DIRECTORATE GENERAL OF HYDROCARBONS
Ministry of Petroleum & Natural Gas, Government of India

सत्यमेव जयते

25 YEARS OF DGH

Determination Growth Hardwork

India's Hydrocarbon Outlook 2017-18

A Report on Exploration & Production Activities

CREATION

Directorate General of Hydrocarbons was formed through a Government of India resolution dated 08.04.1993 under the administrative control of Ministry of Petroleum & Natural Gas.

OBJECTIVE

To promote sound management of the oil and natural gas resources having a balanced regard for environment, safety, technological and economic aspects of the petroleum activity.

DISCLAIMER

All boundaries shown in the maps are not authenticated.

The statistics given in the report are collated from different E&P Companies operating in India and also from available published data in public domain. The correctness of information given herein, is therefore, subjective to that extent.

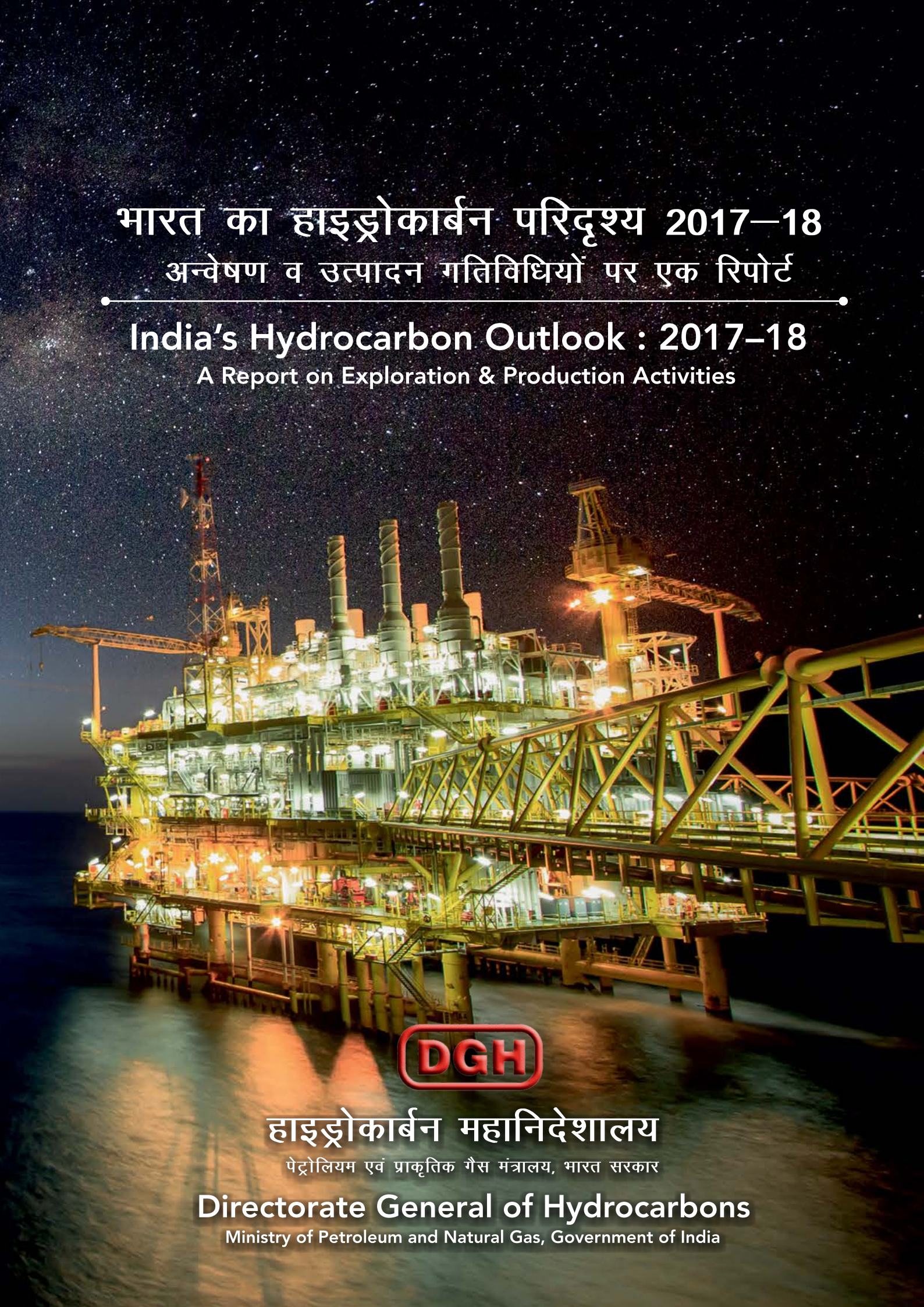
Facts and figures given in the report are provisional / indicative and cannot be used for any commercial or legal purpose. All rights are reserved. No part of this report may be reproduced or transmitted in any form or by any means without the written permission from Directorate General of Hydrocarbons, Noida, India.

भारत का हाइड्रोकार्बन परिदृश्य 2017–18

अन्वेषण व उत्पादन गतिविधियों पर एक रिपोर्ट

India's Hydrocarbon Outlook : 2017–18

A Report on Exploration & Production Activities



DGH

हाइड्रोकार्बन महानिदेशालय

पेट्रोलियम एवं प्राकृतिक गैस मंत्रालय, भारत सरकार

Directorate General of Hydrocarbons

Ministry of Petroleum and Natural Gas, Government of India

INDIAN E&P SECTOR
AT A GLANCE 2017-18

- **18 Hydrocarbon Discoveries**
  16 in Nomination and 2 in PSC regime
- **35.68 MMT**
  Crude Oil Production
- **32.65 BCM**
  Natural Gas Production
- **239.88 MMT [O+OEG]**
  In-Place Accretion
- **108.76 MMT [O+OEG]**
  Accretion of Reserves
- **6 Declaration of Commerciality**
  Approved by Management Committee in PSC regime
- **26 Field Development Plan/RFDP**
  Approved by MC: 22 in PSC and 4 in RSC regime
- **101 Active PSCs**
  10 Pre-NELP, 66 NELP 25 Small and medium size Field PSCs
- **370 Active Nomination Acreages**
  13 PEL and 357 PML Acreages
- **500 LKM**
  2D Seismic Data Acquired
- **5,059 SKM**
  3D Seismic Data Acquired
- **589 Wells Drilled**
  144 Exploratory and 445 Development wells
- **22 PML Granted**
  4 in PSC, 18 in RSC (DSF) regime
- **8,449 Essentiality Certificates**
  Issued of ₹ 28,236 Crore in value
- **₹ 5,960 Crore**
  Profit Petroleum Earned
- **₹ 7,557 Crore**
  Royalty Contribution to Central Exchequer

CONTENTS

1 Evolution of Upstream Indian Oil and Gas Industry 13
1.1 History of Upstream Oil and Gas Industry 14
1.2 Formation of Directorate General of Hydrocarbons (DGH) 22
1.3 Award Process under Pre-NELP and NELP Regime 24

2 Investors' Pick 33
2.1 Exploration 34
2.2 Production 44
2.3 Unconventional Hydrocarbons 47
2.4 Marketing & Pricing 49

3 E & P Activities 51
3.1 Exploration Activities 52
3.2 Development Activities 57
3.3 Oil and Gas Production 76

4 Geoscientific Studies 85
4.1 Hydrocarbon Resource Assessment of Indian Sedimentary Basins 87
4.2 National Seismic programme 92

5 Petroleum Resources and Reserves in India 97
5.1 Conventional Hydrocarbons 98
5.2 Hydrocarbon reserves of India 101
5.3 Reserves established under PSC+CBM regime 101
5.4 Reserve Replacement Ratio (RRR) 109

6 Unconventional Hydrocarbons 113
6.1 Coal Bed Methane (CBM) 114
6.2 Shale Gas & Oil 119
6.3 Gas Hydrate activities in India 120

7 Supplementary Information 123
7.1 Contribution to Government Exchequer 124
7.2 Memorandum of Understanding 126
7.3 RTI Annual Return Information FY 2017-18 126

8 Appendices 129
8.1 Blocks and Fields Offered under PSC and RSC regime 130
8.2 Maps of Awarded Acreages 165
8.3 Companies in Indian E&P Sector 184

धर्मेन्द्र प्रधान
ଧର୍ମେନ୍ଦ୍ର ପ୍ରଧାନ
DHARMENDRA PRADHAN

सत्यमेव जयते

मंत्री
पेट्रोलियम एवं प्राकृतिक गैस;
कौशल विकास एवं उद्यमशीलता मंत्रालय
भारत सरकार, नई दिल्ली

Minister
Petroleum and Natural Gas;
Skill Development & Entrepreneurship
Government of India
New Delhi

We are on the cusp of a transition in global energy markets, witnessing revival in crude oil prices, increasing role of natural gas in the energy mix, new players entering both the oil and gas market, loosening up of the inflexible LNG market and the rise of renewables and EVs.

As it should be in a perfect market economy, there are today a very large number of producers of oil and gas across the globe promoting free market pricing. This has led to a shift of the traditional centre of gravity in the world of oil and gas. The role of OPEC is gradually changing from price determination to price stabilization. While the world is witnessing this phenomenal change, it is in our mutual interest to play a constructive role in promoting responsible pricing, building infrastructure and removing distortions.

India today stands strong as one of the fastest growing major economy in the world and will remain so for years to come. Our Government is boosting local manufacturing, encouraging new ventures and working towards improving the lifestyle of citizens. We are committed to ensuring fiscal prudence and economic stability through enabling policy measures. In the backdrop of such transformational initiatives, India is making landmark strides in the world economy. Our rural areas are fast emerging as key demand centers for auto-fuels. At the same time, rapid urbanization in cities have led to significant increase in urban population. Our urban population is tipped to increase from 31% in 2011 to almost 41% in 2030. This trend of an upward social mobility has led to changed consumption patterns and more energy-intensive lifestyles.

In order to meet the exploding energy needs of its vast population, India imports a large proportion of its crude oil and gas requirements. It is in this context and in line to the vision of our Hon'ble Prime Minister to cut down India's import dependence for domestic energy needs by 10% in the near future, the Ministry has introduced landmark changes in the Indian Upstream E&P sector by launching a slew of policy initiatives. The launch of Discovered Small Fields (DSF) Policy and Hydrocarbon Exploration and Licensing Policy are a few to name. These new policy framework is characterized by progressive features such as uniform license for all forms of hydrocarbons, low regulatory burden through revenue sharing model, easy entry through DSF, marketing and pricing freedom for all the oil and gas produced so as to ensure a level playing field for the global investor community.

The recent policy initiatives are a part of Government's "Ease of Doing Business" initiative to make Indian oil & gas sector fair, transparent and investor friendly through appropriate regulatory, fiscal and policy interventions. The World Bank declared that India has moved up 30 places (to 100 h rank) in the Global Ease of Doing Business rankings. Government has also identified oil and gas sector as one of the 25 priority areas for promotion of manufacturing under the "Make in India" campaign.

I am pleased to say that Directorate General of Hydrocarbons (DGH), the technical arm of Ministry of Petroleum & Natural Gas, has been successful in facilitating companies in Upstream Oil Industry by extending all possible help within the ambit of contractual terms. I compliment DGH on its Annual Publication "India's Hydrocarbon Outlook: 2017-18" that encapsulates the E&P activities in our country.

Dharmendra Pradhan

Back to Content Page

डॉ एम. एम. कुट्टी
सचिव

Dr M. M. Kutty
Secretary

सत्यमेव जयते

भारत सरकार
पेट्रोलियम एवं प्राकृतिक गैस मंत्रालय
शास्त्री भवन, नई दिल्ली–110001

Government of India
Ministry of Petroleum & Natural Gas
Shastri Bhawan, New Delhi-110 001

Tel.: 011-23383501, 011-23383562
Fax: 011-23070723
E-mail: sec.png@nic.in

India is now the fastest growing large economy of the world and energy is one of the important catalysts for accelerated sustained growth. Today, India is 3rd largest energy consumer in the world after USA and China.

To meet this growing demand, the Central Government has revamped energy policies and regulations and brought transparency and competitiveness to the sector. In this regard, oil and gas exploration and production has remained a focus area.

Government has taken a series of policy decisions to promote exploration and production of oil and gas. They include; Reassessment of hydrocarbon resources, Survey of un-appraised areas of sedimentary basins, Setting up of National Data Repository, Hydrocarbon Exploration Licensing Policy, Discovered Small Field Policy, Policy for early monetisation of coal bed methane, Policy for exploration and exploitation of unconventional hydrocarbons, Policy to promote and incentivise enhanced oil discovery methods, Reforms in gas pricing, marketing and pricing freedom etc.

Under Discovered Small Field Policy (DSF) the first round of bidding has been concluded and work awarded. Under DSF Round – I, 30 contract areas have been awarded to 20 companies. Under OALP Round-I 55 blocks covering about 60,000 sq km have been awarded. Inspired with this success, Government of India has launched the second round of DSF and OALP. Further rounds of OALP bidding are in pipeline.

I congratulate the Directorate General of Hydrocarbons (DGH) for playing an important role as the technical arm of Ministry of Petroleum and Natural Gas. I compliment DGH on completing 25 glorious years in the management of oil and natural gas resources and for bringing out this publication, "India's Hydrocarbon Outlook: 2017-18" encompassing important developments in Indian upstream oil & gas sector during the year. The report is a useful reference for all stakeholders in the E&P sector

Dr M M Kutty

Back to Content Page

From the Director General

Dear Stakeholder,

Last year has been remarkable for Indian E&P sector. It saw various key reforms being put into action along with the launch of Hydrocarbon Exploration and Licensing Policy (HELP). National Data Repository (NDR) is a key milestone in the sector. I am sure these will go a long way in shaping up the future of Oil and Gas Industry in India. The year also marks 25 years of DGH and so the synergistic association of business communities and DGH.

India, with about 17% share in the world's total population accounts for only 5.6% of global energy consumption, indicating future growth in energy demand. India will be the biggest contributor to energy growth demand globally in the years to come and hydrocarbons is an important component of India's energy basket in future. By 2035, India is likely to be among the fastest growing oil and gas markets, with oil demand almost doubling to ~10 million barrels per day and gas demand tripling over the same period.

Aiming to reduce the import dependency, enhance transparency and reduce the administrative discretion, Hydrocarbon Exploration & Licensing Policy (HELP) was introduced with several transformative and progressive features to fast track the growth of E&P activities and in turn stimulate the domestic oil and gas production in the country. The most attractive being the Open Acreage Licensing Programme (OALP) that allows potential investors/ companies to carve out acreages of their own choice and submit an Expression of Interest (EoI) which would be subjected to competitive bids. The other features include the marketing and pricing freedom granted to producers, revenue sharing model, uniform licensing for all forms of Hydrocarbons etc.

I am happy to note that the maiden bidding round under Open Acreage Licensing Programme (OALP), has been a spectacular success, with all blocks on offer receiving successful bids. OALP-I was the largest ever offering for E&P in more than a decade adding a significant area of ~60,000 Sq. Kms to exploration map of India. This new contractual regime for energy exploration under HELP is in line with the principle of "Minimum Government and Maximum Governance" and it also marks a transformational shift and modernization of the oil and gas exploration paradigm.

One of the key pre-requisites for success of HELP & OALP was availability and ease of access of quality E&P data. In order to ensure effective implementation of HELP, National Data Repository (NDR) was launched by the government in June 2017. NDR consolidates and archives all the geo-scientific data generated. In line with the Government's digitalization objective, NDR provides an e-platform for interested investors to access, visualize and purchase E&P data. It has registered users from more than 100 companies, including foreign major companies. We are planning to soon migrate NDR to a secured cloud platform for faster and highly durable access for users. Till March 2018, a total of 1.8

Back to Content Page

million LKM of 2D seismic data, 0.65 SKM of 3D seismic data and over 14,000 well and log data have been uploaded in NDR. A secondary data-centre has been established at Bhubaneshwar, which will act as back-up to NDR. Additionally, a National Core Repository is expected to be set up to maintain a central repository of core samples. This would be an essential adjunct to National Data Repository.

As part of the Government's effort to increase domestic production, Discovered Small Field (DSF) Policy was introduced for fast-tracking the monetization of un-monetized small fields/ discoveries of National Oil Companies (NOCs) under Nomination regime and relinquished discoveries under the PSC regime. Some of the notable features of DSF bid in addition to HELP features are: (i) No prior technical experience required enabling ease of entry for non-E&P players; (ii) No upfront bonus; (iii) Exploration allowed during the entire contract period; and (iv) Ready availability of nearby processing facilities. DSF Bid round-I was launched in 2016 which was a roaring success. Seeing the success of DSF round I, DSF round-II was launched in 2018 with 59 discoveries on offer with an in-place volume of 190 million tonnes of oil and oil equivalent gas.

In addition to introducing HELP & DSF policy, several new policies are being introduced to ease out the process flows of India upstream oil & gas sector for streamlining the operations, relaxation of timelines and delegation of powers to Director General, Directorate General of Hydrocarbons (DGH) under Production Sharing Contracts (PSCs). This policy will assist the operator in getting a hassle-free environment with minimum government interference while developing the field which will ensure "ease of doing business" in upstream oil & gas sector.

To make India a preferred destination for investment in upstream oil & gas sector, it was necessary to re-assess the hydrocarbon potential of India's sedimentary basins. A re-assessment study was undertaken for the first time in last two decades by a Multi Organization Team (ONGC, OIL & DGH) in 26 sedimentary basins based on geo-scientific data generated over past decades. The total conventional Hydrocarbon reassessed volumes estimated for 26 sedimentary basins and offshore areas is approx. 42 Billion Tons of Oil and Oil Equivalent Gas (42 BTOE) as compared to the Hydrocarbon resource of 28 Billion Tons of Oil and Oil Equivalent Gas (28 BTOE) assessed earlier, signifying an increase of 49.1% in resource estimates. Out of this about 73% is in yet to discover category.

The total area of 26 sedimentary basins of India is about 3.36 million sq. km. with onland area of 1.63 million sq. km., shallow-water area of 0.41 million sq. km. and deepwater area of 1.32 million sq km. To acquire more data about unexplored and unapprised areas with hydrocarbons prospectivity, a "National Seismic Program (NSP)" has been formulated to conduct 2D seismic surveys in all sedimentary basins of India where no/scanty data is available. It is planned to Acquire, Process and Interpret (API) 48,243 LKM 2D seismic data. In FY 2017-18, under NSP, total 16,135 LKM 2D data has been acquired by NOCs.

