JV investment) :

A Gas Grid connecting all State capitals in the North Eastern region is being constructed to supply PNG and CNG in the region. A trunk gas pipeline from Barauni to Guwahati will connect NE Gas Grid to the National Gas Grid. A JV Company has been incorporated as "Indradhanush Gas Grid Limited" with equal equity participation from IOCL, GAIL, ONGC, OIL and NRL. NRL's refinery expansion has been considered as an anchor customer, constituting around 50% of the total throughput of the pipeline grid. The Cabinet Committee of Economic Affairs (CCEA) of the Government of India, in January 2020, has approved the project for implementation at a cost of INR 9,265 crores out of which 60% granted as Viability Gap Funding (VGF). A total of 1,656 km of gas pipeline will be laid as part of the project. The project is being implemented in three phases:

Phase –I: Sections with plain agricultural terrain and no EC requirement

(Guwahati, Numaligarh, Itanagar, Dergaon /Jorhat, Dimapur)

Phase-II: Section in hilly terrain and having requirement of EC (Shillong, Silchar, Panisagar, Banaskandi, Agartala, Aizawl)

Phase-III: Sections in hilly terrain, requirement of EC and feasibility of laying pipeline linked to highway width widening (Dimapur, Kohima, Imphal)

The project is scheduled to be completed by 2023.

14.3.5 ONGC Videsh Ltd. (OVL)

ONGC Videsh Ltd., is a wholly owned subsidiary and overseas arm of Oil and Natural Gas Corporation Limited (ONGC), the flagship national oil company of India. The primary business of the company is to prospect for oil and gas acreages abroad, which includes acquisition of oil and gas fields in foreign countries as well as exploration, production, transportation and sale of oil and gas. ONGC Videsh produced about 30.3% of oil and 23.6% of oil and natural gas of India's domestic production in FY'20. ONGC Videsh holds 586.907 MMTOE of 2P Reserves spread across the globe.

In terms of reserves and production, ONGC Videsh is the second largest petroleum company of India, next only to its parent ONGC.

ONGC Videsh operates in highly competitive international oil and gas sector by competing with the best in the industry. Over the years, ONGC Videsh has built inherent capabilities and expertise in its areas of operations. ONGC Videsh has developed strong partnership alliance with a host of IOCs and NOCs including ExxonMobil, British Petroleum, Shell, ENI, Total, Repsol, Equinor, MOL, Petrobras, Sodeco, AzACG, Rosneft, ADNOC, Posco International, Kazmunaigaz (KMG), Petro Vietnam, CNPC, Sinopec, PDVSA, Petronas and Ecopetrol.

ONGC Videsh has highly skilled human resource with excellent technical and management capabilities. The company has built facilities for evaluation, interpretation, economic modeling, FEED, design and execution of oil and gas projects and enjoys the technical and human resource support from ONGC. ONGC Videsh has developed core expertise in due diligence, techno-commercial evaluations, bid negotiations and transaction documentations.

Presently, ONGC Videsh has stake in 37 oil and gas projects in 17 Countries, viz. Azerbaijan (2 projects), Bangladesh (2 Projects), Brazil (2 projects), Colombia (7 projects), Iran (1 project), Iraq (1 project), Israel (1 project), Kazakhstan (1 project), Libya (1 project), Mozambique (1 Project), Myanmar (6 projects), Russia (3 projects), South Sudan (2 projects), Syria (2 projects), UAE (1 project), Venezuela (2 projects), and Vietnam (2 projects).

ONGC Videsh adopts a balanced portfolio approach and maintains a combination of producing, discovered, exploration and pipeline assets. ONGC Videsh has oil and gas production from 14 Assets, 4 Assets where hydrocarbons have been discovered and are at various stages of development, 16 Assets are under various stages of Exploration and 3 projects are pipeline projects. Through geographical spread of overseas investment, ONGC Videsh has enhanced its annual production to the level of 14.981 MMToE during 2019-20. During the year 2020-21, the share of oil & gas production for ONGC Videsh from its projects is 6.607 MMTOE till Sep 2020.

ONGC Videsh Limited has made a significant strike of oil in its onshore block CPO-5, Colombia, in Llanos Basin. ONGC Videsh is Operator in the block with 70% stake along with its Partner Geopark Ltd. (30% stake) an independent oil and gas company focused in Latin America.ONGC Videsh till date has drilled 9 exploratory wells with 6 hydrocarbon discoveries in the block with combined production of ~13,000+ barrels per day. CPO-5 is a large on-land block covering an area of 1,992 SKM and offers multiplay Exploratory and Appraisal opportunities. The Company now plans to drill more wells to explore the other plays in the block in immediate future

14.3.6 Bharat Petro Resources Limited (BPRL)

Bharat PetroResources Limited (BPRL), a 100% subsidiary of Bharat Petroleum Corporation Ltd. (BPCL), has Participating Interest (PI) in 24blocks in 7countries along with Equity stakes in 2 companies in Russia that hold the license to 4 Producing assets.Out of the 24 blocks, 14are

located in India and 10Overseas. BPRL is Joint Operator in one overseas block i.e Onshore 1 Abu Dhabi and Operator in two onshore blocks in Cambay Basin, India.

7 Indian blocks were acquired under various NELP bid rounds, 4blocks were awarded under the Discovered Small Fields Bid Round 1and 3 blockswere awarded in the Open Acreage Licensing Policy (OALP) Bid Round 1. Out of the Overseas blocks, 5 are in Brazil, 2 are in UAE and 1 each in Mozambique, Indonesia and Australia. BPRL and its consortia have a total of 26 discoveries in respect of Blocks held in 5 countries i.e. Brazil, Mozambique, Indonesia, Australia and India..

Indian consortium (IC) comprising of BPRL, Indian Oil Corporation Limited (IOCL) and Oil India Limited (OIL), through wholly owned subsidiaries and Special Purpose Vehicles incorporated in Singapore, had acquired 29.9% equity stake in LLC Taas -YuryakhNeftegazdobyacha (TYNGD) and 23.9% in JSC Vankorneft from M/s Rosneft, a National Oil Company of Russia, in October 2016. Currently, TYNGD is producing approx. 14,000 Tonnes per day and Vankorneft is producing approx. 29,000 Tonnes per day.

In 2018, Bharat PetroResources Limited (BPRL), along with ONGC Videsh and Indian Oil Corporation Limited acting jointly as the Indian Consortium were awarded 10% Stake in Lower Zakum Concession, Offshore Abu Dhabi. This is the first time that Indian oil and gas companies have been given a stake in the development of Abu Dhabi's hydrocarbon resources. BPRL through its subsidiary has 30% stake in the SPV of the Indian Consortium that holds 10% stake in the Lower Zakum Concession.The Concession, which has a term of 40 years with an effective date of 9th March 2018, was signed on 10th February 2018. The current production of this field is about 300,000 bopd and Indian Consortium annual share shall be about 1.5 MMT. BPRL's share of the equity crude has been lifted by BPCL group refineries.

In Mozambique, following the discovery of vast quantities of natural gas in the Rovuma Offshore Area 1 off the coast of northern Mozambique, Area 1 consortium partners announced Final Investment Decision (FID) on 18 June 2019 to develop a 2-Train (2x6.44 MMTPA) onshore initial LNG Project for monetization of gas discovered from offshore Golfinho-Atum discovery area. With the announcement of the FID, the Golfinho-Atum Field Development Plan has become effective and Development and Production Period of 30 years has commenced. First cargo will commence after construction concludes, which is estimated to be approximately five years after FID (June 2019).

In Brazil, the Operator i.e., Petrobras concluded extended well testing in Farfan field and the studies are ongoing for the Declaration of Commerciality in the BM-SEAL-11 Concession..

In Indonesia,the minimum work programme committed as per the PSC under the exploration phase has been completed. The Drill Stem Tests (DST) conducted also indicated producible hydrocarbons from these wells and has led to Oil & Gas discoveries in Badik, West Badik and Parang fields of the block. As part of further exploratory/ appraisal activities, drilling campaign in Parang / Keris fields is being planned by the operator. The drilling of appraisal wells in Parang field is currently in progress.

During the year 2019, a consortium of BPRL and IOCL was awarded the Onshore Block 1 concession in Abu Dhabi after emerging as the winning bidder in the Abu Dhabi 2018 Block Licensing Round. The award marks entry of BPRL as an Operator of overseas assets for the first time in the prospective UAE region.. The Concession granted by the SPC, on behalf of the Abu Dhabi government, has an effective concession period of 35 years and in the Exploration Phase will be operated by M/s. Urja Bharat Pte Limited (UBPL), a 50:50 SPV incorporated for the purpose by the Indian consortium in Singapore.The commercial license of UBPL, UAE has been received and the UBPL, UAE branch office is commissioned. The appraisal well drilling programme for the existing discoveries is in progress.

The Madanam discovery in the block CY-ONN-2002/2 in Cauvery basin, India where ONGC is the Operator and BPRL has a PI of 40% as non-operator is currently under development and the commercial oil production has commenced.

BPRL has invested approx. Rs27000crores till December 2020.

14.4. Other CPSEs

14.4.1 Balmer Lawrie Investments Limited (BLIL)

The 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 continues to hold 1,32,46,098 Equity shares of Rs. 10 each (aggregating 59.67% of the total paid-up Equity capital) in the Company. BLIL is under the administrative control of Ministry of Petroleum & Natural Gas having its registered office at Kolkata.

The Company does not have any business activity, except to hold the Equity shares of its subsidiary, namely, Balmer Lawrie & Co. Ltd. (BL). The major source of income is dividend income received, from BL. In addition to the dividend income, the Company earns interest out of its surplus funds deployed in the fixed/term deposit schemes of the Scheduled Banks.

Joint Ventures and Subsidiaries of BLIL:

- BLIL does not have any joint venture with any corporate entity.
- BLIL has at present two subsidiary companies, namely,

i. Balmer Lawrie & Co. Ltd. (as per Section 4(1)(b)(ii) of the Companies Act, 1956 [which is referred to herein as 'BL'] and

ii. Balmer Lawrie (UK) Ltd. (as per Section 4(1)(c) of the Companies Act, 1956).

14.5 Other Organisations

14.5.1 Oil Industry Development Board (OIDB)

A. Objectives and Functions of the Board

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.

B. Organizational Setup

Oil Industry Development Board comprises of Secretary, MoP&NG as Chairman and other member namely Secretary, Department of Chemical and Petrochemical, Additional Secretary and Financial Adviser, MoPNG, Additional Secretary, Department of Expenditure, Joint Secretary (Exploration), MoPNG, Additional Secretary, Department of Expenditure, Joint Secretary (Exploration), MoPNG, Chairman IOCL, ONGC,GAIL, BPCL and HPCL, Director General of Hydrocarbons, Directior (R&D) IOCL and Secretary, OIDB as Member Secretary.

C. 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 i.e. upto F.Y. 1991-92, OIDB has received an amount of Rs. 902.40 crore from the Central Government, which has got accumulated to Rs. 11,972 crore (provisional) as on 31st January, 2021 through internal generation.

D. Deployment of Funds

During 2020-21 (upto 31st January, 2021), OIDB has released grants to institutions viz. DGH, PCRA, CHT, OISD, PPAC and for other R&D activities amounting to Rs. 260.05 crore. OIDB has also released loans amounting to Rs. 892.25 crore to CPSEs till 31st January, 2021. Indian Strategic Petroleum Reserves Limited (ISPRL), a wholly owned subsidiary of OIDB has been entrusted with the construction of strategic storage for crude oil at three locations. OIDB has so far released an amount of Rs. 3775.87 crore as

equity investment is ISPRL and an amount of Rs. 5 crore (approx.) as grant for pre-project activities for phase-II SPRs.

14.5.2 Oil Industry Safety Direcorate (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; Refineries & Gas Processing Plants; Cross Country Pipelines and Marketing (POL & LPG) which are implemented on self-regulatory basis by the Oil & Gas companies.

OISD act as the competent authority to exercise powers and functions as stipulated in Petroleum and Natural Gas (Safety in Offshore operations) Rules, 2008 to enhance safety in offshore operations.

OISD's mission is to support oil and gas industry in India to achieve excellence in Health, Safety and Environment by developing standards, conducting audits, investigating incidents and disseminating knowledge.

a) Safety Audits by OISD: FY 20-21

OISD carries out periodic safety audits of all types of Oil & Gas installations to monitor their compliance level with the OISD standards, recommendation of incident investigated by OISD and statutory regulations. OISD Safety Audit Performance for the year 2020-21 is as indicated below:

Actions	Unit	2020-21		Projection (Feb'21 to Mar'21)	Total (with Projection)
		Plan	Actuals (31.01.21)		
Refinery, GPP and related CTF	No	17	15	05	20
Mktg. Installation (POL/LPG)	No	70	68	20	88
E&P Onshore	No	50	60	10	70
E&P Offshore	No	16	0	16	16
Cross Country Pipeline	Km	8000	7515	1235	8750

b) 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 across the Oil & Gas Industry. These audits are conducted for green-field developments and for major additional facilities at existing locations, to ensure ab initio compliance to the OISD standards at the construction stage itself.