To highlight the E&P activities in FY 2017-18; a total of 500 LKM of 2D seismic data and about 5,059 SKM of 3D seismic data was acquired. 144 exploratory wells were drilled in the year with an exploratory meterage of 334 km. 445 development wells were drilled with a cumulative meterage of 810 km. Total crude oil production in the country in FY 2017-18 is 35.68 MMT (71.81% from nomination regime and 28.19% from PSC regime) and cumulative natural gas production is 32.65 BCM (80.59% from nomination, 17.16% from PSC regime and 2.25% from CBM). As on March 2018, the in- place volume of crude oil is 6,896 MMT and 4,114 BCM for gas (10,960 MMT O+OEG) and there has been a cumulative accretion of in-place volume 240 MMT. Total 18 hydrocarbon discoveries were made in FY 2017-18 with 16 in nomination regime and 2 in PSC regime.

With endeavors towards continuous improvement, we are today playing a pro-active and facilitative role. Our focus, besides production enhancement and enabling investments into E&P, is to encourage collaboration among the industry, academia, investors, service providers and consultants to bring-in new technology, cost and operational efficiency. DGH will continue to play its facilitative role to encourage investors to invest in prolific sedimentary basins of India.

Through DGH Annual Publication "India's Hydrocarbon Outlook – 2017-18" we have tried to present a comprehensive review of Indian upstream sector and its activities till end of financial year 2017-18. I am confident that this report will be a valuable reference to all stakeholders in the industry.

Dr. V. P. Joy

Back to Content Page

महानिदेशक का संदेश

प्रिय हितधारक,

पिछला वर्ष भारतीय अन्वेषण एवं उत्पादन (ईएंडपी) क्षेत्र के लिए उल्लेखनीय रहा है। इस वर्ष हाइड्रोकार्बन अन्वेषण एवं लाइसेंस नीति (एचईएलपी) के शुरू होने के साथ-साथ विभिन्न महत्वपूर्ण सुधारों को लागू किया गया। राष्ट्रीय डेटा रेपोजिटरी (एनडीआर) इस क्षेत्र की एक महत्वपूर्ण उपलब्धि है। मुझे विश्वास है कि यह भारत में तेल और गैस उद्योग की भावी रूपरेखा को आकार देने में मील का पत्थर साबित होगा। यह वर्ष डीजीएच की स्थापना का 25वां वर्ष है और व्यावसायिक जगत और डीजीएच के बीच तालमेल को भी इतना ही समय हो चुका है।

दुनिया की कुल आबादी में भारत की हिस्सेदारी 17% है, जबकि विश्व ऊर्जा खपत केवल 5.6% है, जो भविष्य की ऊर्जा मांग के बढ़ने का संकेत देता है। आगामी वर्षों में विश्व स्तर पर ऊर्जा की मांग भारत में बहुत अधिक होगी और भविष्य में हाइड्रोकार्बन, भारत की ऊर्जा बॉस्केट में शामिल होने वाला एक महत्वपूर्ण घटक है। 2035 तक, भारत में तेल और गैस बाजार की तेजी से बढ़ने की संभावना है, और इसकी तेल की मांग लगभग दोगुनी होकर ~10 मिलियन बैरल प्रति दिन तथा इसी अवधि में गैस की मांग तीन गुनी हो जाएगी।

आयात निर्भरता को कम करने, पारदर्शिता बढ़ाने और प्रशासनिक हस्तक्षेप को कम करने के उद्देश्य से, ईएंडपी गतिविधियों के विकास तथा देश में घरेलू तेल और गैस के उत्पादन में तेजी लाने के लिए कई परिवर्तनकारी और प्रगतिशील विशेषताओं के साथ हाइड्रोकार्बन अन्वेषण एवं लाइसेंस नीति (एचईएलपी) लागू की गई थी। इसमें से सबसे आकर्षक खुला रकबा लाइसेंस कार्यक्रम (ओएएलपी) है, जो संभावित निवेशकों / कंपनियों को अपनी पसंद के एकरिज चुनने और अभिरुचि की अभिव्यक्ति (ईओआई) प्रस्तुत करने की अनुमति देता है जो प्रतिस्पर्धी बोलियों के अधीन होगा। अन्य विशेषताओं में उत्पादकों को दी गई विपणन और मूल्य निर्धारण की स्वतंत्रता, राजस्व हिस्सेदारी मॉडल, हाइड्रोकार्बन के सभी रूपों के लिए एक-समान लाइसेंस आदि शामिल हैं।

मुझे यह जानकर प्रसन्नता हुई है कि खुला रकबा लाइसेंस कार्यक्रम (ओएएलपी) के अंतर्गत पहला बोली राउंड काफी सफल रहा, जिसमें प्रस्तावित सभी ब्लॉकों के लिए सफल बोलियां लगाई गईं। भारत के अन्वेषण मानचित्र में ~60,000 वर्ग कि.मी. का एक महत्वपूर्ण क्षेत्र शामिल होने से अन्वेषण एवं उत्पादन क लिए ओएएलपी-I एक दशक से भी अधिक अवधि की सबसे बड़ी प्रस्तुति थी। एचईएलपी के तहत ऊर्जा की खोज के लिए यह नई संविदात्मक व्यवस्था "न्यूनतम सरकार और अधिकतम शासन" के सिद्धांत के अनुरूप है तथा यह परिवर्तनकारी बदलाव तथा तेल एवं गैस अन्वेषण मानक के आधुनिकीकरण का भी परिचायक है।

एचईएलपी और ओएएलपी की सफलता के लिए एक मुख्य पूर्वापेक्षा, गुणवत्तापूर्ण ईएंडपी डेटा की उपलब्धता और आसान पहुँच था। एचईएलपी का प्रभावी कार्यान्वयन सुनिश्चित करने के लिए, सरकार द्वारा जून 2017 में राष्ट्रीय डेटा रेपोजिटरी (एनडीआर) शुरू की गई। एनडीआर भू-वैज्ञानिक संबंधी जेनरेट किए गए डेटा को समेकित और अभिलेखित करता है। सरकार के डिजिटलीकरण के उद्देश्य के अनुसार, एनडीआर इच्छुक निवेशकों को ईएंडपी डेटा तक पहुँचने, देखने और खरीदने के लिए एक ई-प्लेटफॉर्म प्रदान करता है। इसमें 100 से अधिक कंपनियों के उपयोगकर्ता पंजीकृत हैं, जिनमें विदेशी प्रमुख कंपनियां भी शामिल हैं। हम उपयोगकर्ताओं के लिए तेज और स्थायी सुनिश्चित पहुँच के लिए जल्द ही एनडीआर को सुरक्षित क्लाउड प्लेटफ़ॉर्म में परिवर्तित करने की योजना बना रहे हैं। मार्च 2018 तक, एनडीआर में कुल 1.8 मिलियन एलकेएम 2डी भूकंपीय डेटा, 0.65 एसकेएम 3डी भूकंपीय डेटा और 14,000 से अधिक कूप और लॉग डेटा अपलोड किए गए हैं। भुवनेश्वर में एक सहायक डेटा-केंद्र स्थापित किया गया है, जो एनडीआर के बैक-अप के रूप में कार्य करेगा। इसके अतिरिक्त, प्रमुख नमूनों के केंद्रीय रेपोजिटरी के अनुरक्षण के लिए एक राष्ट्रीय कोर रेपोजिटरी स्थापित किए जाने की संभावना है। यह भी राष्ट्रीय डेटा रेपोजिटरी में सहायक की भूमिका निभाएगा।

घरेलू उत्पादन को बढ़ाने के लिए सरकारी प्रयास के रूप में, गैर-मौद्रीकृत लघु क्षेत्रों का तेजी से मौद्रीकरण करने / नॉमिनेशन व्यवस्था के अंतर्गत राष्ट्रीय तेल कंपनियों (एनओसी) की खोजों और पीएससी व्यवस्था के अंतर्गत परित्यक्त हाइड्रोकार्बन खोजों के लिए अन्वेषित लघु क्षेत्र (डीएसएफ) नीति की शुरुआत की गई थी। एचईएलपी विशेषताओं के अलावा, डीएसएफ बोली की कुछ उल्लेखनीय विशेषताएं इस प्रकार हैं: (i) गैर-ईएंडपी कंपनियों के प्रवेश को सुगम बनाने के लिए किसी पूर्व तकनीकी अनुभव की आवश्यकता न होना; (ii) कोई अपफ्रंट बोनस नहीं; (iii) संपूर्ण संविदा अवधि के दौरान अन्वेषण की अनुमति; और (iv) आस-पास की प्रोसेसिंग सुविधाओं की तुरंत उपलब्धता। डीएसएफ बोली

राउंड-I 2016 में शुरू किया गया था, जो एक बड़ी सफलता थी। डीएसएफ राउंड-I की सफलता को देखते हुए, 2018 में डीएसएफ राउंड-II की शुरुआत की गई, जिसमें 59 खोजों के साथ 190 मिलियन टन तेल और तेल समकक्ष गैस का प्रस्ताव दिया गया।

एचईएलपी और डीएसएफ नीति को लागू करने के अलावा, प्रचालनों को कारगर बनाने, भारत के अपस्ट्रीम तेल और गैस क्षेत्र की कार्रवाई को आसान बनाने, समय-सीमा में छूट देने और उत्पादन हिस्सेदारी संविदा (पीएससी) के अंतर्गत महानिदेशक, हाइड्रोकार्बन महानिदेशालय को शक्तियों का प्रत्यायोजन करने के लिए कई नई नीतियां लागू की जा रही हैं। यह नीति क्षेत्र को विकसित करते समय न्यूनतम सरकारी हस्तक्षेप के साथ सुगम वातावरण बनाने में ऑपरेटर की सहायता करेगी जो अपस्ट्रीम तेल और गैस क्षेत्र में "व्यापार करने में आसानी" सुनिश्चित करेगी।

अपस्ट्रीम तेल और गैस क्षेत्र में निवेश के लिए भारत को एक पसंदीदा स्थल बनाने के लिए, भारत के अवसादी बेसिन की हाइड्रोकार्बन संभाव्यता का पुनर्मूल्यांकन करना आवश्यक था। पिछले दो दशकों में पहली बार बहु संगठन टीम (ओएनजीसी, ओआईएल और डीजीएच) द्वारा गत दो दशकों में सृजित भू-वैज्ञानिक डेटा के आधार पर 26 अवसादी बेसिनों का पुनर्मूल्यांकन अध्ययन किया गया। 26 अवसादी बेसिनों और अपतटीय क्षेत्रों के लिए अनुमानित कुल पारंपरिक हाइड्रोकार्बन पुन: मूल्यांकित मात्रा 42 बिलियन टन तेल और तेल समकक्ष गैस (42 बीटीओई) है जबकि पहले किए गए मूल्यांकन के अनुसार हाइड्रोकार्बन संसाधन 28 बिलियन टन तेल और तेल समकक्ष गैस (28 बीटीओई) था, जो संसाधन अनुमानों में 49.1% की वृद्धि को दर्शाता है। इसमें से लगभग 73% की अभी खोज की जानी है।

भारत के 26 अवसादी बेसिनों का कुल क्षेत्र लगभग 3.36 मिलियन वर्ग कि.मी. है जिसमें तटीय क्षेत्र 1.63 मिलियन वर्ग कि.मी., उथला-समुद्री क्षेत्र 0.41 मिलियन वर्ग कि.मी. और गहरा समुद्री क्षेत्र 1.32 मिलियन वर्ग कि.मी. हैं। हाइड्रोकार्बन संभावना वाले अनखोजे और बिना मूल्यांकन वाले क्षेत्रों के बारे में और अधिक डेटा प्राप्त करने के लिए, भारत के सभी अवसादी बेसिनों, जिनके संबंध में कोई डेटा उपलब्ध नहीं है / नाममात्र उपलब्ध है, में 2डी भूकंपीय सर्वेक्षण करने के लिए एक "राष्ट्रीय भूकंपीय कार्यक्रम (एनएसपी)" तैयार किया गया है। 48,243 एलकेएम 2डी भूकंपीय डेटा को प्राप्त करने, उसकी प्रोसेसिंग और व्याख्या करने (एपीआई) के लिए एक योजना बनाई है। वित्त वर्ष 2017-18 में, एनएसपी के अंतर्गत, कुल 16,135 एलकेएम 2डी डेटा को राष्ट्रीय तेल कंपनियों द्वारा अधिग्रहित किया गया है।

वित्त वर्ष 2017-18 में ईएंडपी गतिविधियों को दर्शाने के लिए; 2डी भूकंपीय डेटा के कुल 500 एलकेएम और 3डी भूकंपीय डेटा के लगभग 5,059 एसकेएम का अधिग्रहण किया गया था। वर्ष के दौरान 334 कि.मी. अन्वेषण मीटरेज वाले 144 अन्वेषण कूपों को ड्रिल किया गया। 810 कि.मी. की कुल मीटर दूरी वाले 445 विकास कूपों को ड्रिल किया गया। वित्त वर्ष 2017-18 में देश में कुल कच्चे तेल का उत्पादन 35.68 एमएमटी (नॉमिनेशन व्यवस्था से 71.81% और पीएससी व्यवस्था से 28.19%) और संचयी प्राकृतिक गैस उत्पादन 32.65 बीसीएम (नॉमिनेशन से 80.59%), पीएससी व्यवस्था से 17.16% और सीबीएम से 2.25%) है। मार्च 2018 तक, कच्चे तेल की मात्रा 6,896 एमएमटी और गैस की 4,114 बीसीएम है (10,960 एमएमटी ओ+ओईजी) और संचयी मात्रा में 240 एमएमटी की वृद्धि हुई है। वित्त वर्ष 2017-18 में कुल 18 हाइड्रोकार्बन खोजें हुई जिसमें नॉमिनेशन व्यवस्था में 16 और पीएससी व्यवस्था में 2 खोजें शामिल थीं।

निरंतर सुधार की दिशा में हो रहे प्रयासों से, आज हम एक सक्रिय विनयामक और सुगमीकरण कर्ता की भूमिका निभा रहे हैं। ईएंडपी में निवेश बढ़ाने और उसे समर्थ बनाने के अलावा, हम उद्योग, शिक्षाविदों, निवेशकों, सेवा प्रदाताओं और परामर्शदाताओं के बीच नई प्रौद्योगिकी, लागत और परिचालन दक्षता प्राप्त करने के लिए सहयोग को प्रोत्साहित कर रहे हैं। निवेशकों को भारत के विपुल अवसादी बेसिनों में निवेश करने के लिए प्रोत्साहित करने हेतु डीजीएच सुविधा प्रदान करने की अपनी भूमिका निभाता रहेगा।

डीजीएच के "भारत का हाइड्रोकार्बन परिदृश्य - 2017-18" नामक वार्षिक प्रकाशन के माध्यम से हमने वित्तीय वर्ष 2017-18 के अंत तक भारतीय अपस्ट्रीम क्षेत्र और इसकी गतिविधियों की व्यापक समीक्षा प्रस्तुत करने का प्रयास किया है। मुझे विश्वास है कि यह रिपोर्ट उद्योग में सभी स्टेकहोल्डर्स के लिए मूल्यवान साबित होगी।

भवदीय

डॉ. वी.पी. जोय

Back to Content Page

1889

1st Oil Discovery in India

1974

Bombay High Field Discovered in India

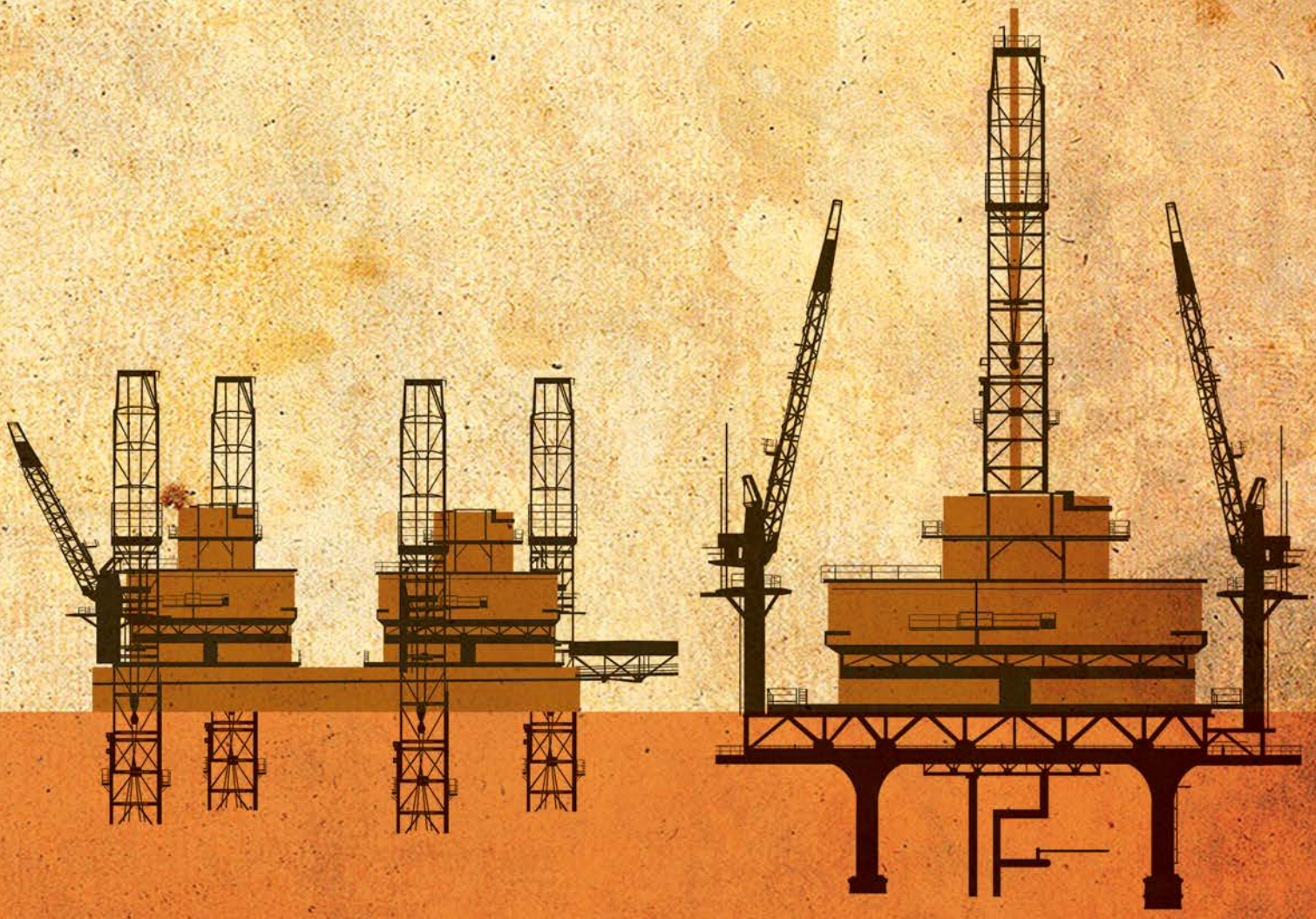
1993

DGH Established

25 YEARS OF DGH

CHAPTER 1

EVOLUTION OF UPSTREAM INDIAN OIL AND GAS INDUSTRY



CHAPTER 1

Evolution of Upstream Indian Oil and Gas Industry

1.1. History of Upstream Oil and Gas Industry

The story of oil exploration in India began in the dense jungles, swamps and river-valleys of the north-eastern corner of the country. Lt. R. Wilcox, Major A. White, Capt. Francis Jenkins, Capt. P.S. Hanny, W.Griffith, W. LicutBigge - they all saw at different times petroleum seepages from the banks of river Dihing. Mr. C.A Bruce (1828) and Mr. H.B. Medicott (1865) of the Geological survey of India also saw oil seepages while prospecting for coal in Upper Assam.