Status of PCSA carried out during 2020-21 as on 31st Jan, 2021:

Actions	Unit	Total
Pre Commissioning Safety Audits (PCSA 2020-21)		
Refinery, GPP and related CTF	No	13
Mktg. Installation (POL/LPG)	No	25
Cross Country Pipeline	Km	182

c) '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. 04 Mobile Offshore Drilling Units and 13 Offshore Platforms have been accorded 'consent to operate' during the year 2020-21 till 31st Jan, 2021.

d) Technical Seminars/ Conferences/ Workshops

Technical Seminars/Conferences/ Workshops for the Oil industry are conducted by OISD to discuss the latest technological developments, case studies etc.

During the year 2020-21 (31st Jan, 2021), OISD has organized seven Workshops for capacity building/ Seminars, as under:

- Two-day Virtual Workshop through Video Conferencing on "Enhancing HSE Awareness" for HPCL officers of POL Terminal / Depot by MO-POL on 13th -14th July 2020.
- One-day Virtual Workshop through Video Conferencing on "Enhancing HSE through Effective Audits" for HPCL officers of LPG Plants on 17th July 2020.
- One-day Virtual Workshop through Video Conferencing on "Enhancing HSE through Effective Audits" for IOCL officers of LPG Plants on 14th August 2020.
- One-day Virtual Workshop through Video Conferencing on "Enhancing HSE through Effective Audits" for BPCL officers of LPG Plants on 1st September 2020.
- One-day Virtual Workshop through Video Conferencing on "Enhancing HSE Awareness" for IOCL officers of POL Terminal / Depot was conducted by MO-POL on 4th Sept' 2020.
- One day Workshop through Video Conferencing on "Enhancing Safety & Reliability through Robust Safety Culture" for BPCL Refinery Officers on 23rd October 2020 by Process & Engineering Group of OISD.
- Two day Workshop through Video Conferencing on "Best HSE practices in E&P Industry" carried out by E&P section of OISD on 10th & 11th December 2020.

It is planned to organize three more Workshops / Seminars by March, 2021.

e) The Safety Council

To ensure proper implementation of various aspects of safety in the Oil & Gas industry, Government of India has set up a 'Safety Council' at the Apex in January, 1986 under the administrative control of MoP&NG as a special self-regulatory industry agency for safety matters & procedures in respect of Hydrocarbon sector.

Safety Council is headed by the Secretary, MoP&NG as Chairman & includes members comprising of Additional Secretary, Joint Secretaries, Chief Executives of all Public Sector Undertakings, at least two Chief Executives from Private/ JV Companies on rotational basis, Statutory bodies such as Chief Controller of Explosives, Director General of Mines Safety, Adviser (Fire), Secretary, Central Electricity Board and Director General of Factory Advice Service and Labour.

Safety Council is assisted by Executive Director, Oil Industry Safety Directorate (OISD) who also acts as the member secretary of the Safety Council. To review the safety performance, the Safety Council meets once a year and 37th meeting of the Council was held on 7th August, 2020.

Key issues discussed & approved during the meeting are as under:

- Major activities undertaken in 2019-20 & activity plan for 2020-21
- OISD Safety audit compliance status (ESA/ SSA) - Sector/ Company wise
- Root cause analysis of major onsite incidents-discussions on recent incidents across industry segment
- Approval of Actual Expenditure of OISD in FY 2019-20 and Budget Estimate for FY 2020-21
- Release of Errata/ updation to already published OISD Standards
- Revision of PCSA tariff for Oil and Gas Sector (except E&P)
- Introduction of PCSA in E&P installations
- Introduction of tariff towards grant of 'Consent to Operate' for offshore installations under the Petroleum & Natural Gas (Safety in Offshore Operations) Rules, 2008

f) Revision of OISD Safety Standards

OISD develops Standards for the oil and gas sector through a participative process involving all the stakeholders. 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 121 technical safety standards for the Oil & Gas Industry. 21 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 and the Oil Miners regulations (OMR), 2017.

At present, OISD has taken revision of 28 Nos. of the existing Safety Standards. Out of these, 04 Nos. of standards have been adopted in 55th Steering Committee meeting held on 28th Jan, 2021 and 04 Nos. of standards have been uploaded for comments from stakeholders.

g) Incident Investigation & Analysis

OISD investigates major incidents 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 periodical bulletins 'Newsletter' and 'Suraksha Chetna'; Safety Alerts and Case Studies; Seminars and Workshops. During 2020-21, 05 Nos. of major incidents have been investigated by OISD till 31st Jan, 2021.

h) Encouragement of Safety Performance across the Industry through 'Oil Industry Safety Awards'

Annual evaluation of Safety Performance of the Industry members is done by a specially developed methodology, which takes cognizance of hazards associated, incident recorded during the year and safety management system of the installation. Installations/ Organizations, achieving 'exceptional safety performance` during the year, are awarded with the Oil Industry Safety Awards. In addition, individuals either company employees or contract labors making exceptional contributions towards the cause of safety are also encouraged and presented with such awards. For the year 2019-20, a new category of award 'innovation in HSE' has been added, both at individual and organisation level.

'Oil Industry Safety Awards' for the year 2018-19 and 2019-20 are expected to be organized in April, 2021

i) Other Major Activities

a. 55th Steering Committee meeting

55th Steering Committee meeting was held through Video Conferencing on 28th Jan, 2021 with representatives from Oil & Gas industry (Principal Panelists). Some of the major points discussed during the meeting are as under:

- Adoption of Revised OISD Standards – 04 Nos.
- OISD's ESA Plan Vs Actual for the year 2020-21 and Plan for 2021-22
- Review of implementation status of long pending critical ESA/SSA recommendations
- Incident analysis for the last five years and discussions about few incidents across industry segment
- Industry Points

b. ISO 9001:2015 Surveillance Audit of OISD

In the year 2013, existing systems and procedures of OISD were validated through Certification of ISO 9001: 2008 by M/s DNV and OISD became the first ISO 9001 Certified Organization amongst all the OIDB grantee Organizations.

In the year 2020-21, the ISO certification of OISD has been continued by M/s DNV during Surveillance audit on 15th Dec, 2020.

c. Organisation of various programmers

Awareness drive about COVID-19, Swachhta, Environment awareness, Hindi Pakhwada and various other activities were organised during the year.

14.5.3 Directorate General of Hydrocarbon (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.

a) Role and Functions of DGH

i. 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.

ii. To evaluate the hydrocarbon reserves discovered and estimated by the operating companies.

iii. To advise the Government on the offering of acreages for exploration to companies as well as matters relating to relinquishment of acreage by companies.

iv. 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.

v. To review and audit concurrently the management of petroleum reservoirs by operating companies and advise on any midcourse correction required to ensure sound reservoir management practices in line with the optimal exploitation of reserves and the conservation of petroleum resources.

vi. 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.

vii. Assist Government in Contract Management functions.

viii. Exploration & Development of unconventional hydrocarbon resources like Gas Hydrate, Shale gas/oil and oil shale.

ix. All other matters incidental thereto and such other functions as may be assigned by Government from time to time.

b) DGH Achievements for the FY 2020-21, upto December 2020

i. DGH is monitoring the E&P activities and contractual performance under Production Sharing Contracts (PSC), Revenue Sharing Contract (RSC) and Coal Bed Methane (CBM) contracts regime. The brief achievements resulting from Exploration, development and production activities during 2020-21 upto December 2020 in contractual regime are as under:

ii. One gas discovery notified

iii. Under OALP Bid Round V, 11 blocks with an area of approximately 19,790 sq. km. were awarded in October 2020.

iv. Crude Oil Production of 5.55 MMT, Gas Production (including CBM): 2715 MMSCM in 2020-21 upto December, 2020 in PSC Regime

v. R-Cluster (Discovery Name- D-34) of KG-DWN-98/3 block operated by RIL, commenced production w.e.f. 18.12.2020.Current production is 4.5 MMSCMD with 3 wells.

vi. Saraswati-4 (basement) discovery of RJ-ON-90/1 block monetized (~50 BOPD, since Apr-2020)

vii. Asokenagar-1 discovery of ONGC (well of NELP Block WB-ONN-2005/4) located in 24 Pargana district of West Bengal, is monetized and put on production in December

2020 following Guidelines for Early Monetization of Hydrocarbon Discoveries issued in June 2020.

Implementation of Policies

DGH has been entrusted for implementation of exploration and production related policies including Hydrocarbon Exploration and Licensing Policy (HELP) and Discovered Small Field (DSF) Policy. The online international competitive bidding process is managed by DGH. The award of acreages/ block is made based on the recommendations of DGH in a transparent manner. Government has delegated additional approval powers and functions to strengthen the DGH for performance of Contract Management.

1. Natural Gas Marketing Reforms

Taking another significant step to move towards gas based economy, 'Natural Gas Marketing Reforms' were announced vide Notification dated 15.10.2020. The objective of the policy is to prescribe standard procedure to discover market price of gas to be sold in the market by gas producers, through a transparent and competitive process; permit Affiliates to participate in bidding process for sale of gas and allow marketing freedom to certain Field Development Plans (FDPs) where Production Sharing Contracts already provide pricing freedom. Subsequently, detailed guidelines for Discovery of Market Price for Domestically Produced Natural Gas through e-bidding were issued vide Notification dated 03.12.2020, which would be applicable for sale of gas having pricing and marketing freedom. Agencies empanelled by DGH for carrying out e-bidding also been notified.

2. OALP Bidding Rounds

Under OLAP Bid Round IV, seven (7) exploration blocks having an area of 18,510 sq.km. have been awarded and contracts signed on 2nd Jan 2020. Under OALP Bid Round V, 11 blocks with an area of approximately 19,800 sq. km. were awarded in October 2020. Five bid rounds have been concluded so far under OALP, and total 105 exploration blocks covering an area of 1,56,590 sq km have been awarded. 12 EoIs covering approx. area of 34,200 Sq. Km. have been received in the OALP window VI closed on 30th November 2020.

First Hydrocarbon discovery in well (KW-2 Updip-1) drilled in RJ-ONHP 2017/1 block has been notified

3. Discovered Small Field Policy (DSF):

Under DSF Bidding Round-II, 59 discovered small fields/unmonetized discoveries were offered for bidding. Total 23 contracts comprising 57 discoveries were signed in March, 2019 and 1 Contract comprising 1 discovery was signed in January, 2021.

4. National Seismic Programme of un-appraised areas

Government approved the proposal for conducting 2D seismic survey for data Acquisition, Processing and Interpretation (API) of 48,243 Line Kilo Metres (LKM). Till December 2020, cumulative data acquisition by ONGC and OIL are 40503.81 LKM and 4637.28 LKM respectively. Processing of 39268.97 LKM data and interpretation of 27379.10 LKM data completed by ONGC whereas processing of 4632.54 LKM data and interpretation of 3559.68 LKM data has been completed by OIL. So far 44259.44 LKM raw data, 43900.97 LKM processed data and 36916.05 LKM interpreted data have been submitted to NDR/ In addition, Appraisal of un-appraised offshore areas of Andaman basin is being undertaken during 2020-21. 15000 LKM 2D seismic data will be acquired. Survey is likely to be completed in June, 2021.

5. Rationalization of No-Go area for carrying out exploration activities:

No-Go areas in Krishna-Godavari (KG) Basin has been rationalised due to constant follow up/ meetings with Ministry of Defence (MoD) and DRDO. Moreover, a Memorandum of Understanding (MoU) has been signed on 06.11.2020 between DGH and ISRO for carrying out seismic activities in Andaman Nicobar Basin.

6. Guidelines for Early Monetization of Hydrocarbon Discoveries

Ministry, after examination the issue of monetization of hydrocarbon discoveries before completion of other activities such as Appraisal, Declaration of Commerciality (DoC) and submission of Field Development Plan (FDP), etc. in the Block under Production Sharing Contract/ Revenue Sharing Contract, issued guidelines

on 23.06.2020 for monetization of discovery at an early stage within prescribed contractual timelines, in the public interest as a step towards energy security of the country. Benefiting from these guidelines, Asokenagar-1 discovery of NELP Block WB-ONN-2005/4, operated by ONGC, located in 24 Pargana district of West Bengal, is monetized and put on production in December 2020.

7. National Data Repository

NDR is managed by DGH. Entire country's E & P data is 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.

The Cumulative data loaded in NDR as on 31st December 2020:

a) 2D Seismic Data : 2.582 Million LKM

b) 3D Seismic Data : 0.872 Million SKM

c) Well and Log Data : 19,190 Wells

d) Well Reports : 39,903 reports

Future plans of utilization of data available within NDR:

- NDR has a huge volume of E&P data as stated above which will be useful for exploration and production activities for years to come.
- Upgrade to new hardware and setup virtual data room on Cloud
- Perform data analytics on the available huge data to gain geological insights for future exploration and production activity in the Indian sedimentary basins

Revenue Generated by NDR:

As on 31st December 2020, NDR has generated a revenue of Rs. 41.43 Crore by means of data sale to various Indian and foreign E&P companies and Rs. 24 lakh by providing data visualization facility to Indian and foreign E&P companies

8. Simplification of Procedures and Processes under Production Sharing Contract of Pre-NELP /NELP Blocks (2020)

Guidelines for simplification of procedures and processes for submission of documents on self-certification were issued on 28.02.2020, after a review of the processes for various approvals and submission of documents under Production Sharing Contracts (PSC) under New Exploration Licensing Policy (NELP) and Pre-NELP. Government rationalized 37 processes in 3 categories required during the life cycle of Exploration and Development of a block under PSC contract during 2020:

Sl. No.	Type	No. of Processes	Approval Definition
1	Category A	22	Processes where documents shall be accepted on self-certification basis and no approval is required.
2	Category B	3	Processes where approval will be deemed on expiry of 30 days of submission of documents under self-certification.
3	Category C	12	Processes where approvals shall be required under the Acts/Rules or Contracts.

9. Policy Framework to promote and incentivize enhanced recovery methods for Oil and Gas (2018)

- Preliminary ER potential of 202 fields assessed.
- 28 fields identified as suitable ER candidates.
- Advanced studies ongoing for additional 34 fields.
- 32 ER proposals received, so far.
- ER Screening Reports of 14 projects approved for commencement of ER Pilot Phase.

Estimated investment (CAPEX) of INR 1909.65 Crore towards implementation of ER Pilot Phase of 14 ER projects

10. Reforms in Hydrocarbon Exploration and Licensing Policy for enhancing domestic

exploration and production of oil and gas introduced in March 2019

Dispute Resolution Committee

To increase exploration activities, attract domestic and foreign investment and to promote ease of doing business, Government vide Notification dated 28.02.2019 decided to constitute a Committee of External Eminent Persons/Experts for dispute resolution. Pursuant to decision, Government vide Notification dated 16.12.2019 constituted a Committee comprising three External Eminent Persons/Experts for dispute resolution.One case has been referred to DRC **Empowered Coordination Committee (ECC)**

An Empowered Coordination Committee (ECC) under the Cabinet Secretary comprising of representatives of Ministry of Environment, Forest and Climate Change, Ministry of Defence, Department of Space and other relevant agencies/ authorities was constituted was constituted in May 2019 for streamlining and expediting grant of approvals/clearances in exploration and production activities in Hydrocarbon Sector. 3 meetings of ECC have been held since its constitution for addressing various policy issues relating to grant of early PEL & PML as well as for expediting environment , forest clearances and Wildlife clearances.

11. Survey through Non-Exclusive and Multi Client Policy

DGH is administering this Policy on behalf of the Government of India, owner of the data acquired under this Policy. So far, 2 Proposals for carrying out 18,720-Line KiloMetre of survey surveys in Krishna Godavari basin and eastern offshore of Andaman Islands have been received by DGH. One proposal is for reprocessing of seismic data in western offshore area.

12. National Gas Hydrates Program (NGHP)

In India, Gas Hydrate research and exploratory activities are being steered by the MoPNG under National Gas Hydrate Program (NGHP). Steering committee of NGHP approved the formation of Advisory Committee and made various suggestions. NGHP Member organisations have submitted integrated project proposal/s for the development of Production technology, flow modelling, Passive Channel behaviour / mapping and EIA Survey for the assessment of Geological and Ecological hazards related to NGHP-03.

13. Information Technology

Encouraging Ease of Doing Business in the sector, strengthening technological prowess and making governance electronic and automatic are some of the priorities for the government. Aligned to the vision, DGH has introduced host of applications and systems to assist the operators for hassle free operations, transparent contract management, expediting grant of approvals & clearances and engagement with the Potential Investors.

An online system for internal work processes and approvals under PSCs of Pre-NELP/ NELP blocks has been implemented for effective contract management. Considerable progress has been made for similar transition to online systems for CBM and Revenue Sharing Contracts. Further, DGH in discussion with MoEF&CC has facilitated the links of PARIVESH under its single window clearance portal for viewing the status of online applications submitted by upstream hydrocarbon exploration companies in the country. A brief about the digital initiatives at DGH is as follows:

(i) Production Sharing Contract Management System (PSCMS)

Launched on 1st April 2019, PSCMS is a workflow- based contract management for PSC Blocks/ Fields. Introduction of PSCMS aims at reducing the paperwork and expediting approval of processes necessitated under the contract. Simplification of procedures and processes will reduce the regulatory burden on operators and allow them to focus on exploration and production activities.

(ii) Production Database Management System (PDMS)

An online Production Database Management System (PDMS) has been implemented wherein all oil and gas production data on daily/monthly basis is uploaded by operators for Nomination and PSC regime. The portal enables to view, monitor and analyze block, field and asset wise production and preparation of reports.

(iii) Essentiality Certificate Management System (ECMS)

Essentiality Certificates are issued for import or indigenous procurement of goods required for petroleum operations. In addition to this, Essentiality Certificates commonly referred to as NOCs (No Objection Certificates), are also issued for private for transfer of material from one block to another. DGH has devised an online portal ECMS - Essentiality Certificate Management System wherein operators can apply for Essentiality Certificates online without sending any physical copy of documents for all import /indigenous/transfer cases. Digitally signed Essentiality Certificates for import cases are uploaded directly on the customs portal. On an average, 90 Essentiality Certificates are being issued every day.

No. of EC/IPC and its value issued from 01-04-2020 to 31-12-2020.

Type of Certificate	Nos. issued under each category	Corresponding value for the period under reference. (in INR Crores(approx.))
EC (Import)	7160	19532
EC for indigenous purchase	3493	2589
Total for the period under reference.	10, 653	22,121

(iv) DSF Operator's Portal: Facilitating contractual process.

DGH has created a dedicated DSF Operator's Portal for monitoring of Revenue Sharing Contracts (RSC) awarded through DSF Bid Rounds. Portal is designed keeping in government objective to enhance ease of doing business and smoothen the process of Revenue Sharing Contract monitoring at DGH end.

(v) Non-Tax Remittance Management System

To overcome the reconciliation the system is aimed to collate Details of remittance/payment made (towards Non-Tax Revenue) to Pay & Account office of MoP&NG/ State Governments under PSCs/CBM contracts under the following heads and interest thereon.

Royalty - Oil	Royalty-Gas
Profit Petroleum	Production linked payment
Government share of Revenue	Petroleum Exploration License (PEL) fees
Petroleum Mining License (PML)fees	Liquidated Damages
Cost of unfinished work programme	Dead Rent
Cess on Oil	Initial Licence fee
Initial Lease Fee	Others

Details of all payments to central/state government w.e.f 1st March 2017 are being uploaded in Non-Tax Remittance Management System.

(vi) Revenue Management System

The system, in place w.e.f 1st April 2015, is aimed to collate the details of Revenue generated in respect of sale of oil, gas and condensates produced in the block. This also facilitates for royalty computation and monitoring. This Revenue information is further supplemented by uploading the details of invoices by operator.

(vii) Accounts Management System

The system, in place w.e.f 1st April 2015, is aimed to capture electronically and collate the details of audited accounts submitted to DGH. It also captures the contract cost and profit petroleum data for each quarter and annual basis.

(viii) Petroleum Exploration Lease/ Petroleum Mining Lease Data Management System

Launched on 5th November, 2019, PEL/PML application is an online application for operators to apply for PEL/ PML under various contractual regimes (Nomination/ PSC/RSC/CBM). Operators can submit their PEL and PML application for both, onshore blocks for onward submission to states and offshore blocks for onward submission to MoPNG from this portal. The approval by MoPNG for onshore and Grant order by MoPNG for offshore , forwarding approved recommendation to State Government Nodal Officer by DGH, forwarding application to state technical and state district officers for review, Issue of Grant order by State Government Nodal Officer and view by all stakeholders are incorporated in the online system.

(ix) Vessel Clearance Portal

Rigs/ships/FPSOs/Vessels entering Indian maritime zone need prior approval from Ministry of Defence. To expedite approvals and facilitate movement of these vessels for E&P related activities in the fair- weather window, an online portal in DGH website has been created. Operators can submit applications for vessel clearance with DGH along with details of vessel, block in which activity is to be undertaken. The vessel clearance is processed and issued online.

(x) Expat Clearance System

Expat Clearance System (ECS) is required for getting clearance of expats coming on vessel, from Ministry of Home Affairs (MHA). DGH has created an online system for application of expat clearance. The Operator can submit the application for seeking expat clearance and can track the status of application online.

(xi) EoI Submission Portal for OALP

EoI submission portal was launched in 2016 for the operators to submit Expression of Interest (EoI) for the identified blocks under OALP bid rounds.

(xii) E-bidding Portal

DGH has developed an online bidding portal for bidding of blocks under DSF. Bidders are required to submit both the envelopes through online e-bidding portal (https://ebidding.dghindia.gov.in).

(xiii) Development of Single Window Clearance (SWC) Portal for expediting statutory approvals / Clearances.

DGH has developed a 'Single-window clearance' portal to expedite and facilitate various clearances /submissions/approvals pertaining to Exploration & Production Operations. The portal will enable operators to submit and track following applications online through single sign-in:

1) Petroleum Exploration License (PEL) - Petroleum Mining Lease (PML) to Central / State Government
2) Expat Clearance from Ministry of Home Affairs (MoHA)
3) Vessel Clearance from Ministry of Defence (MoD)
4) Environment Clearance from Ministry of Environment, Forest & Climate Change (MoEF&CC)
5) Status of Forest/Wildlife clearance from MoEF&CC
6) DGH Production Sharing Contract Management System (PSC-MS)
7) Essentiality Certificate Management System (ECMS)

The system is mapped in a way to achieve last point clearance from all concerned authorities in Centre and State.

14. Investment Promotion Cell in DGH

An Investment Promotion (IP) Cell has been constituted in DGH for planning and execution of investment promotion strategy in India's E&P sector. The IP Cell will endeavour to create high quality and insightful promotional literature and targeted outreach activities for investment promotion.

14.5.4 Centre for High Technology (CHT)

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:

- Performance Benchmarking of Refineries and Pipelines
- Performance Improvement in Refineries through Best Practices, Special Studies, Operational Improvement and Process Technology
- Energy Efficiency Improvement in Downstream Hydrocarbon Sector
- Petroleum Product Quality Improvement
- Sharing of Best Practices and Information & Knowledge Dissemination
- Integration with Alternative Energies and New Initiatives in Downstream Sector for Future Sustainability
- Promoting Innovations and R&D in Downstream Hydrocarbon Sector. Co-

ordination of activities of Scientific Advisory Committee (SAC) on Hydrocarbons of MoP&NG

- Reduction of Water foot print
- Development of import substitute fuels, chemicals and catalysts

Major activities undertaken during 2020-21:

I. Performance Benchmarking :

Performance benchmarking of PSU refineries is being conducted regularly since 2010 by CHT through M/s Solomon Associates (SA), USA. A long-Term Agreement upto 2028 has been made with SA for undertaking benchmarking of the PSU refineries. The study for PSU Refineries for 2020 cycle is in progress.

Performance Benchmarking Study for Pipelines (Liquid, Gas, LPG) and SPMs for 2018 cycle was initiated for the first time through SA. The study for 2020 cycle is in progress.

II. Refinery Performance Improvement

- Energy Efficiency Improvement Study of PSU refineries.

1. PAT (Perform, Achieve and Trade)

PAT is a market based regulatory instrument to reduce specific energy consumption in the energy intensive sector of the economy. PAT is one of the initiatives under The National Mission for Enhanced Energy Efficiency (NMEEE), which is one of the eight missions under the National Action Plan on Climate Change for enhancing energy efficiency, to enhance the cost effectiveness through tradable energy saving certificates.

Refinery sector was included in PAT cycle-2 (2016-17 to 2018-19) along with Discoms & Railways to the eight energy intensive sectors, already covered in Pat cycle-1. Under the scheme, each refinery, including PSU and Private Sector, is mandated to meet the Specific Energy Consumption Targets. The targets are set higher for refineries which have higher specific energy consumption and hence higher potential for energy saving. The energy saving targets were assigned by BEE (Bureau of Energy Efficiency) in consultation with CHT, an associated office under MoP&NG.

The energy reduction Target for refining sector in PAT cycle -2 was set at 5.49% equivalent to 1.01 Million TOE. Against this, the actual energy reduction of 8.05%, equivalent to 1.48 Million TOE was achieved.

For the current PAT cycle-6 (2020-21 to 2022-23), the sectoral energy reduction Target of 5.49% has been retained, which is equivalent to energy saving target of 1.17 Million TOE.

2. Long term energy saving Target till 2030 in PSU refineries

A Roadmap on specific energy consumption for PSU Refineries, aligned with India's NDC of 33-35% reduction in Specific Energy Consumption by 2030 over the base year of 2005, have been prepared. The roadmap has prepared based on various studies conducted both in-house as well as through consultants. The targets are also assigned for midterm (2023-24) based on already identified energy saving scheme as well as long-term (2030) for each PSU refinery.