Barely seven years after Edwin L. Drake drilled the world's first oil well in 1859 at Titusville, Pennsylvania, USA, in 1866, Mr. Goodenough of McKillop, Stewart & Company, Calcutta, drilled a hand- dug well of 102 feet at Nahorpung near Jaipur area of Upper Assam but failed to establish satisfactory production. In his second attempt on 26 March 1867, oil was struck at merely 118 feet (35.97-m) in Asia's first mechanically drilled well at Makum near Margherita area of Upper Assam.

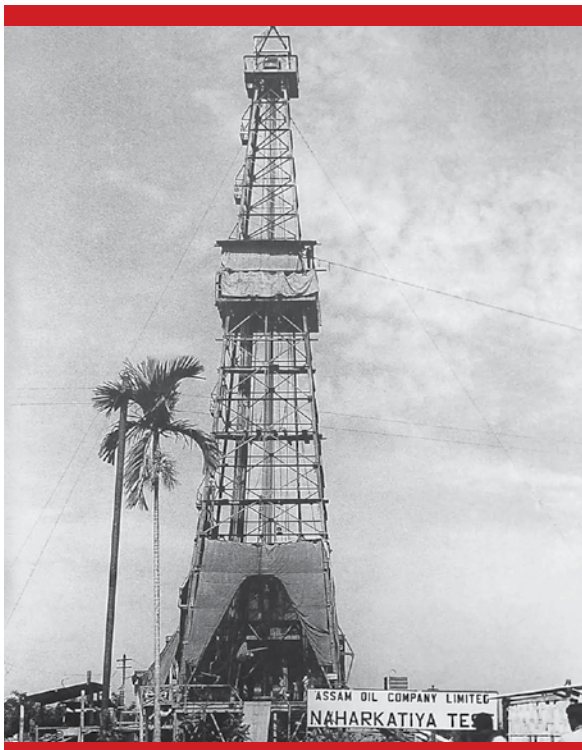
However, the first well dug at Digboi field in Assam in September 1889 and completed in November 1890 at depth of 662 feet by Assam Railways and Trading Company Limited (AR&T Co. Ltd.), registered at London, is regarded as the first commercially successful oil discovery (200 gallons per day). To add colour to geologic reasoning, legend was created that during the construction of a railway line by AR&T, in the year 1867, a herd of logging elephants returned to camp with their feet covered in oil after a night-time excursion to find food and water. This led men to trail to the salt lick where seepages were prolific. Looking this, the elated English owner cried out to his men, "Dig boy, dig". Probably the name Digboi itself came from that word.

AR&T subsequently acquired a 77.7 square kilometer petroleum-rights concession in the Makum area of Assam, and by 1893, it had drilled 10 wells at Digboi producing 757.08 liters/day. AR&T established Assam Oil Company (AOC) in 1899 with a capital of £310,000 to take over the petroleum interests of AR&T, including the Digboi and Makum concessions and set up a small refinery at Margherita (Upper Assam) with a capacity of 500 BOPD to refine the Digboi-oil. Thereafter, systematic drilling began in 1891 and later in 1901, Asia's first oil refinery was set up at Digboi. It is still functional as the world's oldest operating refinery.

Failure to utilize geologic reasoning, promiscuous wild catting, misguided investment and nonchalance of the management towards technical support led to compounding of errors by AOC which made the company technically and financially impotent. Later, UK based Burma Oil Company (BOC) arrived in 1911 in Upper Assam (Surma Valley) and in 1915, after acquiring Oil interest from Budderpore Oil Co. Ltd (formed by a syndicate of Budderpore tea garden during 1911-13) began testing option in the Badarpur structure in the Surma valley (Upper Assam). Gradually by 1921, in a phase-wise manner, BOC acquired petroleum interests of AOC.

Torsion balance which was successfully adapted for geophysical surveys of oil was used at Bordubi (Assam) by a geophysical team in 1925. The Indian Co. "TATA Engineering co." has also drilled several wells in Jagatia, Gujarat and produced small amount of gas in 1930s. In 1937, BOC jointly with British Petroleum (then Anglo-Iranian Oil Co.) and Shell proposed to Govt. of India to carry out a geophysical survey of the important plain areas of India. The proposal was accepted, and a new form of grant known as geophysical license was issued by Assam Government.

In Assam, successful seismic survey was carried out in Naharkatiya during 1937-39, triggering new enthusiasm in oil search and it became forerunner of discoveries in Assam basins and others also. The successful outcome of well NHK-1 in 1937 was vindication for geophysical method in oil exploration.



Naharkatiya Test Well, 1953 - AOC's Success Story Beyond Digboi Oilfield, a watershed event which paved the way for the eventual expansion of Digboi Refinery to 0.5 MMTPA and formation of Oil India Ltd. (OIL)

Assam Shelf & Assam-Arakan Fold Belt (AAFB): Tectonically, the Assam- Arakan Basin has been subdivided in to two major Basins viz., Assam Shelf & Assam-Arakan Fold Belt. Assam Shelf is along the Brahmaputra River from Dibrugarh in northeast to Dhubri in the southwest and Arunachal Pradesh and its area is 56,000 sq. km. Assam- Arakan Fold Belt (AAFB) covers the southern districts of Assam and the states of Tripura, Mizoram, Manipur and Nagaland and its area is 80,825 sq. km. The prognosticated hydrocarbon resources (7,634 million metric tons (MMT)) is around 18% of the country. Resources in Assam Shelf is 14% & Assam-Arakan Fold Belt is 4%. Out of which volume of 2,046 MMT (27%) has been established so far, ~34% of Sedimentary Basin area has been appraised so far and considerable opportunities exist to establish the remaining 73% of the hydrocarbon and to discover, develop and produce the same. The Assam Shelf basin is explored. However Assam-Arakan Fold Belt is yet to be explored extensively. Structural complexities and difficult terrain are an integral part of Fold Belt, which have influenced the exploration inputs and exploration strategy for this area.

Oil and gas are established from clastic reservoirs of Mio-Pliocene-Girujan, Miocene-Tipam, Oligocene-Eocene– Barails, Mid-Upper Eocene-Kopilli, Lower Eocene–Lakadong and Therria and from the fractured Archean Basement. The Miocene-Oiligocene– Tipam and Barail Formations contain most of the discovered oil.

Area under PEL ~9% | Area under PML ~8% | 77% Area is open under HELP/ OAL | 5 PSU Cos., 6 Indian Private and 1 Foreign Cos. are working in the basin under PSC Regime

Production: Average crude oil production ~12.04 thousand tons per day (TPD)/4.40 (MMT) Average rate of gas production is around ~12.85 MMSCMD/4.69 BCM

The world knew importance of oil and after Independence; Indian leaders realized its utility for rapid industrialization and security of nation.

The company rule which were earlier framed to satiate the raw material need of British Empire was re-framed. While framing industrial policy 1948, the development of petroleum industry in the country was given top priority.

By 1948, GSI has started geophysical survey in Cambay area. The first oil discovery in independent India was made by AOC in 1953 in Naharkatiya and then in Moran in 1956, both in Upper Assam. The oil industry, after independence, remained operated by foreign companies for a considerable period. Burma Oil Company (BOC) kept its position as largest company in India till end of its operation.

In 1955-56, a delegation led by Mr. K.D. Malviya, Minister of Natural Resources, visited several European countries to study status of Oil industry in those countries and facilitate training of Indian professionals.

Foreign experts also visited India to share their know- how. Erstwhile USSR helped to draw a detail plan for geological and geophysical survey and drilling plan in second five-year plan (1956-57 & 1960-61).

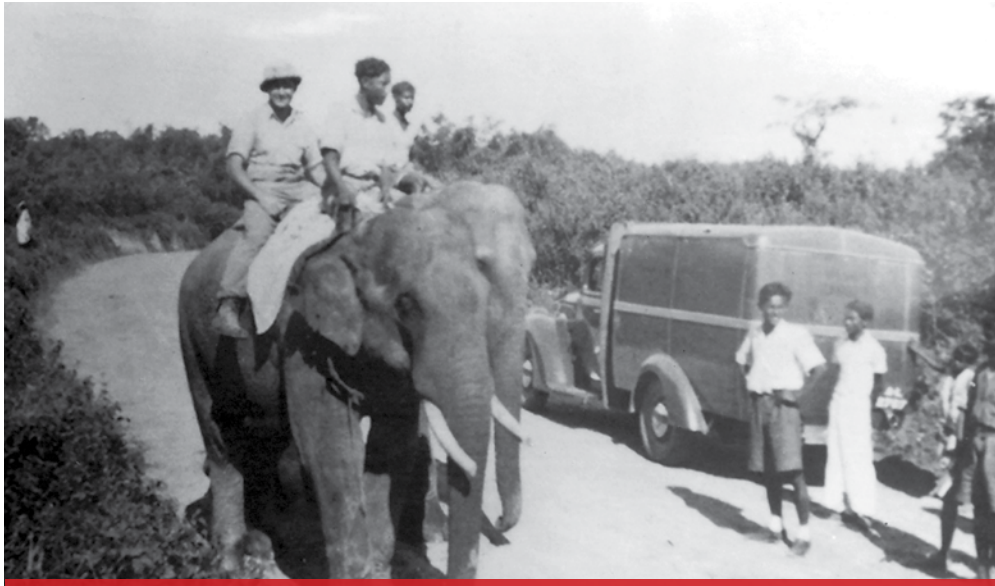
With the intention of intensifying and spreading exploration to various parts of the country, a separate **Oil and Natural Gas Directorate (ONGD) was set up in 1955**, as a subordinate office under the then Ministry of Natural Resources and Scientific Research.

The department was constituted with a nucleus of geoscientists from Geological Survey of India. But soon after its formation it was realized that the directorate cannot function efficiently with its limited financial and administrative liberty and in early 1956, its status was changed to a commission. In October 1959, the ONGC was made a statutory body by an act of parliament delegating it more power but it remained under Ministry. The job of ONGC was defined as "to plan promote, organize and implement programs for development of Petroleum Resources and the production and sale of petroleum and petroleum products produced by it, and to perform such other function as the central government may, from time to time, assign to it".

ONGC systematically started its geophysical surveys on area

considered prospective based on global analogy.

Further, thrust was given for survey in area of Himalayan foothills and adjoining Ganga plains, alluvial tracts of Gujarat, upper Assam and basins of Bengal. The exploratory drilling carried out in Himalayan foothill during 1957, remained unsuccessful. Within a year of being formed, ONGC discovered oil at Cambay. The giant Ankleshwar field in the state of Gujarat in 1960, Kalol in 1961, Lakwa in 1964, Geleki in 1968 and gas discovery Manhartibba in Rajasthan in 1969 were discovered subsequently.



Elephants being used in seismic survey in Brahmaputra valley in 1937-38

Cambay Basin: The Cambay Rift Basin covering an area of about 53,500 sq. km. is a Category-I Basin and encompasses a narrow, elongated rift graben, extending from Surat in the south to Sanchor in the north. The prognosticated hydrocarbon resources in the basin (2,586 million metric tons (MMT)) is around 6% of the country

In the north, the Basin narrows, but tectonically continues beyond Sanchor to pass into the Barmer Basin of Rajasthan. On the southern side, the Basin merges with the Bombay Offshore Basin in the Arabian Sea. The first show of oil was seen in September 1958 from exploratory well at Lunej in Cambay Basin of Anand district. This oil discovery dispelled the myth that there is no viable oil source in India, apart from some small ones in Assam.

The evolution of Cambay Basin from the petroleum point of view is well understood and hydrocarbon accumulations are known in all sequences ranging from Paleocene to Miocene. Major accumulations are known in Middle Eocene structural traps over block uplifts and block edge folds. There are several petroleum systems in the Basin and the most important one is the Cambay-Hazad Petroleum System which is related to several large oil and gas fields.

Currently exploration of the Cambay Rift Basin is in matured stage and bears a good chance of maximizing the probabilities of discovering small fields in subtle traps.

Area under PEL **~13 %** | Area under PML ~14 % | 73% Area is open under HELP/ OAL | 8 PSU Cos., 24 Indian Private and 9 Foreign Cos. are working in the basin under PSC Regime

Production: Average crude oil production ~13.67 thousand tons per day (TPD) / 4.99 MMT, Average rate of gas production is around ~4.67 MMSCMD/ 1.7 BCM

Meanwhile, on 18th February 1959, for development and production of Naharkatiya and Moran prospects and to increase the pace of exploration in Assam, **Oil India Private Limited (OIL) was incorporated** as a rupee company to take over BOC's affairs in Assam. The company was owned two-third by AOC/BOC and 1/3rd by Government of India and in 1961 they became equal partners by transforming OIL into a Joint-Venture (JV) company.

OIL discovered Kusijan oilfield in 1969 and Jorajan oilfield in 1972. Later, Eocene gas was discovered by OIL in Tengakhat field of Assam in 1973.

Offshore exploration was initiated by ONGC in the form of experimental seismic survey in 1962 in Gulf of Cambay and later in western offshore. Detailed seismic surveys in western offshore resulted in a discovery of large structure in Bombay-offshore in 1972- 73 and drilling lead to India's biggest commercial discovery – Bombay-High.

Mumbai Offshore Basin:
The Mumbai Offshore Basin is the most prolific of all the hydrocarbon bearing provinces in India. Mumbai High field is approximately 160 km west of the Mumbai coast and was discovered in 1974 by the Russian and Indian team from seismic exploration vessel, 'Academic Arkhangelsky', while mapping the Gulf of Cambay between 1964 and 1967. The discovery of Bombay High with subsequent other discoveries of oil and gas fields in western offshore changed the oil scenario of India. It is spread over the area of 212,000 sq. km.

Different oil and gas reservoirs namely, L-I; L-II; L-III; L-IV; L-V; basal clastics and fractured basement from top to bottom, are present on the Mumbai High project. L-II and L-III are primarily the limestone oil reservoirs of Miocene age, further classified into several layers.

Bounded by Diu and Narmada Faults and Deccan Trap outcrops to its north and east, the pericratonic Mumbai Offshore Basin extends towards west parallel to the western continental margin of India up to the Western Margin Basement Arch. NE-SW trending Vengurla Arch separates the Basin from the Kerala-Konkan Basin to its south.

Based on structural elements and the nature of sediment fill which influenced characteristic hydrocarbon generation and entrapment patterns in different sectors, the Basin is subdivided in to a number of blocks, viz. Tapti-Daman block, Diu block, Heera-Panna-Bassein block, Mumbai High-Deep Continental Shelf block, Shelf Margin block and the Ratnagiri block.

Continued and sustained exploratory and development efforts in Mumbai Offshore Basin since last four decades have shown remarkable results and led to conversion of nearly 50% of the prognosticated resource of 9,646 MMToE into In-place volume of hydrocarbons.

Area under PEL ~10% | Area under PML ~16% | 74% Area is open under HELP/OAL | Five PSU Cos., Three Indian Private and one Foreign Cos. are working in the basin under PSC Regime.

Production: Average crude oil production ~46.35 thousand tons per day (TPD) / 16.9 MMT Average rate of gas production is around ~52.32 MMSCMD/19.1 BCM.

Encouraged by Bombay-High discovery, exploration was furthered in entire western offshore including Kerala-Konkan basin and eastern offshore area. This led to large discovery of Bassein and Neelam in western offshore and PY-3 and Ravva in Eastern offshore.

Cauvery Basin: Cauvery Basin is pericratonic Basin, evolved due to rifting between India and Sri Lanka during the break-up of Eastern Gondwana land (Katz, 1978) during Late Jurassic-Early Cretaceous and subsequent drifting (Late Aptian) of Indian plate from Gondwana land along NE-SW oriented Eastern Ghat trend. The rifting has created several horsts and grabens. The present-day horst and graben picture of Mesozoic- Cenozoic stratigraphic column have been related to two principal tectonic episodes namely, extension stage during Late Jurassic – Early Cretaceous and thermal subsidence stage during late Cretaceous to Cenozoic. Cauvery Basin has been divided into sub- basins, namely Ariyalur-Pondicherry, Tranquebar, Nagapattinam, Tanjore, and Ramnad-Palk Bay separated by Kumbakonam-Madanam, Pattukottai-Mannargudi & Mandapam-Delft ridges. Concerted efforts to explore the Basement play resulted in major success with discovery of hydrocarbons from Madanam, Pandanallur and Chidambaram areas.

Exploratory drilling in Madanam and Pandanallur areas established the commercial hydrocarbons from basement play in Cauvery on land area. The other important operative plays in Cauvery onland are - Andimadam Play: (prolific producer in Kuthalam-Kali, Pallivaramangalam–Vijayapuram, Periyakudi fields and is characterised by poor porosities and low permeabilities). Bhuvanagiri Play: (Well established in Pallivaramangalam – Vijayapuram, Pundi, Kanjirangudi and Periyapattinam fields tight reservoirs), Nannilam Play (in most of the wells drilled in Ariyaluru-Pondichery sub basin, well established in Nannilam, Tiruvarur, Kanjirangudi, Periyapattinam, Perungulam and PBS fields) Kamalapuram Play (The Paleocene play is well established in Adaiyakkamangalam, Kamalapuram, Nannilam, Kuthanallur & few fields in Ramnad sub-basin).

Discovery from synrift sequence gave a major impetus to synrift play and chance of discovering large fields in the Basin. However, as in the case of Krishna-Godavari, this play is also known for HP-HT conditions. In Cauvery offshore, there is no much breakthrough except in the established PY and PH fields. Recent discoveries reported in Cauvery shallow water, deep waters and from Srilanka /Gulf of Mannar Basins have rekindled the exploration interest in the Cauvery Offshore. The basin area of 240,000 sq. km. it is the largest category I basin in India, with prognosticated resources of 1,964 MMTOE, with ~85% of this is still to be discovered.

Area under PEL ~0.1% | Area Area under PML ~2% | 98% Area is open under HELP/OAL | 5 PSU Cos., 3 Indian Private and two Foreign Cos. are working under PSC Regime

Production: Average crude oil production ~0.96 thousand tons per day (TPD) / 0.35 (MMT) Average rate of gas production is around ~3.37 MMSCMD/ 1.23 BCM

In 1978 OIL ventured from Assam to Orissa both in onshore and offshore. During 1979-89, it went to Andaman offshore and Rajasthan onshore. By the end of 80s, ONGC and OIL have together drilled nearly 3100 wells totaling 4.9 million metres.

ONGC's geo scientific survey spread out to UP, Bihar, Tamil Nadu, Rajasthan, J&K, Kutch and Andhra Pradesh.

By mid 1980s, ONGC successfully discovered prospects in Cauvery and KG basin. Kharsang oilfield was discovered by OIL in 1976 and in the same year ONGC discovered one of India's biggest gas find of 283.17 BCM in the Bassein fields off Mumbai's coast. Other gas fields discovered by ONGC were mid-Tapti, south Tapti and B-55.

Till the end of 1970s, Indian E&P industry was dominated by the two National Oil Companies (NOCs)-ONGC and OIL to whom PELs were granted on nomination basis. Exploration was primarily confined to onland and shallow offshore. The strategic initiative was taken by government in 1979 to attract foreign investment, technology and capital to deal with future commitment and challenges of Indian oil economy by offering 32 exploration blocks (17 offshore & 15 onshore). Government started offering block systematically through bidding. These rounds are also known as Pre- NELP Exploration rounds. The three rounds during 1980-86 were not very successful.

By 1981, Government took over OIL and it became full-fledged PSU. In 1982, ONGC made its biggest gas discovery in Gandhar, Cambay basin, Gujarat and by 1986, KG basin

Digboi Naharkatiya road under construction in 1955

were put in global map with several substantial discoveries made. By the end of 1986, third round of international bidding for exploration block were offered. OIL and ONGC were offered 40% stake in JV, if field was found viable. Few foreign companies participated but there was no committed exploration or breakthrough discovery. The foreshore terminal of IOC was commissioned in Madras (Chennai). However, OIL and ONGC's effort continued in several parts of India and by 1989 OIL discovered gas in Tanot (Mata Temple) in Rajasthan and ONGC discovered south Heera in Mumbai offshore.

In 1990, Fourth round of bidding invited and for the first time, Indian companies could participate with foreign companies. However, no major discovery was made with these partnerships. In 1991, Government of India (GoI) adopted liberalized economic policy that led to de-licensing of core group including petroleum sector and partial dis-investment of government share including other measures. As a result, ONGC was re-organized as a Limited company (under the Company's Act, 1956) from Oil and Natural Gas Commission to Oil and Natural Gas Corporation Limited.

To give momentum to Petroleum sector in India, GoI came up with more lucrative offers in 1994. However, this also led to disagreement in Production Sharing Agreement. In couple of years, ONGC ventured into CBM in Damodar valley and explored EOR options in heavy oil belt of North Gujarat. By 1996, Government conducted 5 rounds of bidding and offered 126 blocks having area in the range of 1 sq. km. to 50,000 sq.km. Beside National Oil Companies and Indian Private Companies, some important companies like Shell, Enron, Amoco and Occidental participated in exploration and contracts were awarded to them.

The government efforts particularly during 1991-96 gave required thrust for opening Oil and Gas sector in India. After this, the process of opening the sector became more streamlined.

Many private players also joined in development of this industry.

Hindustan Oil Exploration Company (HOEC) which started its E&P venture in 1991, was among few such initial domestic private player.

In view of the liberalized policy adopted by GoI, a need for an independent upstream regulatory body called the Directorate General of Hydrocarbons (DGH) was envisaged to oversee and review the oilfield development programs to conform to sound reservoir engineering practices in line with national interests. Thus, DGH was formed vide GoI resolution dated 08.04.1993.

After the Nomination era till late 1970s, Pre-NELP Exploration era (1980-95) and Pre-NELP Field rounds (1993-94), Government of India formulated a policy called as New Exploration Licensing Policy in 1997. The main objective was to attract significant risk capital from Indian and Foreign companies, state of art technologies, new geological concepts and best management practices to explore oil and gas resources in the country to meet rising demands of oil and gas. NELP policy was approved in 1997 and became effective in February 1999. Since then licenses for exploration were awarded only through a competitive bidding system and National Oil Companies (NOCs) were required to compete on an equal footing with Indian and foreign companies to secure Petroleum Exploration Licenses (PELs). Nine rounds of bids have so far been concluded under NELP, in which production sharing contracts for 254 exploration blocks have been signed. Under the PSC regime, two major basins were opened commercially, these are Rajasthan and Krishna- Godavari Basin.

Rajasthan Basin: The 1,26,000 sq. km. of recent sediment covered area to the west of Aravalli up to Pakistan border which is a part of the Thar desert, is designated as the Rajasthan peripheral foreland Basin. It is a part of the Indus Foreland. It is divided into three sub-basins/sectors:-(i) Jaisalmer sub-basin (JB) on the north western slope of the Jaisalmer-Mari basement arch (JMA), (ii) Bikaner-Nagaur (BN) sub-basin on the northeast flank of the arch and (iii) Barmer sub-basin south of the arch (extension of Cambay Basin). Recent discoveries of oil and gas from this Basin have enhanced the perception about the prospectivity of Indian Sedimentary Basins.

Barmer sub-basin is a lacustrine failed rift comprising the sedimentary sequence of more than 6 km ranging in age from Mesozoic to Cenozoic with prolific Eocene source rocks. High quality reservoirs are encountered in the Upper Cretaceous- Paleocene, syn rift deposits. Number of oil and gas discoveries like Saraswati, Rageshwari, Kameshwari, Mangala, Aishwarya, Shakti, Bhagyam are some of the significant fields in Barmer sub-basin. Rajasthan basin has prognosticated resource base of 4,126 MMTOE, of which around 77% is currently undiscovered.

Area under PEL ~4% | Area under PML ~4% | 92% Area is open under HELP/ OAL | 7 PSU Cos., 7 Indian Private and 6 Foreign Cos. are working under PSC Regime

Production: Average crude oil production ~21.61 / thousand tons per day (TPD) / 7.89 (MMT) Average rate of gas production is around ~3.95 MMSCMD/ 1.44 BCM

KG Basin: The Krishna-Godavari Basin constitutes a typical passive margin Basin and has a polycyclic (dual-rift province) evolution history. Basin comprises a wide array of sedimentary facies from early Permian through Cenozoic with the analogous outcrops defining the Basin limitation, along the north western part of the Basin. It is spread over an area of 230,000 sq. km. in the onland and (25,649 sq. km. up to 400 m isobath) in the Bay of Bengal offshore. The prognosticated resources of the basin are 9,555 MMTOE of which 79% is undiscovered.

The prospective area for oil & gas exploration in onland covers the three coastal districts of East Godavari, West Godavari & Krishna and in Offshore till 85° east ridge. Efforts by both NOC's and Private oil companies have unlocked huge hydrocarbon reserves. The major plays established in KG Basin are Mandapeta (Permo-Triassic), Syn-Rift Gollapalli/ Nandigama/ Kanukollu (Late Jurassic to Lower Cretaceous), Raghavapuram (Early-Late Cretaceous), Pasarlapudi/Vadaparru (Late Palaeocene to Eocene), Matsyapuri/Ravva (Oligocene to Miocene) and Godavari (Pliocene). Both biogenic and thermogenic petroleum system are operative in the Basin.

The Basin has distinction of reporting maximum number of discoveries in the last decade. As such, this Basin has shown a very high degree of hydrocarbon potential, particularly in deep waters off the Godavari river mouth, essentially from Mio-Pliocene & Pleistocene Formations. Similarly, recent discoveries of gas from Machilipatnam bay area from Eocene–Pliocene Formations from shallow water segment endorses for sustained exploration. Based on trend of discoveries, there are good chances of discovering large fields, especially from deep water segment.

In KG deep waters mainly slope-channel-levee-complex, debris flows, low stand wedge and Basin floor fan complexes remain as major targets. In shallow water growth fault related structures, channel fills combination traps, upper slope fans remain as attractive plays particularly in the delta-slope transition. In on land, the deeper synrift plays remain as major attractive play.

Area under PEL ~5% | Area under PML ~3% | 92% Area is open under HELP/ OAL | 7 PSU Cos., 4 Indian Private and 5 Foreign Cos. are working under PSC Regime

Production: Average crude oil production ~3.13 thousand tons per day (TPD) / 1.14 (MMT) Average rate of gas production is around ~10.28 MMSCMD/3.75 BCM

NELP regime saw Indian E&P sector opening to private and foreign players, however due to certain contractual bottlenecks, investor sentiments were impacted, with many global Oil & Gas majors deciding to forego the opportunities present beneath the Indian sub-surface. Now, with recent impetus to the sector through policies interventions and facilitating projects, Indian Oil and Gas industry is seeing a renewed global interest.

With huge scope of activities and development in Oil and Gas sector in India, a lot of history in this sector is yet to be written.

1.2 Formation of Directorate General of Hydrocarbons (DGH)

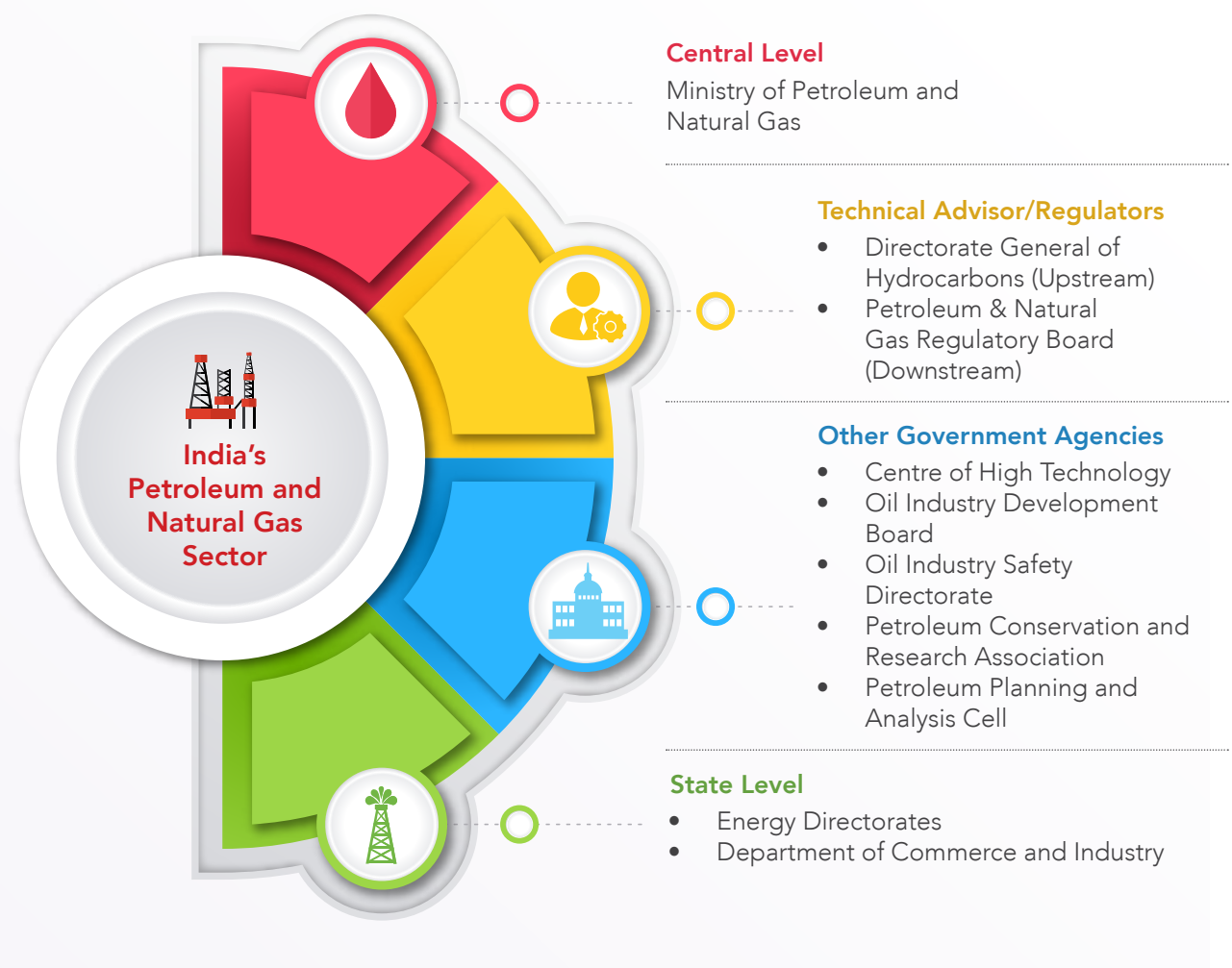
The liberalized economic policy adopted by the Government of India (GoI) in July 1991 sought to deregulate and de-license the core sectors (including the petroleum sector) with partial disinvestments of government equity in Public Sector Undertakings along with other measures. The upstream petroleum sector was largely a monopoly of public sector companies till then and the sector was being increasingly opened to new operating companies in the private and joint sectors. Thus, a need was felt to establish an agency that could effectively supervise the activities of all these companies in the national interest.

The same was elucidated by the committee headed by late Dr. A. B. Dasgupta, which recommended for creation of an autonomous conservation board to oversee and review oilfield development programs for sound reservoir engineering practices in line with national interests. Subsequently, a committee was constituted in 1992 under the chairmanship of late Shri P. K. Kaul, former Cabinet Secretary, to examine the need for restructuring ONGC's organizational structure. This committee also recommended for establishment of an independent regulatory body called the Directorate General of Hydrocarbons (DGH) for discharging the regulatory functions of leasing and licensing, safety and environment and development, conservation and reservoir management of Hydrocarbon resources in India.

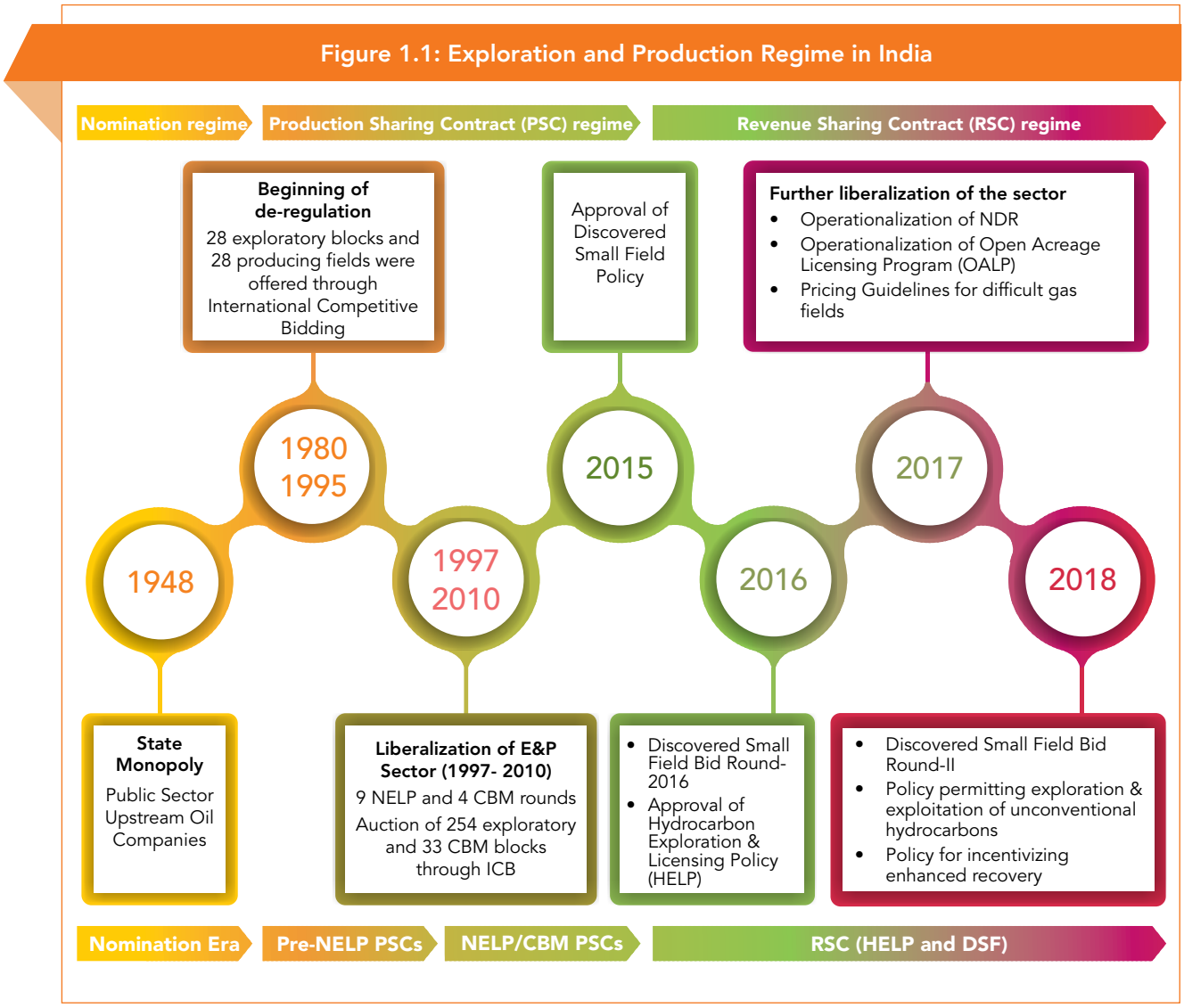
Accordingly, Directorate General of Hydrocarbons was set up through GoI resolution No. O-20013/2/92/ONG-III dated 08.04.1993 under the administrative control of the Ministry of Petroleum and Natural Gas.