3. Annual audit on furnace efficiency and steam leaks

In order to improve energy efficiency and reduce energy consumption, CHT in association with the refineries organize surveys every year in the areas of 1) Furnace/ Boiler efficiency and 2) Steam leak. These two areas are taken up every alternate year. Survey in area of Furnace/Boiler efficiency was carried out in Jan 2020.

- Development of Water Consumption Norms and Reduction of Water

Footprint for Refineries through EIL has been carried out. A roadmap for reduction of water footprint in PSU refineries has been prepared with a short term (<2 years) and a long term (>2 years) target.

- Performance Improvement Programme of PSU Refineries: CHT coordinated finalisation of refinery-wise global consultant for carrying out refinery performance improvement study for 15 PSU refineries. Based on the same, 7 PSU refineries (HPC-Mumbai and Visakh, BPC-Mumbai and Kochi, IOC- Panipat, Paradip and Mathura) have started the study in first phase.

  In the second phase, EOI for the balance 8 refineries (IOC-Barauni, Gujarat, Haldia, Bongaigaon, Guwahati, Digboi, CPCL-Manali and NRL) floated in October,2020 and shortlisting of refinery wise consultant is in progress.

III. Refining & Petrochemicals Technology Meet (RPTM):

With a view to keep abreast with the technological developments and disseminate information, CHT organises RPTM every year in association with one of the PSU oil company on different theme of relevance. The event is attended by large number of process licensors, catalyst suppliers and delegates from India and abroad. The last 24th RPTM was organised along with MRPL in Bengaluru during 19th to 21st January, 2020. The event had presentation of 80 oral papers spread over 15 Technical Sessions and 78 papers in Poster Sessions along with 16 Exhibition Stalls and was attended by around 1500 delegates/ invitees from India and abroad. The 25th RPTM is planned in Mumbai in association with HPCL.

IV. Promotion of innovation and development of Indigenous Technology

CHT co-ordinates the activities of Scientific Advisory Committee (SAC) on Hydrocarbons of MOP&NG in identifying and funding of research projects for downstream 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. During 2020-21, SAC had three meetings till December 2020. SAC had detailed review of the on-going projects and new project proposals.

Hydrogen Research: SAC has identified hydrogen research and its promotion of as one of the major focus areas. CHT has funded various projects for carrying out research and demonstration of technologies including production of hydrogen from different pathways (including electrolysis of water and biomass gasification), development of fuel cell buses in tie- up with vehicle manufacturer as well as transport operators, storage and dispensing of hydrogen, production of HCNG and demonstration of HCNG fuelled buses in Delhi.

ED CHT has been nominated as Technology officer to represent MoP&NG. CHT provided input for the development of Science, Technology and Innovation Policy (STIP) of Govt. of India.

V. Integrated Monitoring and Advisory Council (IMAC)

During 2nd meeting of IMAC chaired by Hon'ble Minister, P&NG, it emerged that holistic and coordinated strategy in close coordination with all IMAC Member Ministries is imperative towards the exercise of Reassessment of the Roadmap to implement the Hon'ble Prime Minister's vision of reducing oil import dependency. Accordingly, 6 Working Groups have

been constituted for monitoring the progress on various initiatives, schemes, projects and strategies taken under respective Member Ministries domain with a view to augment Supply of energy, Savings in energy as a means to achieving oil import reduction.

Meetings of the Working Group on R&D and Innovation as well as of Working group on Biofuels, constituted under IMAC were held.

VI. Awards

CHT is actively associated with the following Annual Awards instituted by Ministry of Petroleum & Natural Gas, Government of India:

- Refinery Performance Improvement Award
- Saksham Awards (based on Steam Leak and Furnace Efficiency Surveys)
- 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.

These awards are presented during the Inaugural function of the Refining & Petrochemicals Technology Meet (RPTM).

VII. Implementation of PM JI VAN Yojana

Pradhan Mantri JI-VAN Yojana was announced in March, 2019 for promotion of 2G ethanol by providing financial assistance for setting up of 12 commercial units and 10 demonstration units at CHT has been nominated as nodal agency for implementation of PM JI VAN Yojana. Request for Selection (RFS) for shortlisting of eligible Project Developers (PD) was issued by CHT. The project proposals were evaluated by SAC and based on its recommendation, Steering Committee of CHT for PM JI-VAN Yojana, approved Financial assistance for 4 commercial projects and 1 demonstration project.

As advised by SAC, it is proposed to incorporate few amendments in the scheme to enlarge the scope and solicit broader participation which is under process.

VIII. Development of Catalyst Manufacturing Plant in India

With a view to set up world class Catalyst Manufacturing Unit under Make in India, Expression of Interest (EOI) was issued from bidders having global reach for marketing of catalysts and catalyst manufacturing capability. The proposed catalyst plant is envisaged to be set up as a Joint Venture between an established Catalyst Manufacturer/Supplier and one or more PSUs under MoP&NG. The discussions are currently in progress with the prospective partners.

IX. Feasibility study for production of ethanol at Refineries using waste gases through M/S LanzaTech, USA:

The study for BPCL-Mumbai Refinery has been completed. The study for Numaligarh Refinery (NRL) is in progress.

X. Feasibility & Business Model for Reference Fuel by EIL & IOC R&D

Reference Fuels are used by OEMs for testing their vehicles. These fuels are imported mainly from Germany. The study has been planned in three phases. The study for Phase-1 (Paper Blend using LP Model) has been completed and Phase-2 (lab blending) is in progress.

XI. Report on enhancing Production of Petrochemicals in Refineries

A Committee was constituted by MoP&NG to undertake detailed study on Business Opportunity for Petrochemicals in India. The Committee identified major petrochemicals based on consumption, value, import, growth and capacity in India including projected capacity addition for identified petrochemicals. The detailed report was submitted to MoP&NG.

XII. Stream Sharing among Refineries

A detailed paper has been submitted to MoP&NG regarding losses incurred by refineries due to not sharing streams on account of dual tax regime.

XIII. Study on Additional Strategic/ Operational Crude Oil Storage

Creation of petroleum reserves is one of the several contingency measures to meet the energy security. A Committee was constituted by MoP&NG to carry out detailed study on all aspects of common crude oil storage in the country. The report has been submitted to MoP&NG.

XIV. 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. Activity Committee Meet on "Strategies for Turnaround Management" was organized by CHT for the first time virtually in collaboration with HPCL-Visakh Refinery. The next Activity Committee Meet on Digitalization in Refining Business Process will be held in association with BPCL-Kochi Refinery.

XV. Swachhata Ranking for Oil & Gas PSUs & attached offices

MoP&NG, its attached offices and Oil & Gas CPSEs under the administrative control of MoP&NG celebrated Swachhata Pakhwada fortnight from 1st to 15th July, 2020. During Swachhata Pakhwada, Oil & Gas CPSEs and attached offices of MoP&NG were ranked based on the Swachhata Index developed by Centre for High Technology. The awards were presented to the winners by Hon'ble Minister of Petroleum & Natural Gas and Steel on 14th December, 2020.

14.5.5 Rajiv Gandhi Institute of Petroleum Technology (RGIPT)

Rajiv Gandhi Institute of Petroleum Technology, Jais, Amethi

Academic Programmes:

Currently, RGIPT Jais is offering 4-Undergraduate Programme (B. Tech. in Petroleum, Chemical Engineering, Computer Science & Engineering and Electronics and Instrumentation Engineering) along with two 5 years integrated dual degree programmes (IDD) in Petroleum Engineering and Chemical Engineering, 3-Postgraduate (M. Tech. in Petroleum & Chemical and M.B.A.) and Doctoral programmes in various disciplines of Engineering, Sciences, Humanities and Management.

Study in India Programme:

RGIPT has been enlisted as one of the few reputed Indian Institutions for offering B. Tech course to foreign students through Study in India Programme. At present,few foreign students have been admitted in B. Tech through Study in India Programme at RGIPT, Jais.

Course Restructuring:

To accommodate the changing demands in the industry the entire course B. Tech/ M. Tech curriculumshave been restructured and also various core domain verticals have been introduced.

Adjunct Faculty:

The institute has appointed 14 renowned industrial/ academic experts, including Shri. S.C.Mishra, CMD OIL, Dr. Manu Vora, Chairman & President, Business Excellence Inc. USA and Prof. Hee Moon, Chonnam national University South Korea, as adjunct faculty to enhance the academic & research outcomes 02 faculty members have also joined RGIPT through DST INSPIRE scheme.

Research & Development:

RGIPT Faculty Figures among World's Top 2% Scientists:

Two faculty membersfrom the institute have figured in a list of top 2% scientists of the world: Dr. Atul Sharma, Associate Professor-Renewable Energy; and Dr. AmritanshuShukla, Associate Professor- Physics. The list has been published by Stanford University, USA to rank the leading scientist of the world in various disciplines.

Research Collaboration MOUs:

RGIPT has signed MOUs with International educational institutions such as Curtin University, Edith Cowan University, Texas A &M University, Qatar and Persian Gulf University, Iran for the value of international cooperation and both sides have agreed to continue their common interest in promoting the mutual cooperation in the area of education and research.

RGIPT works on Hydrogen Generation from Sea Water:

The institute has strong expertise in interfacial electro-/photo-chemistry and electro-/photo-catalysis, in particular advanced nanomaterials development for hydrogen storage and conversion applications. RGIPT has recently got a NTPC-NETRA funded Research Project entitled "Development of electrodes and design of a prototype for the Hard/Sea water electrolysis". Prof.A.S.K. Sinha, Director RGIPT and Project Investigator, and his team works on this project. NTPC-NETRA has sanctioned about 1 Crore to RGIPT for this ongoing project.

Campus Placement:

Students were recruited by OIL& Gas industriesIT companies and consulting firms.

Achievements:

NIRF Ranking:

RGIPT is ranked 134th in the category of Engineering Institutions and 9th in the state of Uttar Pradesh. This is quite an achievement for the Institution considering RGIPT is a domain specific Institution and relatively new with 11 years of functional experience.

QIP Center:

The 'All India Council for Technical Education' (AICTE), New Delhi has granted an approval for starting "Quality Improvement Programme" (QIP) Centre in Engineering & Technology at RGIPT, Jais, Amethi. The new QIP Centre in Engineering & Technology at RGIPT has been authorized to admit QIP Scholars, who are sponsored fulltime/ regular faculty members of AICTE recognized Degree Level Colleges, for the Ph.D. programmes in Chemical and Petroleum Engineering disciplines. The QIP Scholars will also receive scholarship under this scheme for pursuing Ph.D. at RGIPT, Jais. In addition, RGIPT shall also conduct Faculty Development Programmes to help the faculty to upgrade their technical teaching skills.

Industry –Academia Collaboration:

Centre of Excellence for Artificial Intelligence and Machine Learning (CoE for AI/ML) in Petroleum and Energy Sector:

The institute has become the first academic institute in India to establish a CoE for AI/ML in Petroleum and Energy Sector. The Centre has been established in collaboration with Algo8, Canada and Pingala AI Pvt ltd, India. The CoE will foster research, knowledge dissemination and entrepreneurial activities in the petroleum and energy sector.

RGIPT- Chola MS Risks Services Limited

The institute signed an MoU with Chennai based Cholamandalam MS Risk Services Limited to provide industry relevant certification programmes on Health, Safety, Sustainability and Risk to Engineers and Health, Safety and Environment professionals in India. The programme is expected to reach around 1000 professional in India in the next eighteen months.

RGIPT-HPCL:

RGIPT has been consistently excelling in the area of capacity building by successfully offering numerous training programs to the working professionals from various Petroleum companies, since almost for a decade. India's leading Petroleum Upstream & Downstream companies now see RGIPT as one of the potential institutions for developing competency level of their own employees. Hindustan Petroleum Corporation Limited signed an MoU with RGIPT on 30th January 2021 to train their officers, Engineers, and technicians.

RGIPT-OIL:

The institute has been always closely working with the leading Oil& Gas companies to strengthen the Industry-Academia collaborations primarily to serve the nation in the areas of Petroleum & Energy. RGIPT signed an MoU with Oil India Limited on 28th January, 2021 for advancement of academic, research & training collaboration and exchanges in areas of interest and benefit to both parties

New Establishments:

RGIPT main campus at Jais was handed over to RGIPT on 6th October' 2016 and since then, there is constant upgradation in the facilities of institute to cater the growing need of the students, research scholars and the institute. With the said intention and in order to accommodate the married scholars and to establish the Workshop cum Incubation center and the Director's Bungalow, construction activities have been started in the month of January 2021.

Track & Field:

In order to develop few more amenities for student development, it was decided to develop the open area near the NH highway to develop as a Track & field, which currently caters the need of the students to conduct a small athletic event. The area covered in the construction of said track & field area was of 3600 Sqm. length by 18 m wide, The work was completed in the month of January' 2021.