1.2.1 DGH – Objective:

To promote sound management of the oil and natural gas resources having a balanced regard for environment, safety, technological and economic aspects of the petroleum activity.



Exploration and Production Regime in India



1.2.2 Role and Functions of DGH:

To promote sound management of the Indian Petroleum and Natural Gas resources having a balanced regard for the environment, safety, technological and economic aspects of the petroleum activity.

i. A nodal agency for implementation of NELP and CBM policy on behalf of Ministry of Petroleum & Natural Gas

ii. To advise Ministry of Petroleum & Natural Gas on Exploration Strategies & Production Policies

iii. To provide technical advise to the Ministry of Petroleum and Natural Gas on issues relevant to the exploration and optimal exploitation of hydrocarbons in the country

iv. To review the exploration programs of companies operating under Petroleum Exploration Licenses 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 programs

v. To evaluate the hydrocarbon reserves discovered and estimated by the operating companies

vi. To advise the Government on the offering of acreages for exploration to companies as well as matters relating to relinquishment of acreage by companies

vii. 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

viii. To review and audit concurrently the management of petroleum reservoirs by operating companies and to advise on any mid-course correction required to ensure sound reservoir management practices in line with the optimal exploitation of reserves and the conservation of petroleum resources

ix. 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

x. All other matters incidental thereto and such other functions as may be assigned by Government from time to time

xi. Assist Government in contract management functions

xii. Exploration & Development of unconventional hydrocarbon resources like Gas Hydrate, Shale Gas/Oil and Oil Shale

xiii. Issue Essentiality Certificate for importing goods and services used in E&P sector to avail custom duty concessions

1.2.3 Advisory and Administrative Council of DGH:

Advisory Council

- Directorate General of Hydrocarbons has an Advisory Council, which is appointed by the Government comprising of Chairman and members, who are eminent persons in the field of hydrocarbon exploration and production. The Advisory Council is serviced by the Directorate which is headed by a Director General who is also the Member Secretary to the Council.

Administrative Council

- Government of India set up an Administrative Council on 02.02.2001 to guide and to take care of all administrative aspects of the functioning of DGH, through Office Memorandum No. O-32012/1/95- ONG-III dated 02.02.2001. The Administrative Council takes decisions on various matters concerning establishment, budget and undertakes periodical review of the functioning of DGH. It is headed by Secretary (MoPNG) and has the following composition:

Table 1.1 Composition of Administrative Council of DGH

Name	Designation
Secretary, MoP&NG	Chairman
Additional Secretary, P&NG	Member
AS&FA, MoPNG	Member
Joint Secretary (Expl), MoPNG	Member
Secretary, OIDB	Member
Director General, DGH	Member - Convener

1.3 Award Process under Pre-NELP and NELP Regime

Licenses/leases for domestic exploration & production of crude oil and natural gas were granted under different regimes over a period time.

1.3.1 Nomination Basis:

Till the end of 1970s, Indian E&P industry was dominated by the two National Oil Companies (NOCs), ONGC and OIL to whom PELs were granted on nomination basis. Exploration was primarily confined to onland and shallow offshore.

1.3.2 Pre-NELP Exploration Blocks:

28 Exploration blocks were awarded to private companies between 1980 and prior to implementation of NELP, where ONGC and OIL had the rights for participation in the blocks after hydrocarbon discoveries. Brief details of the Pre-NELP Exploration blocks is provided below and details of blocks awarded is appended in Chapter-8.

Table 1.2 Brief details of the Pre-NELP Exploration blocks

Year	Exploration Rounds	Contracts signed			
		Description	Offshore	Onshore	Total
1980	First round	PSC signed with Chevron, USA and 3 wells were drilled 1 without success, block area was relinquished in 1985	1	0	1
1982	Second round	No PSC signed	0	0	0
1986	Third round	-	0	0	0
1991	Fourth round	5 PSCs signed	2	3	5
1992		First development round	-	-	-
1993	Fifth round	Second development round	4	2	6
	Sixth round	First speculative survey round	2	3	5
1994	Seventh round	-	2	3	5
	Eighth round	Second speculative survey round	1	3	4
1995	Ninth round	JV Exploration Program	1	1	2
Total			**13**	**15**	**28**

In 1993, GoI offered blocks for geophysical and other surveys to update the information on hydrocarbon potential of India's unexplored sedimentary basins. Once the surveys on these blocks were completed, they were to be offered in subsequent rounds of exploration. The Second speculative survey round was launched in 1994 and the third round in 1995. The third round was called as Joint Venture Speculative Survey Round (JVSSR) with a provision of risk participation/ cost sharing by DGH up to 50%. Government of India has signed 28 contracts for blocks offered under Pre-NELP Exploration regime.

1.3.3 Pre-NELP Discovered Field or Development Rounds:

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. These rounds received overwhelming response from various private E&P operators. Government of India has signed 28 contracts (One PSC for Panna Mukta–PM) for 29 discovered fields under Pre-NELP Discovered (Small and Medium size fields) regime.

Table 1.3 Pre-NELP Discovered Field or Development rounds

Month/Year of award	Round	Blocks offered in Medium sized field Round		Blocks offered in Small sized field Round		Contracts signed
		Offshore	Onshore	Offshore	Onshore	
August 1992	1	6	6	10	21	18
October 1993	2	2	6	4	29	10
Total Contracts signed				**28**		

1.3.4 New Exploration Licensing Policy (NELP):

Government introduced healthy competition and public participation by introducing NELP for exploration & production of oil & gas in the country. Under NELP, blocks were awarded to Indian, private and foreign companies through International Competitive Bidding process where NOCs, viz. ONGC and OIL, were competing on equal footing.

NELP not only accelerated the quest for hydrocarbon exploration, but also brought state-of-the-art technology and efficiency of operations/ management to the country.

Government of India has signed 254 contracts under NELP regime with National Oil Companies and private (Both Indian and foreign)/

Joint Venture companies. At present, 101 contracts are operational out of total 310 contracts (254 NELP, 28 Pre-NELP Field round and 28 Pre-NELP Exploration) signed so far under various bidding rounds.

The awarded 254 blocks under NELP regime are located in onland (114), offshore shallow water (59) and deepwater (81) areas. As a result of exploratory activities, several unexplored and poorly explored areas, in particular offshore and deepwater areas have been appraised through geophysical surveys and exploratory drilling. Till date, 242 hydrocarbon discoveries (127 Oil and 115 Gas) have been made under various regimes and most of the gas discoveries have been made in offshore - shallow (52) and deepwater blocks (40).

NELP bidding rounds have attracted many Private and Foreign Companies in addition to PSUs. Before the NELP, a total 35 E&P Companies (5 PSUs, 15 Private and 15 Foreign) were working in Nomination and Pre-NELP regime. After the conclusion of nine rounds of NELP bidding, the total number of companies has increased to 117 (11 PSUs, 58 Private and 48 Foreign Companies as Operators and Non-operators/ Consortium Partners). Major Private Companies were RIL, Jubilant and Essar. The major foreign companies were British Gas, British Petroleum, the then Cairn Energy (now Cairn India), ENI, Santos and BHP Billiton.

Public Sector Undertakings (PSUs) IOCL, GAIL, BPCL working under MoP&NG and their subsidiaries like Bharat Petro Resources Ltd. (Subsidiary of BPCL), Prize Petroleum Company Limited (Subsidiary of HPCL), have participated in various NELP bidding rounds and have been awarded exploration blocks in various NELP bidding rounds. In addition to central PSU, state PSU like GSPC have participated in various NELP bidding rounds and have been awarded exploration blocks.

The domestic crude oil/ gas production in the country consists of oil production from Nomination Blocks/Fields under ONGC and OIL and from the discovered fields and producing Pre-NELP and NELP blocks under the Production Sharing Contract (PSC) regime. The average oil and gas production under the PSC regime during the current year (April' 17– March' 18) is to the tune of 2,02,005 barrels /day (BOPD) and 542 Million Standard Cubic feet per day (MMSCFD) respectively.

Table 1.4 Status of Blocks under NELP (As on 31.03.2018)

Round	Offered	Awarded				Relinquished				Operational			
		Deep Water	Shallow Water	Onland	Total	Deep Water	Shallow Water	Onland	Total	Deep Water	Shallow Water	Onland	Total
NELP I	48	7	16	1	24	5	15	1	21	2	1	0	3
NELP II	25	8	8	7	23	8	7	5	20	0	1	2	3
NELP III	27	9	6	8	23	9	5	5	19	0	1	3	4
NELP IV	24	10	0	10	20	10	0	6	16	0	0	4	4
NELP V	20	6	2	12	20	6	1	8	15	0	1	4	5
NELP VI	55	21	6	25	52	21	3	18	42	0	3	7	10
NELP VII	57	11	7	23	41	11	4	14	29	0	3	9	12
NELP VIII	70	8	11	13	32	8	6	8	22	0	5	5	10
NELP IX	34	1	3	15	19	1	2	1	4	0	1	14	15
Total	**360**	**81**	**59**	**114**	**254**	**79**	**43**	**66**	**188**	**2**	**16**	**48**	**66**

Figure 1.2: Status of Blocks Awarded under NELP

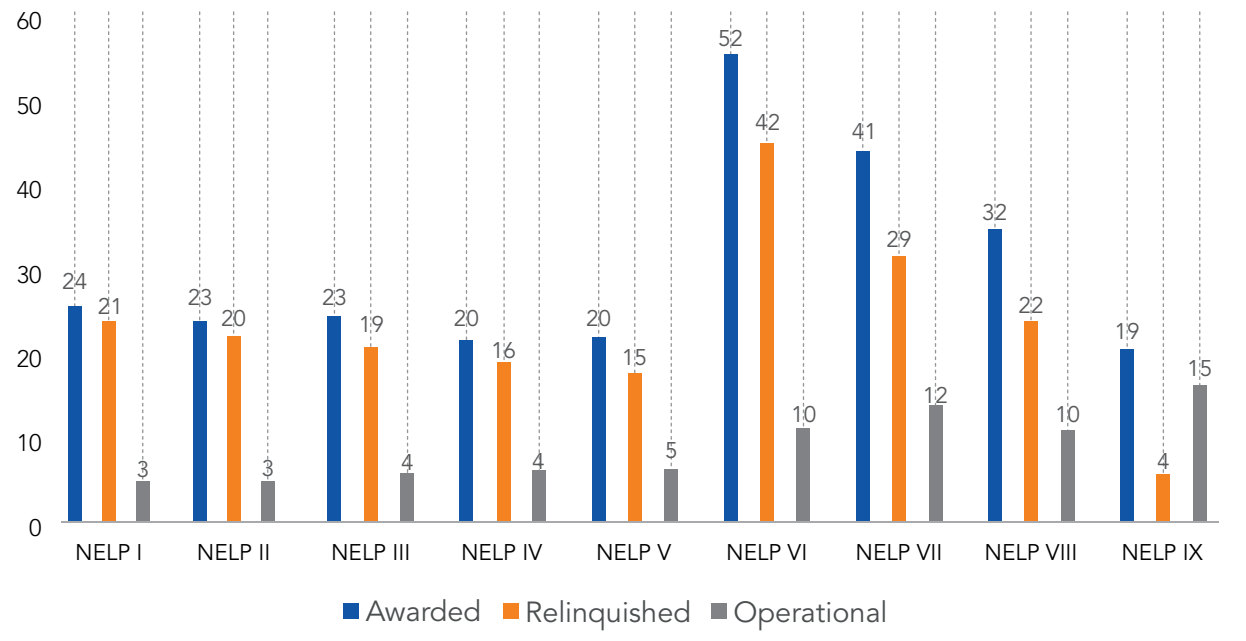


Table 1.5 Chronology of NELP Bidding Rounds

Round	Launch Year	Signing Year
PRE-NELP Exploration	1980	1980-1995
PRE-NELP Field	1992	1992-1993
NELP-I	1999	2000
NELP-II	2000	2001
NELP-III	2002	2003
NELP-IV	2003	2004
NELP-V	2005	2005
NELP-VI	2006	2007
NELP-VII	2007	2008
NELP-VIII	2009	2010
NELP-IX	2010	2012

Table 1.6 Investment made in NELP blocks in USD Million (As on 31.03.2018)

NELP Committed Investment		Actual Investment		
NELP Bidding Round	Exploration Investment commitment	Actual Exploration Investment	Actual Development Investment	Total Investment
NELP I	1,082.23	4,791.73	7,939.04	12,730.77
NELP II	775.41	908.73	33.94	942.67
NELP III	978.18	3,347.34	1,957.25	5,304.59
NELP IV	1,135.05	2,095.64	19.40	2,115.04
NELP V	847.22	1,025.12	1.26	1,026.37
NELP VI	3,570.00	2,684.01	1.72	2,685.73
NELP VII	1,504.61	866.96	13.00	879.96
NELP VIII	1,102.25	596.30	0.00	596.30
NELP IX	733.66	220.65	0.00	220.65
Total	**11,728.61**	**16,536.48**	**9,965.60**	**26,502.08**

Promotional Events in 2017-18

28-06-2017
Launch of NDR and HELP/OALP

11-07-2017
Promotional Event for HELP and OALP at WPC, Turkey

04-09-2017
Promotional Event for HELP and OALP at SPE, Aberdeen and London

26-10-2017
Promotional Event for HELP and OALP at Mumbai

14-11-2017
Promotional Event for HELP and OALP at ADIPEC, Abu Dhabi, UAE

18-01-2018
OALP Bid Round-I launch Event

12-02-2018
OALP Bid Round-I promotional Roadshow at Mumbai

15-02-2018
OALP Bid Round-I promotional Roadshow at Ahmedabad

05-03-2018
OALP Bid Round-I promotional Roadshow at Kolkata

21-03-2018
OALP Bid Round-I promotional Roadshow at Hyderabad

Mumbai Roadshow

Roadshow at WPC Turkey

Kolkata Roadshow

NDR Launch event

OALP I NIO Launch Event

Abu Dhabi Roadshow

Launch of NDR and OALP

OALP I Press Conference

Facilitation Desk at Roadshows

DGH Stall at ADIPEC 2017

1867

Struck oil in Jeypore, Assam

1882

Assam Railway Trading Co. set up to explore oil

1890

First Commercial Discovery at Digboi

1891

Assam Oil Syndicate set up a Refinery at Margherita

1895

Assam Oil Company to take over petroleum interests from Assam Oil Syndicate

1901

First Oil Refinery Set up at Digboi

1922

Burmah Oil Company bought shares from ARTC, and appointed commercial and technical managers from AOC

1930

Crude oil production plummeted upto 250000 tonnes per annum and exploration activities continued in Assam- Arakan range

Petroleum Act of 1934

1948

Industrial Policy Statement, Oilfields Act, 1948

1954

Oil and Natural Gas Directorate

1956

ONGC Estd.

1959

Petroleum and Natural Gas Rules, 1959 ONGC– statutory body

1962

Petroleum Pipelines Mineral Act, 1962

1974

Bombay High Discovered

Oil Industry Development Act, 1974

1976

Petroleum Rules 1976

1985

Government of India's decision for participation of companies in development of discovered oil and gas fields

1993

Estd. DGH , Policy for round-the-year bidding for exploratory blocks

1995

GoI approved NELP

1997

Government of India formulated CBM policy

1999

NELP-I Launched 48 blocks offered

2000

NELP-II

2001

First round of CBM bidding

2002

NELP-III

2003

Second round of CBM blocks bidding

NELP-IV

2005

Third round of CBM bidding

NELP-V

2006

NELP-VI

2007

NELP-VII

2008

Fourth round of CBM bidding

2009

NELP-VIII

2010

NELP-IX

2015

Discovered Small Field Policy

2016

Approval of Hydrocarbon Exploration Licensing Policy (HELP)

Marketing and Pricing freedom for new gas production from Deepwater, Ultra Deepwater and High Pressure-High Temperature Areas

Discovered Small Fields Bid Round 2016

Policy for grant of extension to Production Sharing Contracts for smallmedium- sized and discovered fields

2017

Launch of NDR and HELP

HELP Through Open Acreage Licensing (OAL) Mechanism

2018

OALP Bid Round I and Second Bid Round under DSF Policy

Policies
Projects
Notifications

CHAPTER 2

INVESTORS' PICK

CHAPTER 2

Investors' Pick

2.1 Exploration

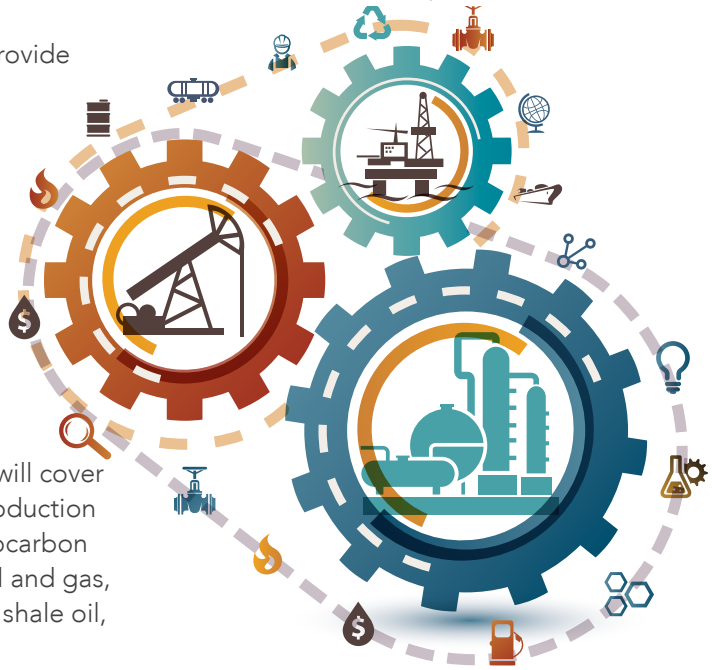
2.1.1 Hydrocarbon Exploration & Licensing Policy (HELP)

Date of notification:
10 March 2016

In the line with the vision of reducing hydrocarbon import dependency by 10% by 2022, Hydrocarbon Exploration and Licensing Policy (HELP) was launched with the clear objective of boosting the production of oil & gas in the Indian sedimentary basin. This policy is based on the new model of Revenue Sharing Contract (RSC) which has replaced the earlier model of Production Sharing Contract (PSC). Under HELP Open Acreage Licensing (OAL) mechanism has been launched which allows the investors to carve out blocks of their choice by assessing E&P data available at NDR & by submitting an Expression of Interest (EoI). EOI can be submitted throughout the year without waiting for a formal bid round from the government. These blocks would be subsequently offered through bi-annual formal bidding process. OAL would be manifested through National Data Repository which will provide rapid jumpstart to E&P activities by providing seamless access to the country's entire G&G data for interpretation and analysis.

Following are the salient features of HELP:

- Single license that will cover exploration and production of all types of hydrocarbon viz. conventional oil and gas, coal-bed methane, shale oil, gas hydrates, etc.
- Revenue Sharing Model: Simple, easy to monitor; only two monitoring parameters for the government-revenue & production of the contractor, no cost recovery; no micro-management by the Government; operational



Expected Positive Outcome:

OALP was operationalized on 01.07.2017 which was EOI submission start date. OAL will open the entire Indian sedimentary basin for investors to realize the untapped potential of Indian Hydrocarbon Sector.

OALP events with timeline:- 1st EOI closing date was 15.11.2017 & the blocks were offered for bid on 18th of January & the bids were closed on 02.05.2018. The blocks were awarded in June 2018. 2nd EOI cycle started on 16.11.2017 & will end on 15.05.2018.

allow potential investors/ companies to carve out acreages of their choice and submit an expression of Interest basis which government would call for competitive bids

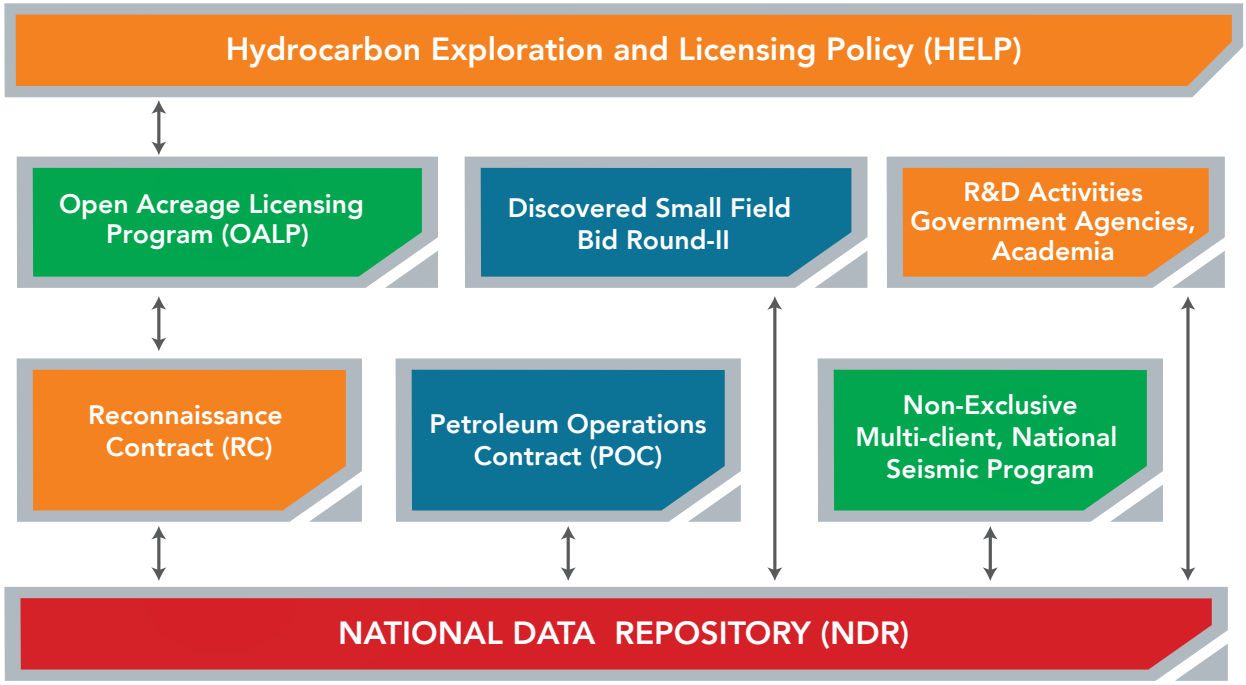
- Reduced and graded royalty rates. Further to encourage exploration in deep water and ultra-deep water areas, the royalty was exempted for first seven years (and subsequently royalty of 5% and 2% applicable in deep water and ultra-deep water areas)
- Other fiscal incentives viz. exemption of cess on crude oil and custom duty applicable on equipment/ services for exploration and production activities
- Full marketing and pricing freedom of gas produced on arm's length basis
- Extended period for exploration and production i.e. 8 years for onland/ shallow water and 10 years for deep water/ frontier areas
- Providing option of Reconnaissance Contract (RC) to interested E&P and Oil Field Services (OFS) companies. A Reconnaissance Contract allows interested companies to undertake exploration activities, seismic surveys and exploratory drilling to gather E&P data and exclusive rights to lease out the same for a period of 12 years with an option to migrate to development and production phase subject to competitive bidding
- Pre-determined Liquidated Damages (LDs) for any shortfall in committed work program

2.1.2 National Data Repository

For E&P companies quality data of an oil & gas field is of utmost importance to plan the bidding for the acreages and taking cognizance that E&P data is a national asset therefore to make this entire data available for commercial exploitation, research & development purpose, National Data Repository was set up by DGH on behalf of Ministry of Petroleum & Natural Gas, Govt of India. NDR has the following broad objectives:

- To validate, store, maintain and reproduce reliable E&P data with provisions for seamless access online and offline
- To facilitate efficient data reporting, data exchange and trading among existing players

NDR: Backbone of E&P Activities in India



- To improve DGH ability to monitor and control E&P activities
- To support E&P activities in India under Hydrocarbon Exploration and Licensing Policy (HELP) for improved E&P environment in India
- To provide data for processing, interpretation and visualization
- To strengthen overall Geo-scientific activities in India

NDR is the backbone of HELP. Open Acreage License Program (OALP) was launched along with NDR on 28.06.17 so that the contractors can analyze the data & bid for particular block in which they are interested. The data presented through NDR is obtained through advance technology simulations which makes the data more reliable & the operators can take advantage of these data to make a precise decision regarding bidding of a particular block.

Setting up of NDR is the key facilitator to provide a rapid jumpstart to E&P activities in India. The key beneficiaries of NDR- E&P operators, Govt. agencies, Universities, Research Institutes & Parties entitled by DGH.

Some of the key features of NDR are:

i. State of the art Primary Data Centre (PDC) equipped for data storage capacity of 156TB of hard disk to store processed data& 720TB robotic tape library

ii. Secondary Data Centre (SDC) facility with 60TB for Disaster Recovery and Business Continuity to be opened at Bhubaneshwar

iii. Real time data replication between PDC & SDC

iv. Fully equipped Data Visualization Rooms set up for viewing G&G data

v. Skill Development Centre facility for specialized training

vi. Highly secured access with multiple biometric entry and exit points for separate teams

vii. Network access secured by two layers of firewall

Expected Positive Outcome

NDR enables the contractors to bid according to E&P data available and make sound decision regarding the investment.

NDR Data policy is a pre-cursor to award of blocks under Hydrocarbon Exploration and Licensing Policy. It will providea unique platform to view, analyze, purchase data for all E&P companies, institutions, research agencies, etc.

NDR is located on fifth and sixth floors of DGH Office, OIDB Bhavan, NOIDA. It was established on Build, Populate and Operate Model on a turnkey basis by Halliburton Offshore Services Inc.

As on 31st March, 2018 data available in NDR:

- ~18 lakh LKM of 2D seismic data
- ~6.5 lakh SKM of 3D seismic data
- 14,415 wells and log data
- 29,638 well reports
- 14,464 Seismic reports
- Interpretation solution in Physical data viewing room.

Way forward to NDR

- Cloud based solution for virtual data room.
- ISO certification

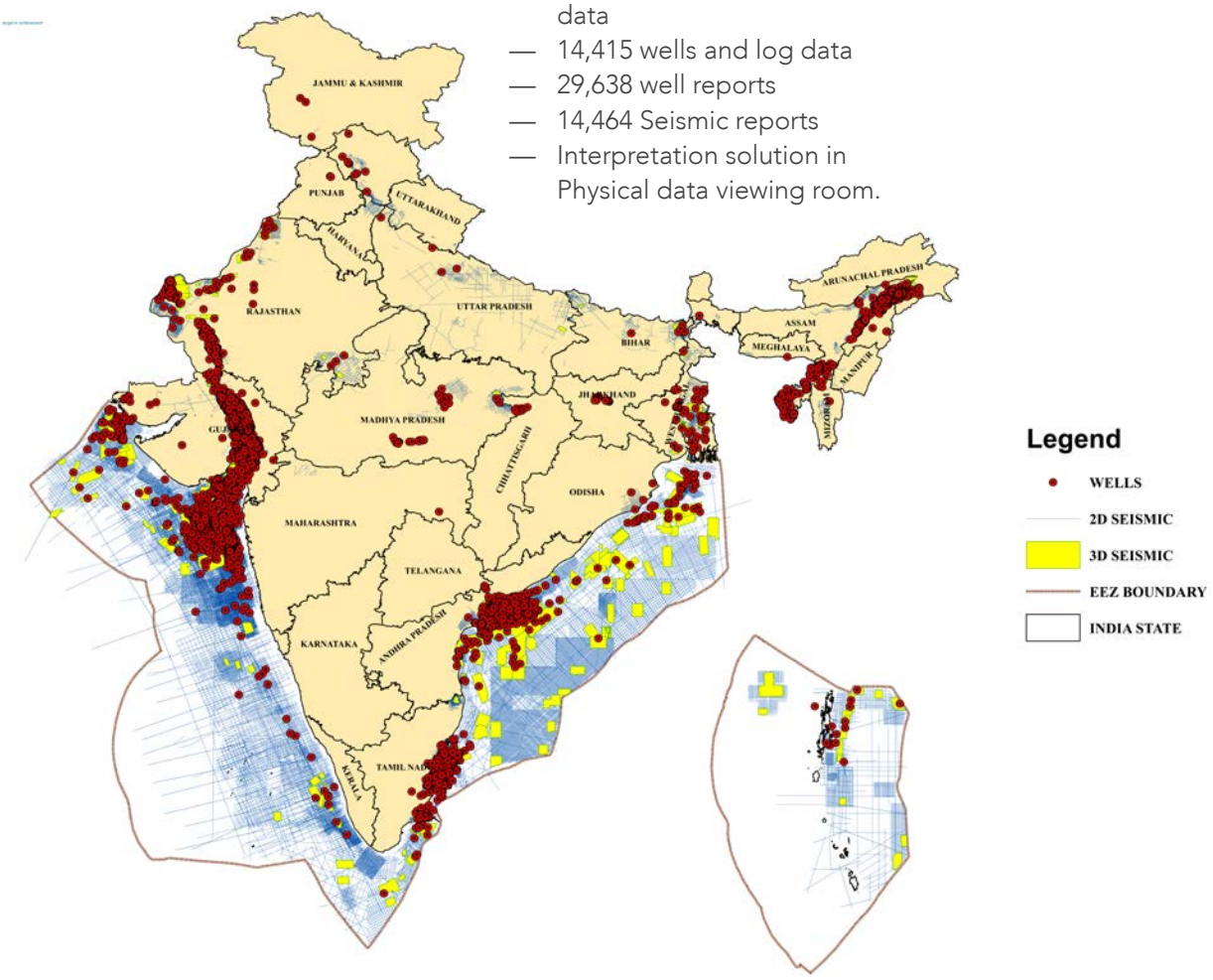


Fig 2.1: Reports Loading Target & Achievement

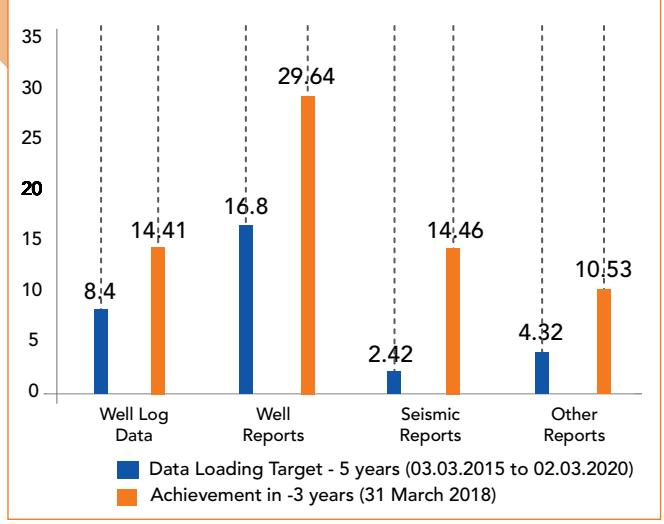
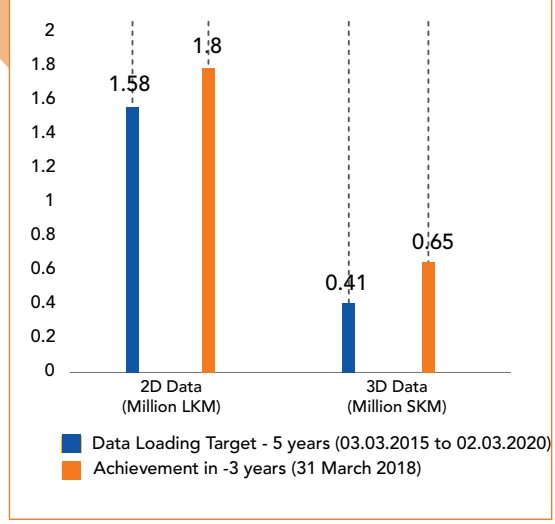


Fig 2.2: Seismic Data Loading Target & Achievement



2.1.3 Policy for E&P, Data Assimilation, Disclosure, Sharing, Accessibility & Dissemination through National Data Repository (NDR) at DGH

Date of notification: 16 March 2017

The objective of this policy is to assimilate, preserve and regulate the E&P data generated by various companies over the last several decades and held within the National Data Repository (NDR) in order to enable systematic disclosure, sharing and dissemination and to standardize the norms for accessibility within the overall provisions of the Oilfields (Regulations and Development Act 1948) and the Petroleum and Natural Gas Rules 1959, Government policies and other guidelines as may be applicable.

The policy is broadly divided into the following three parameters:

- Data assimilation: Under this policy, all data generated will be assimilated by NDR in DGH office. All data held in NDR shall be the property of Government of India with DGH as its custodian. All private cos. PSUs are required to submit the data generated in the blocks to DGH within a stipulated timeframe.
- Data availability/disclosure/ timelines: Any commercial entity, students from Government Recognized Indian/Foreign Universities, Private Universities, Govt. Recognized Research Institutes and/or any other user authorized by DGH can view the data available in NDR after registering on NDR web portal. NDR/DGH shall have the right to disclose/visualize and sell any or all data including proprietary data, to any person or legal entity.
- Data dissemination: Data access shall be available to the registered users through web portal. E&P users / investors will be allowed to see data in physical data rooms located at NDR, DGH after scheduling an appointment with NDR. Recognized Indian / Foreign Universities / Educational Institutions will be provided data after uploading the signed and duly stamped scanned copy of Confidentiality Agreement.

Recent update:

1. Secondary data center will be opened in next few months in Bhubaneshwar which will provide full back-up to NDR. This data center will provide data to boost E&P activities in the eastern & north eastern region by providing data viewing facility at a proximity to all E&P companies operating in eastern & north eastern part of India.
2. DGH NDR facility, Noida hosted physical data view room for 55 blocks of OALP round I
3. Interpretation solution (DSG-Decision space geoscience) implemented in Physical data viewing room in DGH NDR facility, Noida.

"The Open Acreage and National Data Repository will help companies participate in field they are interested in and help increases the exploration interest in Indian fields."

Shri Narendra Modi

Expected Positive Outcome

NDR launched on 28th June 2017 after which OALP was launched so that the contractors can bid according to the data available in NDR and can make a sound decision regarding the investment . NDR Data policy is a pre-cursor to award of blocks under Hydrocarbon Exploration and Licensing Policy. It will provide a unique platform to view, analyze, purchase data for all E&P companies, institutions, research agencies, etc.

2.1.4 Policy for encouraging E&P activities in North East India (NE Hydrocarbon Vision 2030)

Date of notification:
9 February 2016

Government of India released the Hydrocarbon Vision Document 2030 for NE Region with the aim of preparing a roadmap for the next 15 years to increase the production of oil and gas in NE and outlining the necessary investment in the hydrocarbon sector to increase exploration activities, etc. The vision rests on 5 pillars: People, Policy, Partnerships, Projects and Production.

Objectives to be met:

- To develop North East (NE) Region as a dominant hydrocarbon hub at the forefront of India's energy economy
- To double the production of O+OEG by 2030
- To get access to clean fuel for 100% households at affordable price in the region (LPG/PNG)
- To develop natural gas grid, CGD networks and CNG Highways

Status of project:

1) Relaxation of timelines for challenging area blocks has been approved.
2) Flexibilities in carrying out outstanding MWP has been approved
3) HELP & OAL has been operational for North eastern oil & gas fields

Expected Positive Outcome

An Executive Council has been formed consisting of government officials and industry stakeholders for the implementation of the vision document to develop NE region as a hydrocarbon centre.

2.1.5 Discovered Small (Marginal) Field Policy: Discovered Small Field Bid Round – 2016

Date of Notification:
15 October 2015

Policy Brief: To reduce the import dependency of hydrocarbons & to effectively exploit the untapped established reserves Marginal Field Policy was announced. The policy was later rechristened to Discovered Small Field Policy (DSF), under the broad policy framework of the new Hydrocarbon Exploration and Licensing Policy (HELP). DSF policy offers discovered acreages for investors with low risk & several liberal features which are as follows:

- **Revenue Sharing Contract (RSC):** In line with the vision of "ease of doing business"

a simple and easy way to administer contractual model of revenue sharing is introduced wherein the government's take is based on bid revenue share. Following are the advantages of RSC:-

- Operational autonomy to developers and reduced micromanagement by the Government.
- Government of India need to audit only production and revenue of the contractor.
- Less disputes between the government and the operator leading to faster approvals.
- With revenue being shared with government from the first day of production, the operator would focus on reducing its cost.

- **Single license for Conventional & Non-conventional hydrocarbon:** Single license to explore and extract all hydrocarbon resources, including CBM, Shale gas/oil, tight gas, gas hydrates and other resources to be identified in future.
- **No restriction on exploration activity during contract period:** Contractor will be allowed to carry out exploration during entire contract duration.
- **Eligibility for Bidding:** Up to 100% participation by foreign companies, Joint ventures will be allowed. No mandatory state participation and no carried interest by ONGC and OIL are envisaged.