Social outreach Activities:

During the last 09 months i.e. from April 2020 under the aegis of Project Amethi, more than 1200 students had enrolled and benefitted by Gyan Arpan. In view of the online education being need of the hour, a total 300 mobile phones were distributed so far. The aim of this mission is to distribute minimum of 1000 mobile phones among the students. The mobile phone distribution was done in three different phases which facilitated a continuous teaching delivery by RGIPT in these hard COVID-19 times. In all the distribution made 10 % of the students were essentially girls.

On 21 May 2020, the institute donated the surplus furniture including tables, chairs, folding cots to the nearby primary schools and Madrasas developing a reputed and amicable relationship in different regions of Amethi district.

The institute came forward to help the poor people during the lockdown period, announced by the Government of India to contain the spread of COVID-19. RGIPT had made available 1000 packets of foods daily during the first phase of lockdown to District Administration to distribute among needy people. Further to this, the Institute also made available masks, hand sanitizer and pamphlets to frontline COVID warriors.

Energy Institute, Bengaluru

(Centre of RGIPT, Jais, Amethi)

Academic Programmes:

Energy Institute, Bengaluru, commenced the academic PG programme, M. Tech. in Renewable Energy since September 2018. Presently, Bangalore Centre is operating from a transit campus, NMIT Bangalore and offering 04 M. Tech programmes in Renewable Energy, Energy Science and Technology, Power and Energy Systems Engineering and Electric Vehicle Technology with total intake 60 Nos. (15 Nos. intake for each M. Tech. Programme). Currently, Bangalore Centre is also hosting 10 Ph.D. students working in the field of Energy. Campus presently hosts total 68 M. Tech. and Ph.D. students working in the field of Green Energy and Sustainable Transportation. Bangalore Centre is also in process to offer 03 new M. Tech. programmes in the advance technology related to Oil and Gas sector from 2021-22 academic year onwards with approval of academic senate, Board of Governors and General Council. These programmes will full fill the requirement of oil and Gas industries in the area of safety, 2nd Generation green fuel, Energy

Management, Energy Efficiency, Indigenous Technology & process related to Oil and Gas and process Digitization of Technology & Operation.

Faculty:

Currently, the Centre is having total 06 faculty members appointed as Assistant Professor- Gr-II in August 2020 who are M. Tech. and Ph.D. from Institutions of repute like IITs and NITs. RGIPT recruited and appointed 06 Six Assistant Professors for its Energy Institute Bengaluru (EIB) Centre.

Project History:

Land allotted by Government of Karnataka in the year 2014 - extent 150 acres - in Sy.No.127, Kambalipura, HosakoteTaluk, Bangalore Rural District. Boundary wall erection commenced in September 2018 and 56% completed.Institute is taking necessary steps to get the complete possession of awarded land.

In order to shift the academic activities from temporary campus to main campus Kambalipura land a make shift campus of 3500 Sq. Mtr was proposed in December 2018 and as per BoG's, advice CPWD has been engaged for the task, since September 2020.

Assam Energy Institute, Sivasagar

(Centre of RGIPT, Jais, Amethi)

Academic Programmes:

Assam Energy Institute, Sivasagar started offering 3 year Polytechnic diploma courses in Petroleum Engineering, Chemical Engineering and Mechanical Engineering with specialization in Pipeline Engineering from academic session 2017-18 with 30 students in each course. The admission in these courses have been done based on Polytechnic Admission Test (PAT), conducted by Directorate of Technical Education (DTE), Govt of Assam. The students are all Class X pass out selected through PAT. The 1st batch of 90 students passed out in August-2020. All the Diploma courses are registered in NATS portal.

New Programmes:

From the academic session 2020-2021 two new Diploma courses in Fire & Safety Engineering & Electronics & Instrumentation Engineering have been floated with 30 students in each course. Also the intake capacities of the three old Diploma courses have been increased from AY 2020-2021 to 50 seats from the existing capacity of 30 seats.

Faculty & Staff:

Regular faculty positions were advertised in the month of May-2020 &18 regular faculty members have been appointed as on date. Regular non-teaching positions have also been advertised in the month of June-2020 & interview has not been conducted yet.

Construction Project:

Government of Assam has allotted 100 acres land to RGIPT to develop a residential campus. In the first phase, earth filling/site grading and piling has been done on land area of 35 acres.

Construction of an Engineering Workshop for students is being carried out by CPWD currently and is likely to be completed by March-2021.

Construction of 4 numbers of additional classrooms has been completed on 27/01/2020.

For construction of another Academic Block (5 nos of laboratories & 10 faculty cabins) , 2 nos of Boys Hostels, 1 no of Girls Hostel, dining hall, boundary wall, development of internal roads, sewer lines, firefighting system, etc , an amount of Rs. 50.28 crores have been sanctioned to CPWD in the month of June-2020. Construction activities for the above mentioned works have been started in the month of January-2021.

Campus Placement:

The first batches of graduated students were predominantly recruited by OIL& Gas industries.

14.5.6 Indian Institute of Petroleum and Energy (IIPE)

Indian Institute of Petroleum & Energy (IIPE) is established by the Government of India under the aegis of the Ministry of Petroleum & Natural Gas, in the year 2016 at Visakhapatnam in accordance with the provisions of the Andhra Pradesh Reorganization Act, 2014.The main objective of the institute is to meet the quantitative and qualitative gap in supply of skilled man power for the petroleum sector and to promote research activities needed for the growth of the sector

recognizing the challenges as a domain specific institute in research in emerging areas like Shale Gas, Coal Bed Methane, Gas Hydrates and Renewable Energy etc.The institute is co-promoted as an energy domain specific institute by the leading Public Oil PSUs namely HPCL, ONGC, OIL, GAIL & IOCL in association with the Oil Industry Development Board (OIDB).

The Indian Institute of Petroleum & Energy Act, 2017 (No. 3 of 2018) enacted by the Parliament, declares IIPE is an 'Institute of National Importance'.

Programs/ Courses:

Presently, two programs B.Tech Petroleum Engineering & B.Tech Chemical Engineering with 50 seats in each are being offered by the Institute. The students are admitted to the B.Tech Courses based on their JEE (Advanced) rankings. The first batch of B.Tech students were graduated in the month of June 2020. IIT Kharagpur is the mentor institute for IIPE.

Ph.D research courses have been commenced from the spring semester, A.Y. 2020-21. IIPE is collaborating with the leading International Universities and other National Institutions specialised in the Energy domain.

Admission Data :

Discipline	Students			
	2017-18	2018-19	2019-20	2020-21
B.Tech Petroleum Engineering	42	46	59	55*
B.Tech Chemical Engineering	41	40	49	52*
	93	83	86	107*
'*' Strength as per admissions list, as they are not physically available in campus due to the present pandemic situation on account of COVID-19.				

Campus:

IIPE is presently operating its academic and administrative activities from its temporary campus situated at the second floor of Andhra University College of Engineering, Visakhapatnam. The Government of Andhra Pradesh has made available an area admeasuring about Ac. 201.80 Cts, free of cost, at Vangali Village, Sabbavaram Mandal, Visakhapatnam District, Andhra Pradesh for construction of permanent campus. IIPE was handed over the land to an extent of Ac. 201.80 cts in the month of February 2019 by the Visakhapatnam District Administration, out of which Acs. 175.74 Cts has the clear possession of the land and the remaining balance of land i.e. Ac. 26.06 Cts, is covered by the Court case.

IIPE has made MoUs with Andhra Pradesh Industrial Infrastructure Corporation (APIIC) for construction of boundary wall in the alienated landand with CPWD for construction of buildings as per plan approvals submitted by the licensed architecture agency. Presently, the boundary of webinars were organised involving the distinguished and academic experts like Prof. Ian Griffiths, Mathematical Institute, University of Oxford, Dr. Kalachand Sain, Director, Wadia Institute of Himalayan Geology, Dehradun, Shri CM Jain, Former ED, ONGC Videsh Limited, Shri Shailendra Gokhale, Rosefield DAA, Dr. Vikas Mehto, Professor, Dept. of Petroleum Engineering, IIT (ISM) Dhanbad. Though students were not physically available due to Covid-19, they were encouraged in participation in online competitions.

Future plan:

(i) Planned to start two PG programs from the A.Y. 2021-22, out of which one shall b e on energy based program;

(ii) Extension of the present temporary campus for starting new PG courses at the present premises;

(iii) Phase-1 construction of permanent campus at the alienated site after clearance o f

wall construction at the alienated site is in progress.

ReOPEN-2020:

IIPE has conducted its first International workshop on "Research Opportunities in Petroleum, Energy and Natural Gas (ReOPEN-2020) at Visakhapatnam from 24 – 27 February, 2020. Shri M.K. Surana, Chairman and Managing Director, HPCL attended as the Chief Guest for the Inauguration. Many renowned professors from India and abroad gathered on the occasion to discuss advanced research opportunities and challenges associated with petroleum, renewable energy and natural gas processing. The session was followed by the panel discussion and various research and job opportunities existed in petroleum & energy sectors were highlighted apart from imparting the technical knowledge.

IIPE-AAPG Student Chapter:

IIPE- AAPG (American Association of Petroleum Geologists) Student Chapter was inaugurated to foster scientific research; to advance the science of geology, especially related to petroleum, natural gas, other subsurface fluids and mineral resources; to promote environmental-friendly technology and to induct high professional conduct. The student chapter program of AAPG plays a critical role by providing an avenue where undergraduate and graduate students can engage in meaningful networking opportunities, and connect with professionals, both inside and outside of academia. As part of IIPE-AAPG Student Chapter, IIPE conducted various geological field trips and other academic related activities during the Academic year.

IIPE – IIChE Student Chapter:

Indian Institute of Chemical Engineers, which is a confluence of steams of professionals from academia, research institutes and Industry provides appropriate forum for joint endeavours, hand-in-hand, to work for the benefit of the society through application of chemical engineering and allied sciences. IIPE has inaugurated its Student Chapter during this academic year and conducted various activities such as Logo Competition, industrial visit and quiz competition as part of its inaugural session.

In spite of Covid situation, the classes were organised through online mode. Also number

the land under litigation and handed over by the AP State Government;

(iv) Implementation of MoUs made with University of Houston (UoH) and Texas A&M University, USA for interaction and collaboration between faculty, staff and students and faculty exchange programs.

(v) Encouraging the Quality Research among the faculty & students;

(vi) Extending MoUs with Internationally & Nationally reputed Universities in the energy domain.

14.5.7 Petroleum & Analysis Cell (PPAC)

Introduction:

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 Governing Body under the chairmanship of Secretary, P&NG and senior officials of MoP&NG and Chief Executives of major oil and gas PSUs as members, provides necessary supervision and guidelines in the functioning of PPAC. It is attached to the Ministry of Petroleum and Natural Gas (MoP&NG) to assist the Government, inter alia, in discharging 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.

Important Database and dissemination of regular MIS Reports on oil and gas sector:

PPAC maintains data related to production, consumption, import and export of crude and petroleum products and oil infrastructure. It also maintains data related to production of

natural gas, import of LNG and consumption of natural gas and on the CGD sector. Under the mandate of PPAC, many daily, fortnightly, monthly, six-monthly and annual reports are published on PPAC's website http://ppac.gov.in as well as on the mobile app "PPACe" available on Apple App store and Google Play store. These reports pertain to daily prices of crude oil and petroleum products, Industry Sales Review, LPG Sales, crude oil processing and production, POL products imports & exports, consumption and import of Natural Gas etc. Besides the regular Reports and inputs on Petroleum products, PPAC also carries out many studies on the Demand, Supply, Transportation and Pricing of MS, HSD, LPG, Gas etc. The Reports by the PPAC assist the Policy makers and are also much demanded and appreciated by the Industry as well as other institutions and organisation in oil and gas sector.

Price Trends of Petroleum products and impact of subsidy/under-recoveries:

A Crude Oil:

Due to India's reliance on imports to meet the domestic 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, 2016-17 and 2017-18 was recorded at $46.17/bbl, $47.56/bbl and $56.43/bbl respectively. The price increased to $ 69.88/ bbl during 2018-19 and fell to $60.47/bbl in 2019-20 . The prices increased from a low of $19.90 / bbl during April 2020 to a high of $56.26/bbl during Jan 2021.

B Petrol and Diesel:

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.

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.

C Domestic LPG (Subsidised):

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.

Since May, 2020, there is no subsidy to consumer on Domestic LPG (at Delhi Market) under the DBTL scheme. However, in far-flung areas and some other markets, there is some subsidy mainly due to higher inland freight from port to bottling plant.

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 and whose name is appearing in the Socio- Economic Caste Census 2011. The said scheme was revised in March, 2018. Under the revised scheme, a total of 8 crore BPL households were covered over a period of 4 years (till 2019-20) with additional inclusion of BPL families covered under one of the following categories:

a) Antyodaya Ann Yojana (AAY)

b) Pradhan Mantri Awas Yojana (Gramin)

c) SC/ST households

d) Forest dwellers

e) Most backward classes

f) Tea and Ex- Tea Garden tribes

g) People residing in islands and river islands.