"Discovered small field bid round is a good opportunity for various start-up firms that intend to foray into oil and gas sector."

Shri Dharmendra Pradhan

- **Crude Oil & Gas pricing and Sale:** Contractor will be free to sell the crude oil and Natural Gas exclusively in domestic market through a transparent bidding process at arm's length.
- **Oil Cess & Royalty:** No Oil Cess will be applicable on crude oil production however, Royalty rates will be as under NELP regime.
- **Custom duty:** Customs duty exemptions for specified goods and services will be available for contract areas.

The DSF bid round was launched in May 2016 under the overarching vision of Hon'ble Prime Minister's vision for reducing import dependency on oil and gas by 10% by 2022. The DSF bid round was completed in record time. Further, many bidders participated despite the global economic slowdown and volatile crude oil price environment. The Bid Round 2016 46 Contract Areas consisting of 67 fields across

Nine sedimentary for extraction and exploration of oil and gas. DGH in May 2016 launched the DSF Bid Round - 2016 and invited bids to develop and monetize these contract areas which are estimated to hold in-place Oil and Oil equivalent as reserves of 86 Million Metric Tonnes with estimated recoverable reserves of roughly 30 Million Metric Tonnes.

Government of India signed the contracts of the fields awarded under the DSF Bid Round 2016 with the awardees at New Delhi on 27th March 2017. The event was presided by Shri Dharmendra Pradhan, Hon'ble Minister of State for Petroleum and Natural Gas along with other senior officials of Ministry of Petroleum and Natural Gas (MoPNG) and DGH and witnessed a large audience comprising successful awardees, E&P majors, service companies and key media houses.

A two-way Interactive Portal for DSF which has been developed by DGH to facilitate contract management.

Positive outcome of the policy:-

- Thirty contract areas have been signed which are expected to come into production within the next 3-4 years.
- The cumulative peak production from the awarded fields is expected to be around 15,000 BOPD of oil and 2 MMSCMD of gas over the economic life of field.
- Estimated total revenue would be ~Rs. 46,400 crores.
- Expected Gross royalty collection is 5,000 crores and expected state royalty collection is Rs. 2,100 crores. Government's revenue share would be ~Rs. 9,300 crores.
- Employment of ~37,500 persons would be generated through the awarded fields.

DSF Round II

- Following the success of DSF Bid Round I-2016 and the fact that there are still many more unexploited discoveries, Government has extended the DSF policy and will be launching DSF Bid Round-II in the year 2018-19 offering 25 Contract Areas for International Competitive Bidding.
- DSF Round II aims to provide an opportunity for industry professional to invest in larger areas on offer in already discovered basins, thereby providing investment opportunity at minimal risk. 25 contract areas will be offered in the second round of DSF out of which 15 are on land and 10 shallow offshore. In total 59 discovered small fields are clubbed into 25 contract areas spread over 8 sedimentary basins covering an area of total 3042 square Km. Current estimates of Hydrocarbon in place is over 190 MMT/1.39 billion barrels.
- The DSF round-II process will be made entirely digital which will offer a transparent, secure and easy bidding process through state of art e-bidding portal. Not only the tendering process will be completely digitized but also the geological information about the sedimentary basins will be available for purchase in digital mode. Also the digital data set comprising seismic data, navigation data and well log data, special reports like well completion reports, etc. can be purchased on National Data Repository (NDR) portal.

2.1.6 Re-assessment of Hydrocarbon Resources in India

Date of notification: 21st January 2014

To assess the hydrocarbon potential, a Multi-Organization Team (MOT) has been constituted on 21st January to carry out re-assessment of hydrocarbon resources of India in all its 26 sedimentary basins which is being undertaken by ONGC in association with OIL and DGH.

Status of project:

The project started on 1st September 2015 & completed on 30th November 2017. This project was completed by 12 teams of 60+professionals located at 7 work centers of ONGC. All 26 sedimentary basins are reassessed in 2017 with 41,872 MMTOE total hydrocarbon in place which is an increase of 49.1 % on previously assessed basins which was done in 1995-96. Out of this total hydrocarbon in place 12076 MMTOE is discovered hydrocarbon & 29,796 MMTOE is undiscovered hydrocarbon.

Basin-wise reports is formally submitted at DGH in hard copy on 19.01.2018. The final copy of all-basin comprehensive report was submitted to MoP&NG on 26.02.2018 and individual basin reports are made available to all the potential bidders & interested readers. The soft copies of the reports and project datasets were submitted to DGH on 14th March 2018.

These 26 basins are divided into 3 categories:-

1) Category I-Commercially established & producing basins-Total 7 basins
2) Category II-Prospectivity identified-Total 5 basins
3) Category III- Prospective-Total 14 basins

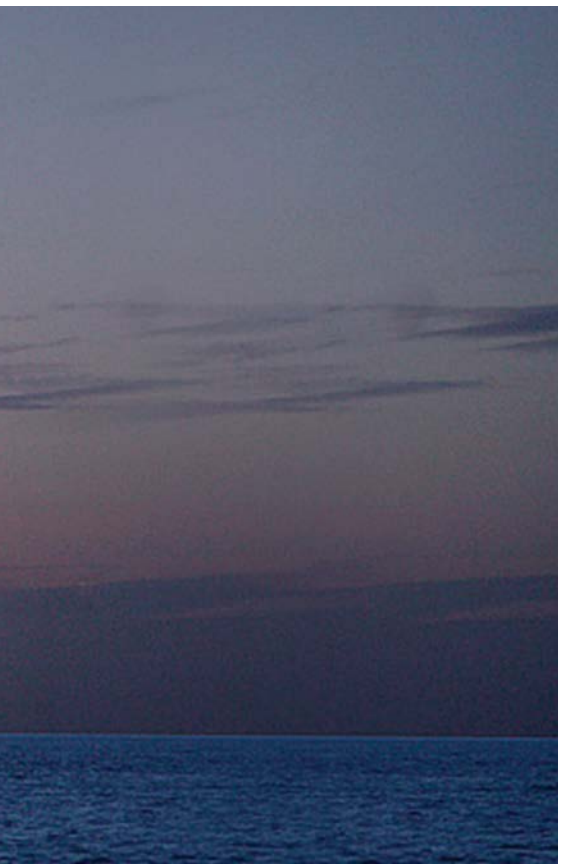
These 26 sedimentary basins include on land, shallow water & deep water areas which covers a total area of 3.36 million Sq. Kms out of which Onland area is 1.63, shallow water is 0.41 & deep water is 1.32 million Sq. Kms.

All the data of these basins are obtained using improved 3D petroleum system modelling to make this data more reliable which can help the companies to take a precise decision on investing in these fields.

2.1.7 National Seismic Programme

Date of notification:
20 May 2014

This project was also introduced under the broad policy



framework of Geo-Scientific Data Generation for Hydrocarbons in Indian Sedimentary Basins to appraise the un-appraised on land areas in 26 sedimentary basins by ONGC & OIL.

OIL has been assigned to carry out 2D seismic API of 7408 LKM falling in North Eastern part of India covering states of Assam, Arunachal Pradesh, Nagaland, Manipur, Tripura and Mizoram and ONGC has been assigned to carry out 2D seismic API of approx. 40,835 LKM seismic data in onland part of 22 sedimentary basins of India

Status of project:

So far, out of 24 states, in-principal approval from 22 states and forest permissions from 18 states have been obtained. Also during the FY 207-18 16,135 LKM of data has been acquired which is significant 33% of total target under NSP programme.

2.1.8 Non-Exclusive Multi Client Geo Scientific Survey

Date of notification:
20 May 2014

MoP&NG vide letter dated 20.05.2014 has approved the Policy for Geo- Scientific Data Generation for Hydrocarbons in Indian Sedimentary Basins and the Agreement to carry out Non-exclusive Multi-client Geo-scientific Surveys / Activities relating to Hydrocarbons. This project aims to get quality data in offshore basinal areas and to acquire high quality of geophysical/seismic for sedimentary basins. DGH will administer the Policy on behalf of GoI and GoI will continue to be the owner of the data acquired under this Policy.

Policy brief:

The approval process will consist of two stages.

Stage I:

a. Service Providers will submit the proposal along with an Application Fee (US$ 1,000)

b. DGH will seek clearances from MoD and MoHA for the survey area and company

c. Subsequently to obtaining clearance, DGH will issue a "Provisional Letter of Consent" to Service Provider that will help the applicant company to approach and tie up pre-funding with prospective buyers of the data to be generated.

d. Validity of the Provisional Letter of Consent will be for six months.

DGH will have power to extend the validity up to a maximum period of one year. Within these six months the Service Provider will look for pre-committers for pre-funding of the Project. If the pre-commitments look positive, then only the Service Provider goes ahead with the signing of the Non-exclusive Multi- client Agreement.

Stage II:

a) The applicant would submit the Non-exclusive Multi-client Agreement with all necessary details to DGH and would pay a Project Fee of US$ 10,000

b) Applicant Company would furnish a Data Delivery Bank Guarantee of US$ 100,000 and the same shall remain valid for 180 days after expiry of the Survey Period (or extended survey period).

c) Survey Period will be for a Period of 2 years from signing of Agreement and may be extended for maximum period of 12 months by paying 60% percent of the Project Fees (Project Extension Fee) or pro-rata thereof along with the extended Data Delivery Bank Guarantee.

d) No liquidated damages if the generated data is less than that proposed in the Non-exclusive multi-client Agreement.

e) Agreement shall remain valid for a period of 12 years from the signing of Agreement, (including the extended Survey period).

Status of project:

So far, proposals have been submitted for 3 areas, MOD & MOHA clearances are received for 2 areas and issuance of provisional letter of consent is on the final stage.

NEMC | Office Order: 22 June 2018

The competent authority has approved the followings for supply of DGH Data to the Service Providers under Non-Exclusive Multi-Client (NEMC) Survey Policy of Government of India (GoI):

1. Non-exclusive Multi-client (NEMC) proposals and signed agreements shall be governed by NEMC policy and agreement only.
2. DGH Data' shall be provided free of cost from National Data Repository (NDR) for NEMC proposals/surveys as per Clause 7.12 of the NEMC policy.
3. The Service Provider will have exclusive rights to license the generated or value added data under NEMC policy of GoI for a period of twelve (12) years (including the survey period/ study period) subject to provisions of the signed agreement between DGH and Service Provider.
4. NDR may sell the generated or value added data as per Article 3.7 of NDR Data policy only after expiry/conclusion of NEMC agreement with an intimation to GDA section.

Expected Positive Outcome:

This policy has replaced the earlier profit sharing model with the payment of one time fees to the government i.e. $10,000 USD which will encourage competent private players to undertake G&G activities and sell the data to earn profits by submitting a copy of data with the DGH. This policy initiative will encourage deployment of cutting edge technology by private players which will lead to generation of quality data for better assessment of Indian sedimentary basins.

2.2 Production

2.2.1 Policy to promote and Incentivize Enhanced Recovery Methods for Oil and Gas

Date of Notification: Approval stage

The strategic objective of the Policy is to build a supportive ecosystem through academic and research institutes, industry- academia collaboration and to support and encourage Exploration and Production (E&P) Contractors to deploy ER/IR/UHC Methods/ techniques. The Policy will be applicable to all contractual regimes and Nomination fields. This policy initiative is expected to spur new investment, provide impetus to economic activities and generate additional employment opportunities. The Policy is expected to facilitate induction of new, innovative and cutting-edge technology and forging technological collaboration to improve productivity of existing fields.

Status Update- The policy is under final approval stage.

2.2.2 Policy Framework for streamlining the operations, relaxation of timelines and delegation of powers to Director General, Directorate General of Hydrocarbons (DGH) under Production Sharing Contracts (PSCs)

Date of Notification: Approval stage

Policy Brief: The objective of this policy is to streamline the operations under Production Sharing Contracts (PSCs) so that there will be no impact on the field development or production activities done by the operator which will eventually lead to no impact on the operator's investment and profitability.

Expected Positive Outcome of the Policy:

This policy will help the operators in getting a hassel free environment with minimum government interference while developing the field. This will support ease of doing business in upstream oil & gas sector.

2.2.3 Policy for the Grant of Extension to the Production Sharing Contracts signed by Government of India awarding Pre-New Exploration Licensing Policy (Pre-NELP) Exploration Blocks.

Date of notification: 7 April 2017

Government of India has approved a policy for granting extension to the Production Sharing Contracts (PSCs) signed by Government of India awarding Pre-New Exploration Licensing Policy (Pre-NELP). Exploration Blocks, to have a transparent and defined framework for granting extension.

Salient features of the policy are as below:

- Submission, Consideration and Approval of request for extension of Contract by contractor at least 2 years before expiry of contract
- Fiscal parameters for extension: During the extended period of contract, Government's share of profit petroleum will be 10% higher, however, the royalty and cess shall be payable at prevailing rates
- Duration of extension: 10 years both for oil and gas fields or economic life of the Field, whichever is earlier. Pre-requisites for Evaluation: Area should have valid mining lease, area to have fields under production, area of extension to be determined on basis of existing production/ injection wells or new development plan, exploration work program to be backed by BG with time schedule. Availability of balance recoverable reserves (third party audited), submission of RFDP, adequate technical expertise and no statutory dues and payment due to Government.
- Criteria for evaluation of request: Contractor should have completed at least 70% of development plan and should have complied with the provisions of creation of Site Restoration Fund (SRF) and Site Restoration Plan (SRP) as per PSC.

Expected Positive Outcome

This policy will help the operators of 10 Pre-NELP Exploration blocks in planning their investments and operations in these fields and will enable the contractors to extract not only the remaining reserves but also plan to extract additional reserves by implementing new technologies. This will help accelerate and supplement indigenous production of hydrocarbon from existing blocks and act as a progressive step towards achieving the target of 10 per cent reduction in import of crude oil by 2022.

2.2.4 Policy for grant of extension to Production Sharing Contracts signed by Government awarding small and medium sized discovered fields to private Joint Ventures

Date of notification: 28 March 2016

To enable optimal recovery of oil and gas after expiry of PSC, policy for extending Production Sharing Contracts for 28 Pre-NELP

discovered (small and medium size) fields has been approved. This Policy would provide for a uniform, non-discretionary framework for extension of contract for a period of 10 years both for Oil and Gas. The primary objective of this policy is to continue uninterrupted production from oil and gas reserves engaged under PSC model and to ensure a stable business environment to Contractors and E&P operators of the PSC regime.

Salient features of the policy are as below:

1. Submission, Consideration and Approval of request for extension of Contract by contractor at least 2 years before but not more than 6 years in advance of expiry.
2. **Fiscal parameters for extension:** During the extended period of contract, Government's share of profit petroleum will be 10% higher, however, the royalty and cess shall be payable at prevailing rates (of nomination regime).
3. **Duration of extension:** 10 years both for oil and gas fields or economic life of the field, whichever is earlier.
4. **Pre-requisites for evaluation:** Area should have valid mining lease, evaluation will be on basis of future development plan, firm exploration program supported by BG, availability of balance recoverable reserves (third party audited), submission of RFDP, adequate technical expertise and no statutory dues and payment due to Government.
5. **Criteria for evaluation of request:** Contractor should have completed at least 70% of development wells of plan or achieved 70% committed production and should have complied with the provisions of creation of Site Restoration Fund (SRF) and Site Restoration Plan (SRP) as per PSC.

Expected Positive Outcome

There will be no interruption in the oil & gas production from these particular fields & during the extension period, it is proposed to increase the Government's take by way of charging normal royalty and cess in place of concessional royalty and cess charged during the original contract period. The profit petroleum during extension period will be 10% higher than the normal percentage.

2.2.5 Policy for testing requirement

Date of notification:
29 April 2015

Government has approved a one- time policy on testing requirements for discoveries made under New Exploration and Licensing Policy (NELP) Blocks. Under this policy, the contractors have been asked to carry out a pending Drill Stem Test (DST) on the discoveries and submit the results within in a specified time frame.

The policy aims to resolve the dispute related to testing requirements and to bring transparency and uniformity in decision making as against case by case approach in the past.

The policy would provide a way forward for development of 12 discoveries with associated gas reserves of around 90 Billion Cubic Meter (BCM) which would be valued at over Rs. 1 lakh crore at the current gas price of US$ 4.66 / Million British Thermal Unit (mmbtu) on Gross Calorific Value (GCV).

Expected Positive Outcome

The policy is expected to monetize the stuck up discoveries withheld because of DST test not conducted by operators, which might otherwise be relinquished on account of failure of operators to conduct the test.

2.2.6 Policy Framework for Relaxations, Extensions and Clarifications at the Development and Production stage under PSC regime for early monetization of hydrocarbon discoveries

Date of Notification:
18th October 2014

This policy framework was developed to address various issues and concerns regarding PSCs. It discusses the relaxation, extensions and clarifications at the Development and Production Stage under the PSC Regime.

Policy framework provides for following relaxations:

— Extension of time period for submission of Declaration of Commerciality (DoC) and Field Development Plan (FDP)

— Drilling of Appraisal Well after submission of DoC and probing additional reservoir during appraisal program

— Reduction of Minimum Work Program in case of overlapping of blocks with SEZ, reserve forests, DRDO danger zones, national parks, urban areas, firing ranges, etc.

— Swapping of 2D seismic with 3D Seismic Work Program and vice- versa

— Entry into subsequent phase after payment of Cost of Unfinished Work Program of previous phases

— Condoning the delays in submission of notice for entering subsequent phase and condoning delays in submission of Annual & Appraisal - Work Program and Budget

— Drilling of Appraisal wells after submission of DoC

— Probing additional reservoirs during appraisal programme

— Acceptance of discoveries for which notification has not been made as per PSC provision

Positive Outcome of the Policy:

— 40+ issues have been resolved

— Enabled early monetization of oil and gas discoveries in 5 blocks, which would result in exploitation of about 34.06 million barrels of oil and about 0.731 TCF of gas reserves

— Will also help in probing additional reservoir and submission of robust FDP in 3 blocks, having estimated reserves of about 172.34 million barrel of oil and 1.934 TCF of gas

— 11 cases of entire block area or part of block area overlapping with special economic zone, reserve forest, naval exercise area, DRDO danger zone, national parks and firing range of Defence, etc. have been cleared one case in is under consideration

— Helped in taking technical decisions based on merits for swapping of 2D seismic work program with 3D seismic work program and vice-versa in five blocks

2.3 Unconventional Hydrocarbons

2.3.1 Cabinet approves Exploration and Exploitation of Coal Bed Methane (CBM) from areas under Coal Mining Lease allotted to Coal India Limited (CIL) and its Subsidiaries

Date of notification: 11April 2018

- The Cabinet Committee on Economic Affairs chaired by the Prime Minister has given its approval for issuing a notification amending clause 3(xiii) of the notification dated 03.11.2015 issued by the Ministry of Petroleum & Natural gas under Section 12 of the Oil Fields (Regulation and Development) Act, 1948 (ORD Act, 1948).
- Due to this amendment, relaxation is granted under the Petroleum & Natural Gas Rules 1959 (PNG Rules, 1959), to Coal India Limited (CIL) and its subsidiaries for not applying for grant of license/lease under the PNG Rules, 1959 for extraction of Coal Bed Methane (CBM) under their Coal Bearing Areas.