The objective of the scheme is to provide clean fuel to all poor households.

The said scheme was further revised

in December, 2018. Under the latest guidelines, the benefit was to be extended to such poor households which were not covered either in the SECC list or in the expanded categories as per guidelines revised in March, 2018.

The target of 8 crore connections has been achieved in September 2019, well ahead of the target completion date.

In the Union Budget 2021-22, the scheme has further been extended to cover 1 crore more beneficiaries.

To help the poor to fight the battle against corona virus, the Government decided to provide gas cylinders free of cost to the beneficiaries under Pradhan Mantri Ujjwala Yojana (about 8 crore) for a period of 3 months under Pradhan Mantri Garib Kalyan Yojana. These cylinders were initially supplied for the period April-June 2020.

The scheme was extended for 3 months w.e.f 1st July 2020 till 30th September 2020 for those beneficiaries who had been credited with the advance for buying first/ second cylinder, but were not able to buy the free cylinders till 30th June 2020.

The scheme was further extended for 3 months w.e.f 1st October 2020 till 31st December 2020 for those beneficiaries who had been credited with the advance for buying first/second cylinder, but were not able to buy the free cylinders till 30th September 2020.

D PDS Kerosene

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.

E Subsidy/ Under-recovery

The total subsidy/under-recovery on petroleum products (including DBTL subsidy, PMUY subsidy, DBTK subsidy and Natural gas Subsidy for North East) for the year 2019-20 was Rs.26,621 crores in comparison to Rs.43,814 crores in 2018-19.

F Important Activities:

Some of the important activities during 2019-20 undertaken by PPAC were as follows:

Domestic natural gas pricing and ceiling price for gas produced from discoveries in deep water, ultra- deep water and high pressure-high temperature areas: fir notification and issuance were under the provisions of the New Domestic Natural Gas Pricing Guidelines, 2014: Domestic Natural Gas prices were notified for the periods 01.04.2020 to 30.09.2020 and from 01.10.2020 to 31.03.2021 in line with the New Domestic Natural Gas Pricing Guidelines, 2014.

Study on sectoral consumption of petrol and diesel to be carried out across 20 states & 2 UTs covering 3000 retail outlets for a period of 7 days per RO in a quarter spread across 4 quarters. The study aims at capturing sector wise consumption data for petrol and diesel sold across the country. M/s. CRISIL has been awarded the tender to carry out the study and has started the survey on 01.10.20. A total of about 3000 Retail outlets have been covered in first quarter of survey. The work for 2nd quarterly study has also started.

Involvement of PPAC in many Strategic Committees / Study Groups for the Oil & Gas Sector : PPAC, during the year, has been involved in various Strategic Committees / Study Groups of the Ministry to study , inter-alia, allocation of domestic crude to PSU Refineries , review the definition of Indian Basket of Crude Oil, review the definition of Remote Retail Outlets, re-assessment of strategies for import reduction in the Oil & Gas sector and strategies to increase the share of Gas consumption in the primary energy mix.

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 awarenes 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 Regulatory Board (PNGRB) was constituted under the PNGRB Act, 2006 (NO. 19 of 2006) notified via Gazette Notification dated 31stMarch, 2006. The Act provides for the establishment of PNGRB to protect the interests of consumers and entities engaged in specified activities relating to petroleum, petroleum products and natural gas and to promote competitive markets and for matters connected therewith or incidental thereto. The Board under the Act has to regulate the refining, processing, storage, transportation, distribution, marketing and sale of petroleum, petroleum products and natural gas excluding production of crude oil and natural gas so as to ensure uninterrupted and adequate supply of petroleum, petroleum products and natural gas in all parts of the country. The vision of PNGRB is as under:

"To create a vibrant energy market with rapid and orderly growth through facilitation of flow of investments into the basic infrastructure for efficient transportation and distribution of petroleum, petroleum products and natural gas at minimum cost and high level of protection of consumer interests through fair trade practices and competition amongst the entities so as to ensure the enhanced competitiveness of Indian economy and customer satisfaction."

PNGRB has authorized Mumbai - Nagpur - Jharsuguda Natural Gas Pipeline (MNJPL) to M/s GAIL (India) Limited (approx.1405 Km) and North-East Natural Gas Pipeline Grid to M/s Indradhanush Gas Grid Limited (approx.1656 Km).

In order to expand the coverage of CGD Networks, PNGRB has granted authorization for 86 GAs under 9th CGD Bidding Round and 50 GAs under 10th CGD Bidding Round. So far 232 Gas have been authorized for development of CGD Networks across the country spread over 27 States/ UTs.

The PNGRB has signed a Memorandum of Understanding with American Society of Mechanical Engineers (ASME) on 17th August 2020 to develop joint collaboration between ASME and PNGRB to inter alia associate to develop knowledge of the standards/regulations, conformity assessment system and inspection in Oil & Gas sector within India.

The Board formulated Petroleum and Natural Gas Regulatory Board (Gas Exchange) Regulations, 2020 for regulating the establishment and operations of gas trading exchange(s) which is expected to secure suitable distribution and increase availability of natural gas by creating a free gas market to usher in gas-based

economy in the country. These regulations were notified on 28thSeptember, 2020 to regulate the establishment and operation of the gas exchanges and clearing corporations. On 2nd December, 2020, PNGRB authorised India Gas Exchange Limited (IGX) as first Gas Exchange in the country which started operating as the Gas Exchange since 10thDecember, 2020.

PNGRB has notified the CGD Guiding principles and amendment in the CGD Access code regulations, which shall have the provisions for opening up of the CGD business in the CGD networks. These regulations are to regulate the open access and to protect the interest of consumers and entities by fostering fair trade and competition. Once the CGD networks, for which marketing exclusivity has been expired, shall be declared as common carrier or contract carrier, open access will be provided to the third party for using these authorized CGD networks. This will result in overall development of the CGD networks and increase in share of natural gas in the energy basket of India.

14.5.10 Indian Strategic Petroleum Reserves Limited (ISPRL)

To ensure energy security, Government of India had decided to build a strategic crude oil reserve of 5.33 MMT through a Special Purpose Vehicle (SPV). The SPV named Indian Strategic Petroleum Reserves Limited (ISPRL) was initially a subsidiary of Indian Oil Corporation Limited, which w.e.f. 09.05.2006, became a wholly owned subsidiary of Oil Industry Development Board (OIDB).

ISPRL Phase – I

Under Phase I of Strategic Petroleum Reserve (SPR) programme, Government through ISPRL has built SPR facilities with a total capacity of 5.33 MMT at three locations viz. Visakhapatnam (1.33 MMT), Mangalore (1.5 MMT) and Padur (2.5 MMT). The total reserve of Phase-I of SPR is currently estimated to supply approximately 9.5 days of India's crude requirement.

All the three facilities i.e. Visakhapatnam, Mangalore & Padur have been commissioned in June'2015, October'2016 and December'2018 respectively. All these three facilities were dedicated to the Nation by Hon'ble Prime Minister on 10th February'2019.

ISPRL Crude was first time released for Mangalore Refinery and Petrochemicals Limited (MRPL) from ISPRL Mangalore Cavern in Aug 2019. Subsequently crude oil was released from Padur facility also to MRPL in Oct 2019.

The COVID-19 pandemic that gripped the world, and effected sever lockdowns globally,impacted the crude oil demand world over and India was no exception. The refineries operated at a bare minimum capacities, as a result of drastic reduction in the demand for petroleum products. This coupled with increase in supply of crude, resulted in a demand supply imbalance which saw the crude oil prices nosedive across the globe. To take advantage of the prevailing low crude oil prices, Govt. of India decided to fill the Strategic Reserves on priority.

In this context, the Government had earlier allocated Rs.690 Crores from the Budgetary allocation for the year 2020-21 for filling one compartment at Padur. To leverage the down turn in global crude prices, Government of India further allocated Rs.3184 Crores towards filling the SPRs in Phase I during the year 2020-21.

MoPNG, advised the Oil Marketing Companies (OMCs) ,BPCL, IOCL, HPCL and MRPL to fill the crude in the SPRs. Approximately, 16.37 million bbls for Mangalore and Padur and 0.34 million bbls of crude oil for Vishakhapatnam, thus total of 16.71 MillionBbls was procured for filling the SPR' The strategic reserves at all the three locations werecompletelyfilled duringApril & May'2020, and a small quantity in Oct'2020.

The average cost of procurement was 19$/bbl as compared to US$60 per bbl prevailing at the beginning of the year in Jan 2020. This resulted in substantial savings to Govt. of India to the tune of Rs 5069 Crore (US$685.11 Million).

Agreement with ADNOC

An agreement was signed between ADNOC and ISPRL on 10th Feb'2018, permitting ADNOC to use one compartment at Mangalore. As per the agreement, ADNOC stored approx. 5.8 Million Barrels of crude at ISPRL's Mangalore cavern. ADNOC use a portion of this oil as commercial supply to its customers in India, while the rest will remain as strategic storage to be released

to meet emergencies such as supply disruptions due to natural disaster or geopolitical factors. The Mangalore facility has two compartments of 0.75 MMT each. One of the compartments has been given to Abu Dhabi National Oil Company (ADNOC).

In order to enhance the commercial viability of the existing Strategic Petroleum Reserves of ISPRL, Government of India approved modification of 'ADNOC Model' in October 2020, wherein the Caverns can be offered to ADNOC on 50:50 basis i.e. 50% strategic and 50% commercial, from the current 65:35 applicable presently.

Commercial utilization of ISPRL facilities

On request of ADNOC, ISPRL successfully loaded first commercial consignment containing approx. 8,68,000 Barrels of Das grade crude oil to HPCL, Vizag on 11-13th Dec 2019 as per the terms of Agreement between ADNOC and ISPRL. Thereafter ADNOC has sold crude consignments from the SPR to MRPL and BPCL and replenished it as per the contractual terms.

ISPRL Phase – II

The Union Cabinet on 27th June'2018 gave "In Principle" approval for establishing 6.5MMT Strategic Petroleum Reserves at two locations Chandikhol (4 MMT) in Odisha and at Padur (2.5 MMT) Karnataka including dedicated SPM's for the two SPR's. The 'In Principal' approval is to take up the project under PPP model to reduce budgetary support of Government of India.

On completion of 6.5 MMT storage envisaged in Phase II, there will be an additional storage capacity created to cover another 12 days of crude oil requirement. Thus, the total cover would be approximately 21 days.

Land acquisition activities for both the locations i.e. Chandikhol, Odisha and Padur II, Karnataka is in progress. Environment Impact Assessment for both the sites are being done by NEERI. Request for Proposal (RFP) for prospective investors to participate in Phase 2 of SPR Projects under Public Private Partnership (PPP) mode is in final stages of approval and can be issued shortly.

14.5.11: Society For Petroleum Laboratory (SFPL)

Fuel Testing Laboratory (FTL) situated at Noida, is registered in the name of Society For Petroleum Laboratory (SFPL), was set up in the year 2000 in compliance of the directives by Hon'ble Supreme Court of India for checking quality of auto liquid in NCT/NCR to minimize vehicular pollution.

Operation and Management of Fuel Testing Laboratory is outsourced by SFPL to CSIR-Indian Institute of Petroleum (IIP) a reputed CSIR Laboratory in the field of Petroleum. FTL conducts test on fuel samples, viz. petrol, diesel & kerosene oil against the prevailing Bureau of Indian Standards (BIS) specifications applicable for NCT/NCR. The samples are drawn and submitted to FTL Noida by Government Enforcement Agencies and PSU Oil Marketing Companies from NCT/NCR.

Society for Petroleum Laboratory (SFPL) has been allocated an amount of Rs.266,54,305 under Grant-in-aid for financial year 2020-21 under General Head (non-salary after deducting previous FY's unspent balance of Rs.3,45,695/-) and Rs.12,96,000/- lakhs under Salary head(after deducting previous FY's unspent balance of Rs.1,04,000/-).

CHAPTER 15

General

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.

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 around 17 offices of our PSUs which includes offices of OIL, ONGC, IOC, BPCL, HPCL, GAIL, Balmer Lawrie, OIDB, PCRA, PPAC and EIL 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 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 a few 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 2020-21 issued by the Department of Official Language, senior officers of the Ministry inspected more than 34 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.

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 14th September to 28th September, 2020. 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.

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.

One of the important tasks assigned to the Hindi Division of the Ministry is of translation of various documents of the Ministry. The Hindi Division successfully carried out these responsibilities. The translation of various documents including the Parliament Questions, Cabinet Notes and Parliamentary Standing Committee material , MOUs etc was done well in time.

15.2 Public Grievance

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 2020-21, out of total number of 20341 PGs received, 96.35% stands disposed of as on 31st December, 2020.

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 2020, 2130 applications/receipts and 183 appeals have been received under RTI Act, 2005 in the Ministry.

15.4 Flagship Scheme

15.4.1 Start Up India

Under the Start-Up initiative of Oil and Gas sector, proposals/ applications were invited through open advertisement by the individual PSUs for funding and mentoring. The themes for the proposals included leveraging Internet of Things (IoT) in Upstream/ Midstream/ Downstream operation of Oil and Gas PSUs, Digitization of business processes, Green fuels, Alternative Energy, Improved technologies for Hydrocarbon industry besides topics of societal relevance.

The PSUs under the Ministry of Petroleum and Natural Gas have created a corpus fund of Rs.320 Crores. At present, a total no. of 167 Startups are being funded by the PSUs with a committed fund value of approximately Rs.195 Crores.

15.4.2 Skill Development

Skill Development Institutes (SDIs) for hydrocarbon sector have been set up at six cities viz Bhubaneswar, Vizag, Kochi, Ahmedabad,

Guwahati and Raebareli. Till December 2020, more than 16000 trainees have been trained in these SDIs.

Under the Pradhan Mantri Kaushal Vikas Yojna (PMKVY) Recognition of prior learning (RPL) Type-4 project, Hydrocarbon Sector Skill Council (HSSC) is in process of certifying the large uncertified workforce engaged with the Dealers, Distributors and Contractors of IOCL, HPCL and BPCL in Retail Outlet Attendant (Oil & Gas), LPG Delivery Personnel and Tank Lorry Driver (Petroleum Products) Trades. Till December 2020, assessment of more than 85000 personnel has been completed.

15.4.3 Make in India

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 CPSEs under MoPNG had been approved by the Government on 12th April, 2017. The policy aims to incentivize growth of local content in goods and services by providing purchase preference to the manufacturers/ service providers who meet the local content targets in Oil and Gas business activities. Ministry of Petroleum and Natural Gas has recently revised the policy on 17th November, 2020 in line with DPIIT's Public Procurement (Preference to Make in India) Order, 2017.

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. Ol 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-fules, National Policy on Bio-fuels, policy of Bio-fules, policy/scheme for supporting manufacturing of bio-fules, setting up of a National bio-fule Development Board and strengthening the existing institutional mechanism and research, development and demonstration on transport, stationary and other applications of bio-fuels.
8. Lube 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 Researchy Association (PCRA), etc.
15. Planning, development and regulation of oilfield services.
16. Administration of Engineers India, 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 Field (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 Pipeline (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 there under.
26. Administration of Balmer Lawrie Investment Limited and Balmer Lawrie and Company Limited.
27. Petroleum & Natural Gas Regulatory Act, 2006.
28. Matters pertaining to Gas Authority of India Limited (GAIL)
29. Matter pertaining to natural gas pipelines.
30. Matter pertaining to LNG terminals.
31. The Rajiv Gandhi Institute of Petroleum Technology (RGIPT) Act, 2007.
32. Matter pertaining to Indian Institute of Petroleum & Energy (IIPE), Act 2017 (3 of 2018)
33. Liquefied Petroleum Gas (Regulation of Supply and Distribution) Order, 2000.
34. Matter pertaining to Direct Benefit Transfer of LPG (DBTL) PAHAL.
35. Matter pertaining to Direct Benefit Transfer in Kerosene (DBTK).
36. Matter pertaining to Pradhan Mantri Ujjwala Yojana (PMUY).

Appendix-II

List of Public Sector Under takings 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 31.03.2020

1. Oil & Natural Gas Corporation Limited 60.41 %
2. Indian Oil Corporation Limited (IOCL) 51.50%
3. Bharat Petroleum Corporation Limited
4. GAIL (India) Limited 51.76%
5. Engineers India Limited 51.50 %
6. Oil India Limited 56.66 %
7. Balmer Lawrie & Co Limited

   There is not dirtect holding by Govt. of India in Balmer Lawrie & Co. Ltd. Balmer Lawrie Investments Ltd. (BLIL), a Government Company holds 61.8% of shares in Balmer Lawrie & Co. Ltd. Central Govt. holds 59.57% in Balmer Lawrie Investments Ltd.

II. Subsidiaries and other Companies

1. ONGC Videsh Limited-Wholly owned by ONGC
2. Mangalore Refinery & Petrochemicals Limited Subsidiary of ONGC
3. Hindustan Petroleum Corporation Limited (HPCL) subsidiary of ONGC
4. Petronet MHB Limited (PMNBL) subsidiary of ONGC
5. Bharat Petro Resources Limited-Subsidiary of BPCL
6. Numaligarh Refineries Limited-Subsidiary of BPCL
7. Chennai Petroleum Corporation Limtied-Subsidiary of IOCL
8. Certification Engineers Internatioinal Limite-Wholly owned by EIL
9. EIL Asia Pacific Sdn BHD-Wholly owned by EIL
10. GAIL Gas Limited-Wholly owned by GAIL

III. Other Organisations

1. Oil Industry Development Board
2. Petroleum Conservation Research Associaiton
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 Institute of Petroleum Energy
10. Society for Petroleum Laboratory

Appendix-III

Production of Crude Oil and Natural Gas

State/Region	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21 (Apr-Dec) (P)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
I. Production of Crude oil (TMT)							
Andhra Pradesh	254	295	276	322	296	243	145
Arunachal Pradesh	76	57	55	50	43	56	41
Assam	4466	4185	4203	4345	4309	4093	2948
Gujarat	4653	4459	4605	4591	4626	4707	3487
Rajasthan	8848	8602	8165	7887	7667	6653	4411
Tamil Nadu	240	255	284	345	395	415	307
Offshore	18924	19089	18421	18145	16868	16003	11643
Total Crude Oil Production	37461	36942	36009	35684	34203	32169	22982
of which							
ONGC-Nomination	22264	22360	22218	22249	21042	20627	15209
OIL-Nomination	3412	3226	3258	3376	3293	3107	2227
PSC Regime	11785	11356	10532	10059	9868	8436	5546
II. Production of Natural Gas (MMSCM)							
Andhra Pradesh	541	619	868	959	1081	912	624
Arunachal Pradesh	34	30	28	30	28	46	41
Assam	2958	3025	3128	3219	3289	3141	2270
Gujarat	1527	1490	1580	1607	1402	1342	853
Jharkhand (CBM)	2	2	3	4	4	5	1
Madhya Pradesh (CBM)	2	1	6	200	357	345	256
Rajasthan	1178	1338	1277	1442	1483	1883	1468
Tamil Nadu	1192	1011	983	1207	1208	1097	696
Tripura	1140	1332	1430	1440	1554	1473	1221
West Bengal (CBM)	224	389	555	531	350	306	221
Offshore	24861	23012	22038	22011	22117	20635	13479
Total Natural Gas Production	33657	32249	31897	32649	32873	31184	21129
of which							
ONGC-Nomination	22023	21177	22088	23429	24675	23746	16544
OIL-Nomination	2722	2838	2937	2881	2722	2668	1870
PSC Regime	8912	8235	6872	6338	5477	4770	2715

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

(Figures in TMT)

Refinery	Installed Capacity	Refinery Crude Throughput						
	01.04.2020	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21 (Apr-Dec) (P)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(a) PUBLIC SECTOR	**142566**	**121183**	**127087**	**137388**	**145234**	**150976**	**144716**	**89729**
IOCL, Guwahati	1000	1006	904	864	1024	863	892	590
IOCL, Barauni	6000	5944	6545	6526	5819	6661	6516	3793
IOCL, Koyali	13700	13285	13820	13994	13811	13505	13075	8560
IOCL, Haldia	8000	7650	7776	7689	7655	7965	6463	4714
IOCL, Mathura	8000	8515	8860	9230	9240	9737	8948	6389
IOCL, Digboi	650	591	562	533	666	676	664	502
IOCL, Panipat	15000	14191	15282	15638	15654	15281	15038	9622
IOCL, Bongaigaon	2350	2403	2442	2486	2402	2513	2045	1814
IOCL, Paradip	15000	-	1817	8230	12730	14616	15778	8776
Total IOCL	69700	53586	58007	65191	69001	71816	69419	44759
BPCL, Mumbai	12000	12821	13371	13541	14054	14773	15017	8980
BPCL, Kochi	15500	10356	10712	11820	14095	16051	16515	8915
Total BPCL	27500	23177	24083	25362	28149	30823	31532	17895
HPCL, Mumbai	7500	7408	8013	8510	8641	8671	8065	5379
HPCL, Vishakhapatnam	8300	8770	9220	9335	9635	9773	9115	6647
Total HPCL	15800	16179	17234	17846	18276	18444	17180	12026
CPCL(MRL), Manali	10500	10251	9100	9725	10289	10271	10161	5604
CPCL(MRL), Narimanam	1000	531	544	531	500	423	0	0
Total CPCL	11500	10782	9644	10256	10789	10695	10161	5604
NRL, Numaligarh	3000	2777	2520	2683	2809	2900	2383	1991
MRPL, Mangalore	66	14632	15532	15965	16130	16231	13953	7396
ONGC, Tatipaka	15000	51	67	86	80	66	87	59
(b) PRIVATE SECTOR	**88200**	**88533**	**88662**	**91093**	**91163**	**88041**	**89515**	**58109**
RIL, Jamnagar	33000	30867	32428	32823	33153	31752	33019	25680
RIL, SEZ-Jamnagar	35200	37174	37133	37351	37317	37393	35876	19930
Total RIL	68200	68042	69561	70174	70470	69145	68895	45610
NEL, Vadinar	20000	20491	19101	20919	20693	18896	20620	12499
(c) JOINT VENTURE	**19100**	**13526**	**17116**	**16882**	**15538**	**18189**	**20155**	**12524**
BORL, Bina	7800	6209	6402	6360	6708	5716	7913	4292
HMEL, Bathinda	11300	7318	10713	10521	8830	12473	12242	8232
Grand Total	**249866**	**223242**	**232865**	**245362**	**251935**	**257205**	**254386**	**160361**

Note: Totals may not tallydue to rounding off figures.

P: Provisional

Source: CPSEs

Appendix-V

Production of Petroleum Products

(Figures in TMT)

Products	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21 (Apr-Dec) (P)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
LPG	9840	10568	11326	12380	12786	12823	8856
Motor Spirit	32325	35321	36593	37784	38039	38616	25766
Naphtha	17391	17861	19946	20006	19786	20679	14000
ATF	11103	11789	13831	14594	15479	15238	4664
Kerosene	7559	7503	6041	4408	4072	3141	1766
HSD	94428	98588	102484	107904	110535	111198	72406
LDO	358	429	629	562	702	643	570
Total Fuel Oils	11919	9727	9962	9486	10032	8610	5349
of which							
a) Furnace Oil	11248	9468	9694	9019	9598	8173	4885
b) LSHS/HHS/RFO	671	259	268	468	434	437	465
Lube Oils	946	1037	1029	1036	949	932	730
Bitumen	4632	5157	5185	5277	5803	5244	3408
Petroleum Coke	12448	13322	13936	14754	14676	15528	9317
Others	18188	20622	22589	26215	29503	30291	22237
Total Production of Petroleum Products	**221136**	**231923**	**243551**	**254405**	**262361**	**262944**	**169071**
of which							
Refineries	**217141**	**227907**	**239256**	**249797**	**257430**	**258181**	**165870**
Fractionators	**3994**	**4016**	**4294**	**4608**	**4931**	**4763**	**3200**

Note: Totals may not tally due to rounding off figures

P: Provisional.

Source: CPSEs

Appendix-VI

Consumption of Petroleum Products

(Figures in TMT)

Products	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21 (Apr-Dec) (P)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
LPG	18000	19623	21608	23342	24907	26330	20580
Motor Spirit	19075	21847	23765	26174	28284	29975	20144
Naphtha	11082	13271	13241	12889	14131	14268	10461
SKO	7087	6826	5397	3845	3460	2397	1357
ATF	5723	6262	6998	7633	8300	7999	2356
HSDO	69416	74647	76027	81073	83528	82602	52130
LDO	365	407	449	524	598	628	566
Fuel Oil (FO+LSHS)	5961	6632	7150	6721	6564	6302	4398
Lubes/Greases	3310	3571	3470	3884	3668	3833	2537
Bitumen	5073	5938	5935	6086	6708	6720	4799
Petroleum Coke	14558	19297	23964	25657	21346	21708	13454
Others	5870	6352	6593	8339	11723	11365	7836
Total Consumption	**165520**	**184674**	**194597**	**206166**	**213216**	**214127**	**140617**

Notes: Consumption includes sales by oil companies, own consumption & direct private imports

P: Provisional

Source: PPAC

Appendix-VII

Imports / Exports of Crude Oil and Petroleum Products

ITEM	2016-17			2017-18			2018-19			2019-20			2020-21 (Apr-Dec) (P)		
	TMT	Rs. Crore	Million USD	TMT	Rs. Crore	Million USD	TMT	Rs. Crore	Million USD	TMT	Rs. Crore	Million USD	TMT	Rs. Crore	Million USD
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Imports															
Crude Oil	**213932**	**470159**	**70196**	**220433**	**566450**	**87803**	**226498**	**783183**	**111915**	**226955**	**717001**	**101376**	**143232**	**293752**	**39501**
Product															
LPG	11097	32124	4775	11380	37875	5849	13235	49939	7178	14809	50347	7070	12274	35254	4719
MS	476	1617	239	174	581	91	670	3104	445	2146	9610	1357	1013	3324	452
Naphtha	2777	8374	1240	2212	8161	1261	2082	9665	1391	1662	6678	941	1034	2619	349
ATF	338	1109	163	300	1159	178	259	1392	200	65	309	45	0	0	0
SKO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HSD	1008	2959	438	1361	4269	660	555	2486	360	2796	11619	1632	561	1686	227
LOBS/ Lube oil	2131	8625	1276	2539	12075	1860	2457	13349	1910	2675	11869	1673	1545	6907	921
Fuel Oil	925	1848	273	1213	3231	499	1419	4782	696	4583	11791	1650	4485	8898	1190
Bitumen	951	1638	242	950	1902	293	877	2149	309	1630	3634	510	1216	1993	265
Petcoke	14416	7929	1174	12777	11100	1709	7926	10350	1494	10674	9713	1374	8279	5319	708
Others	2169	5342	793	2556	8020	1237	3869	16449	2358	2749	10172	1438	1644	4793	638
Total Product Import	**36287**	**71566**	**10614**	**35461**	**88374**	**13637**	**33348**	**113665**	**16341**	**43788**	**125742**	**17689**	**32050**	**70793**	**9469**
Total Import	**250219**	**541725**	**80810**	**255894**	**654824**	**101440**	**259846**	**896848**	**128255**	**270742**	**842743**	**119065**	**175282**	**364544**	**48970**
Exports															
LPG	317	1168	173	359	1501	231	417	1976	283	463	1970	277	318	1139	152
Petrol	15417	52920	7895	14036	54580	8464	12885	60419	8641	12710	54512	7708	8542	23281	3154
Naphtha	8727	24616	3666	8951	29075	4505	6963	28893	4137	8897	31509	4439	4556	10682	1442
Aviation Turbine Fuel	7271	22294	3324	7183	25348	3931	7389	34030	4867	6906	28458	4021	2394	5285	719
SKO	15	54	8	17	68	10	19	98	14	176	560	78	10	29	4
HSD	27302	79857	11905	29717	99454	15420	27833	123519	17625	31653	123919	17481	23074	54924	7449
LDO	151	399	59	18	37	6	99	364	50	0	0	0	0	0	0
Lubes	13	104	15	13	118	18	8	106	15	8	96	13	13	70	9
Fuel Oil	2248	3930	583	2525	5291	817	2197	6537	923	1527	3811	537	791	1137	152
Bitumen	38	37	6	64	119	18	23	72	10	25	89	13	6	21	3
Petcoke/ CBFS	673	804	121	561	687	107	1124	3255	463	465	1096	155	576	281	37
Others	3344	8710	1294	3387	9110	1412	2140	8429	1208	2854	7998	1128	1828	4581	612
Total Export	**65513**	**194893**	**29049**	**66833**	**225388**	**34940**	**61096**	**267697**	**38236**	**65685**	**254018**	**35848**	**42108**	**101429**	**13733**
Net Import	**184706**	**346832**	**51760**	**189061**	**429436**	**66500**	**198750**	**629152**	**90020**	**205057**	**588725**	**83217**	**133174**	**263115**	**35237**
Net Product Export	**29226**	**123327**	**18436**	**31372**	**137014**	**21303**	**27747**	**154031**	**21895**	**21898**	**128276**	**18159**	**10058**	**30636**	**4264**

Source: Oil companies and DGCI&S
(P): Provisional

Appendix-VIII

Internal & External Budgetary Resources

(Figures in Rs. Crore)

CPSEs	2015-16	2016-17	2017-18	2018-19	2019-20		2020-21	
	Actual	Actual	Actual	Actual	BE	Actual	BE	Actual**
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
CPSE-wise Internal & Extra Budget Resources								
ONGC	30110	28006	72902	29450	32921	29538	32502	17611
OVL	6470	17617	6798	5827	5161	5435	7235	4160
OIL	3622	11083	8154	3181	4105	4247	3877	2523
GAIL	1880	1814	3680	7143	5339	4562	5412	3437
IOCL	11485	20737	21457	28208	25084	31421	26233	15805
BPCL	8287	16949	8998	10993	7900	11064	9000	5626
HPCL	1430	5757	7210	12438	9500	16311	11500	7603
MRPL	1550	616	1281	1072	818	1318	1150	732
CPCL	1272	1269	1020	1314	1105	961	569	382
NRL	70	503	420	465	455	529	949	624
BL	45	74	83	132	40	46	35	19
EIL	*	*	*	87	1212	171	60	27
Total (I&EBR)	**66223**	**104426**	**132004**	**100309**	**93639**	**105603**	**98522**	**58550**
Exploration & Production Sector	-	72383	95455	49613	49057	44769	51750	28254.69
Refining & Marketing Sector	-	30524	32794	46990	39391	56668	42562	27275.50
Petro-Chemicals Sector	-	1446	3672	3487	3940	3949	4499	2973.01
Engineering Sector	-	74	83	219	1252	217	110	46.41
Total (I&EBR)	**-**	**104426**	**132004**	**100309**	**93639**	**105603**	**98922**	**58550**

Note: BE IEBR 2020-21 as printed in Expenditure budget document 2020-21.

*: For the purpose of reporting IEBR , EIL was introduced first time w.e.f 2018-19.

**: Actual upto 31.12.2020

Source: Central Public Sector Enterprises

Appendix-IX

PSU-WISE VARIATION IN PROFIT BEFORE TAX (PBT) AND PROFIT AFTER TAX (PAT) 2019-20 VIS-À-VIS 2018-19.

ONGC

Reasons for reduction in PBT and PAT for FY 2019-20 vis-à-vis actual FY 2018-19

Variation in estimated PBT and PAT for FY 2019-20 vis-à-visactual FY 2018-19 is mainly due to reduction in crude oil price from $68.19/bbl in FY 2018-19 to $58.61/bbl for FY 2019-20 and higher impairment provision in FY 2019-20 , due to low crude prices.

This was partially offset due to improvement in gas price from$3.21/MMBTU to $3.46/MMBTU and exchange rate from Rs 69.89/$ to Rs 71/$.

IOCL

Variation in estimated PBT for Financial Year(FY) 2020-21 vis-a-vis 2019-20 is mainly on account of inventory gains in current FY as against huge inventory losses, a part of which was also shown as exceptional item in previous FY. In current FY, there is improvement in Petrochemical Margins and reduction in Finance Costs. Further, the company is reporting exchange gains in current FY against exchange losses in previous FY.

GAIL

The estimated profitability for FY 2020-21 is lower than FY 2019-20 due to COVID and related disruption in market leading to volatility in product pricing of LNG, LHC and petrochemical.

OIL

Profit Before Tax (PBT) for the year 2019-20 was lower at Rs. 2,120.10 crore as compared to Rs. 3,916.22 crore in the year 2018-19.The reduction is primarily due to lower crude oil price realization by about USD 7.75/BBL in 2019-20and impairment provisions. The reduction in PBT is largely offset by tax adjustment due to adoption of new concessional Tax Rate of 25.17% effective financial year 2019-20. As a result, the profit after tax (PAT) for 2019-20 was maintained almost at the level of profit in 2018-19.

BPCL

Reduction in PAT and PBT in FY 2019-20 vis-à-vis FY 2018-19 is mainly due to significant decrease in Refining Margin, coupled with incurrence of significant foreign exchange losses due to depreciation of Indian Rupee vis-à-vis Dollar. Further, due to outbreak of Covid-19 pandemic, there was significant reduction in crude oil prices which resulted in huge inventory losses at period end

EIL

There is an increase in Profit before Tax (PBT) and Profit after Tax (PAT) in FY 2019-20 (actual) as against that of FY 2018-19 (actual) primarily due the receipt of Change order from one of the Client in consultancy & engineering Projects segment, in which the work was done in the previous year. The Financial impact of the same on profit is to the tune of Rs. 85 Crore on PBT and corresponding impact to the tune of Rs. 60 Crore on PAT in terms of the accounting principles.

ONGC Videsh Limited (OVL)

Reasons for reduction in PBT and PAT for FY 2019-20 vis-à-vis actual FY 2018-19

"Profit before tax (PBT) for the company was more over in-line with FY 2018-19 however the main reason for lower profitability in FY 2019-20 compare to FY 2018-19 is higher impairment provision due to low crude prices."

HPCL

International Oil market faced an unprecedented volatile environment in 2020, impacted massively by COVID-19 pandemic, restrictions imposed during consequent lockdowns and the resultant demand collapse. In India, such impact of price volatility and loss of demand of petroleum products was felt during Mar 2020 thus severely impacting the financials for FY 2019-20. HPCL's Profit before tax for FY 2019-20 is Rs. 1,573 Crore (PAT: Rs. 2,637 Crore) as compared to Rs. 9,339 Crores (PAT: Rs. 6,029 Crore) for 2018-19. Variation in profits is primarily on account of inventory losses and foreign exchange losses during 2019-20 as compared to inventory gains & lower foreign exchange losses during the 2018-19.

Average Crude price has decreased from $ 60.50/ bbl in FY 2019-20 to $ 40.27/bbl in FY 2020-21 (till

Jan 2021), and Rupee has depreciated from Rs. 70.88 /$ average in FY 2019-20 to Rs. 74.48/$ average in FY 2020-21 (till Jan 2021).

MRPL

Decrease in PBT and PAT for the FY2019-20 vis-a-vis FY2018-19 was mainly on account of unprecedented water scarcity which affected the plant operation for a month and half in first quarter and a minor landslide of an aftermath of the intensified monsoon in Dakshina Kannada Dist during the second Quarter. The third and fourth quarters were effected due to significant drop in crude prices, exchange rate variation and also outbreak of COVID 19 pandemic.

CPCL

Increase in PBT and PAT in 2019-20 vis-à-vis PBT and PAT in 2018-19 is mainly due to sustained reduction in produce cracks and consequentially GRM, i.e. It was compounded in the later part of the year by fall in crude and product prices due to COVID-19, resulting in significant write down.

Balmer Lawrie & Co. Ltd

The negative variance of 17% in PBT for the year 2019-20 as compared to 2018-19 is primarily due to onset of Covid-19 pandemic during the last quarter of F.Y. 2019-20, and specifically affected our Logistics – Freight Forwarding business due to early onset in Europe.

However, the variance in PAT of 6% for the year 2019-20 as compared to 2018-19 is due to offset on account of substantial reduction in applicable Tax Rates in F.Y. 2019-20.

Appendix-X

Position of ATN in respect of Audit Observation 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 resubmission 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
16	2018	9	6	19	-
17	2019	11	13	14	3
18	2020	12	6	4	2

Paras contained in Inspection Reports: A total of 36 Inspection Reports (IR) Paras from 04 IR were outstanding against this Ministry as on 31.12.2019. In the meantime, 07 Paras have been settled in the latest audit held during 27.07.2020 to 06.11.2020 and 12 new paras have been added for the Financial Year 2019-20. Hence, as per the latest intimation by the Audit on 07.12.2020, a total of 41 Paras from 05 IR have been shown pending including new paras for the year 2019-20.

5. Report No. 10 of 2020 of CAG of India on Union Government (Economic & Service Ministries-Civil) - Compliance Audit Observations

Ministry of Petroleum and Gas

• Government of India awarded 254 blocks during New Exploration and Licensing Policy (NELP) I to IX rounds for exploration of oil & gas. As per the terms and conditions of Production Sharing Contracts (PSC), contractors are required to pay cost of unfinished minimum work programme (CoUMWP), if the block is relinquished or terminated by Government. However, contractors of 54 relinquished blocks failed to pay the CoUMWP as specified in PSCs.

• An amount of US$ 510.79 million (₹3,652.64 crore), which was 77 per cent of the Ministry of Petroleum and Natural Gas (MoPNG) approved amount of US$ 664.67 million (₹4,753.03 crore) on account of CoUMWP in respect of 45 blocks still remained unrecovered (September 2019). The CoUMWP for nine blocks is yet to be worked out by Directorate General of Hydrocarbons (DGH) / approved by MoPNG.

• The delay in determination/ working out and approval of the CoUMWP for relinquished/ terminated blocks was not only on the part of contractors but was also on the part of DGH/ MoPNG. DGH has not been able to finalise rates of benchmarking of costs and building of databank till date (September 2019). Non-maintenance of cost data by DGH, which was required as per Government Policy of December 2007, resulted in multiple and prolonged communications for seeking/ collection of information and data from the contractors by DGH.

(Para 5.1)

NOTES

NOTES



पेट्रोलियम और प्राकृतिक गैस मंत्रालय
भारत सरकार
Ministry of Petroleum and Natural Gas
Government of India