Expected Positive Outcome

- The decision is in line with the Government's initiatives of 'Ease of Doing Business' & reducing the hydrocarbon import. It will expedite the exploration and exploitation of CBM, enhance the availability of natural gas and reduce the gap in demand and supply of natural gas.
- The increased development activities for exploration and exploitation of CBM gas reserves in-and-around the block will generate economic activities which in turn has potential to create employment opportunities in CBM operations and in the industries.

2.3.2 Policy Framework for exploration and exploitation of Unconventional Hydrocarbons

Date of Notification: Final approval stage

Approval of Policy framework for exploration & exploitation of unconventional hydrocarbon is under the final stage. This policy framework will permit exploration and exploitation of unconventional hydrocarbons such as Shale oil/gas, Coal Bed Methane (CBM) etc.

It will be carried out under the existing Production Sharing Contracts (PSCs), CBM contracts and Nomination fields to encourage the existing Contractors in the licensed/ leased area to unlock the potential of unconventional hydrocarbons in the existing acreages.

Expected Positive Outcome

- This policy will enable the realization of prospective hydrocarbon reserves in the existing Contract Areas which otherwise would remain unexplored and unexploited.
- With this policy dispensation, new investment in Exploration and Production (E&P) activities and chances of finding new hydrocarbon discoveries and resultant increased domestic production thereof is expected.
- Exploration and exploitation of additional hydrocarbon resources is expected to spur new investment, impetus to economic activities, additional employment generation and thus benefitting various sections of society.
- This will lead to induction of new, innovative and cutting-edge technology and forging new technological collaboration to exploit unconventional hydrocarbons.

2.3.3 Policy framework for Relaxation, Extension & Clarification in existing CBM contract areas for early monetization of CBM

Date of notification:
15 March 2017

Government of India has till date awarded 33 CBM blocks.

Owing to various impediments in current contractual provisions, the monetization of CBM hasn't been at par with conventional oil and gas.

Since unconventional hydrocarbons like CBM have higher breakeven prices and to usher renewed exploration and production activities in CBM blocks, the policy exempts CBM from existing pricing and allocation policy and provides pricing and marketing freedom to CBM contractors and provision to sell CBM to affiliates. This is in tune with Government's policy of **"Ease of Doing Business".**

Further, Government has been empowered to discharge cases and condone delays on basis of technical merit and reasonable endeavour exercised by contractor.

The new policy includes the following features:

- Pricing and marketing freedom to sell CBM in domestic market arm's length
- Provision to reduce CBM contract areas or relinquish contracts with proportionate reduction in work program for contractors with overlap issues in coal blocks, conventional oil and gas, PEL/PML areas etc.
- Easy exit option for CBM blocks subject to certain conditions
- Entry into subsequent phase, after paying cost of unfinished MWP
- Provision for extension and excusable delay in Development phase on account of getting Government Approvals/ Permits etc.
- Provision to sell CBM to affiliates of existing CBM contractors
- Relaxation of Notice Period for submissions as per CBM Contract
- Resolution of CBM contractual issues under ECS

Expected Positive Outcome of the Policy:

The policy is expected to boost CBM production to 6 MMSCMD by 2018- 19 and generate new avenues of employment and increased investment in CBM blocks. It is also envisaged that 14 CBM blocks which are under relinquishment will be provided an easy exit option under the policy.

2.3.4 Policy framework for development of Underground Coal Gasification in coal and lignite bearing areas

Date of notification:
16 December 2015

A policy framework for development of Underground Coal Gasification (UCG) in coal and lignite bearing areas in the country was approved by the Government. UCG is a method of extraction of energy from coal/ lignite resources which are otherwise regarded as uneconomical to work through conventional mining methods. For this purpose, a policy on lines broadly similar to the existing policy for Coal Bed Methane (CBM) development on revenue sharing basis is to be adopted for offering the blocks through competitive bidding.

Positive Outcome of the Policy:

The policy is expected to work towards the larger goal of Energy Security.

2.4 Marketing & Pricing

2.4.1 Marketing and Pricing freedom for gas production from Deepwater, Ultra Deepwater and High Pressure-High Temperature areas

Date of notification:
10 March 2016

Government of India announced a policy for all discoveries in DW/ UDW/HPHT areas which commence commercial production from 1st January 2016 and all future discoveries due to the challenging cost and technology intensive operations. The policy is aimed to exploit oil and gas resources in Deep-water (DW), Ultra deep-water (UDW) and High Pressure High Temperature (HPHT) areas and to incentivize gas production from these discovered, difficult areas.

Pursuant to this policy, producers will be allowed marketing including pricing freedom subject to a ceiling price based on landed price of alternate fuels, which is calculated once in 6 months and applied prospectively for the next 6 months.

Positive Outcome of the Policy:

The policy is expected to increase gas production by 6.75 TCF by improving the economic viability of discoveries currently made in: 21 DW areas, 1 UDW area and 5 HPHT areas. Further, this policy would facilitate development of such discoveries to be made in future.

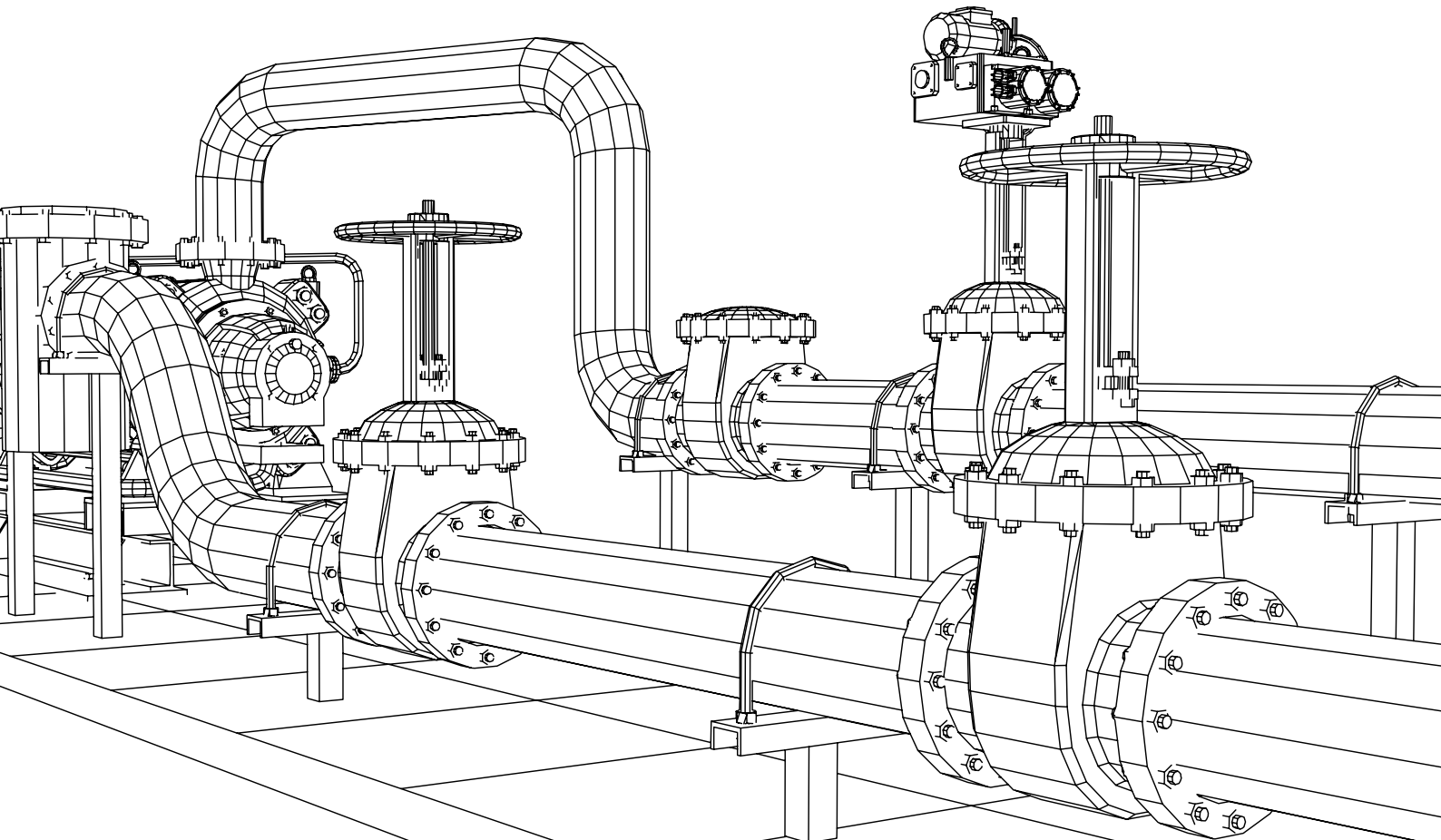
2.4.2 New Domestic Natural Gas Pricing Guidelines

Date of Notification:
25 October 2014

1. This pricing policy is based on the prevailing hub prices of United States, Mexico, Canada, European Union and Russia; and has price revision cycle of six months.
2. To protect the interests of consumers as well as producers, a ceiling based on the landed cost of the alternate fuel has been imposed.
3. Ceiling price in USD per MMBTU (GCV) to be calculated as lowest of (i) The landed price of imported fuel oil, (ii) the weighted average import landed price of substitute fuels and (iii) the landed price of imported LNG.
4. The pricing is notified for every six months by Petroleum Planning and Analysis Cell of MoP&NG.

Expected Positive Outcome

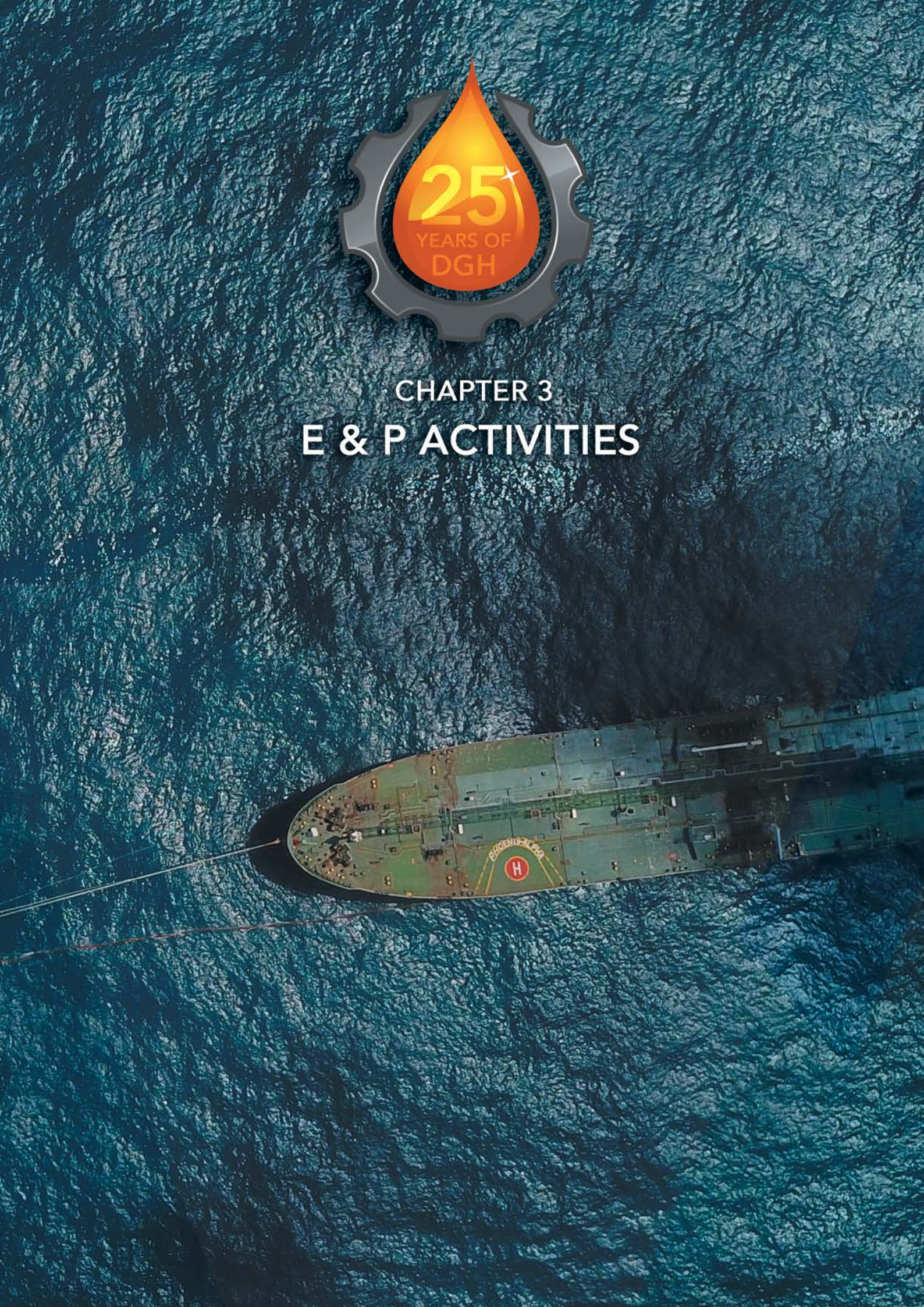
Indian gas markets to move towards a largely uniform formula based gas prices.



E&P Activities

Discoveries

Production



CHAPTER 3

E & P ACTIVITIES

CHAPTER 3

E & P Activities

Government of India has set an ambitious target of reducing hydrocarbon import. Increasing oil & gas production is one of the measures by which oil & gas import dependency can be reduced. Enhancing domestic oil and gas production by promoting Exploration and Production activities by providing more exploration and discovered acreages has always been among Government's highest priorities. Despite relatively low crude prices globally, substantial E&P activities have been carried out in the country in 2017-18, which augurs of the consistent government policies in-place. This chapter incorporates all E&P activities executed in FY17-18. It also provides the detail of hydrocarbon discoveries made in 2017-18 and statistics of exploration, development & production activities of the country.

3.1 Exploration Activities

In FY 2017-18, cumulative 499.86 LKM 2D seismic data was acquired which was all executed in Onland. Majority of the Data acquisition was carried out by PSUs/Pvt. companies/ JVs under PSC regime, which was approximately 355 LKM. Cumulative 3D seismic data acquired in FY17-18 was 5,059 SKM out of which approximately 4,596 SKM data was acquired by ONGC under nomination regime. This year the focus was on offshore basins which resulted in the data acquisition of 3,478 SKM (approximately 70% of total 3D data acquisition) and 1,580 SKM 3D seismic data was acquired in onshore area, majority of 3D data was generated by ONGC in its nomination areas. Total 144 exploratory wells (including Onland and offshore) amounting to a drilling meterage of 4,13,660 m were drilled.

Details of exploratory activities in Nomination & PSC regime in FY 2017-18 compiled in Table 3.1 and company-wise exploratory activities under PSC regime are provided in Table 3.2.

Table 3.1 Exploratory efforts in Nomination & PSC regime in FY 2017-18

Sl. No.	Subject	Parameter	ONGC (Nomination)	OIL (Nomination)	NOCs/Pvt/JVs	Total
1	2D seismic data acquired	Onland (GLKM)	5.36	139	355.50	499.86
		Offshore (GLKM)	-	-	-	-
	Total 2D Seismic		**5.36**	**139**	**355.5**	**499.86**
2	3D seismic data acquired	Onland (SKM)	1,118.18	171.72	290.71	1,580.61
		Offshore (SKM)	3,478.42	-	-	3,478.42
	Total 3D Seismic		**4,596.6**	**171.72**	**290.71**	**5,059.03**
3	Exploratory wells drilled	Onland	57	11	17	85
		Offshore	45	-	14	59
	Total Exploratory Wells		**102**	**11**	**31**	**144**
4	Exploratory Meterage drilled	Onland ('000 m)	164.33	52.28	48.39	265.00
		Offshore ('000 m)	117.44	-	31.22	148.66
	Total Exploratory Meterage drilled		**281.77**	**52.28**	**79.61**	**413.66**

Table 3.2 Exploratory efforts by Companies in FY 2017-18 under PSC regime

Operator	2D (LKM)	3D (SKM)	Exploratory Wells
Indian Private			
Cairn Energy India Pty Ltd.	0	0	2
Essar Oil Ltd.	0	0	1
Focus Energy Ltd.	0	0	4
Jubilant Oil & Gas Private Limited.	0	0	0
Mercator Petroleum Private Limited.	0	0	3
Indian Private Total	**0**	**0**	**10**
PSUs			
Bharat Petro Resources Ltd	0	0	2
Gujarat State Petroleum Corporation Ltd.	0	0	1
Oil and Natural Gas Corporation Ltd.	355.50	49.19	15
Oil India Ltd.	0	241.52	3
PSU Total	**355.50**	**290.71**	**21**
Grand Total	**355.50**	**290.71**	**31**

In table 3.2 exploratory efforts of PSUs, Pvt. companies/Joint Ventures is provided in which all the 2D seismic data acquisition is carried out by ONGC & 3D acquisition is carried out by ONGC & OIL. Majority of 3D data acquisition is executed by OIL India ltd.

Cumulative of 11,65,996 LKM of 2D seismic and 3,03,673 SKM of 3D seismic have been acquired and 6,766 exploratory wells have been drilled by PSUs till date.

Cumulative of 1,28,944 LKM of 2D seismic and 1,09,471 SKM of 3D seismic have been acquired and 367 exploratory wells have been drilled by Indian private E&P companies till date. Foreign companies have carried out 64,790 LKM of 2D seismic survey, 22,143 SKM of 3D seismic survey and have drilled 249 exploratory wells till March 2018. Company-wise details are in Table 3.3, 3.4 & 3.5.

Fig 3.1: Seismic Exploration data as on FY 2017-18

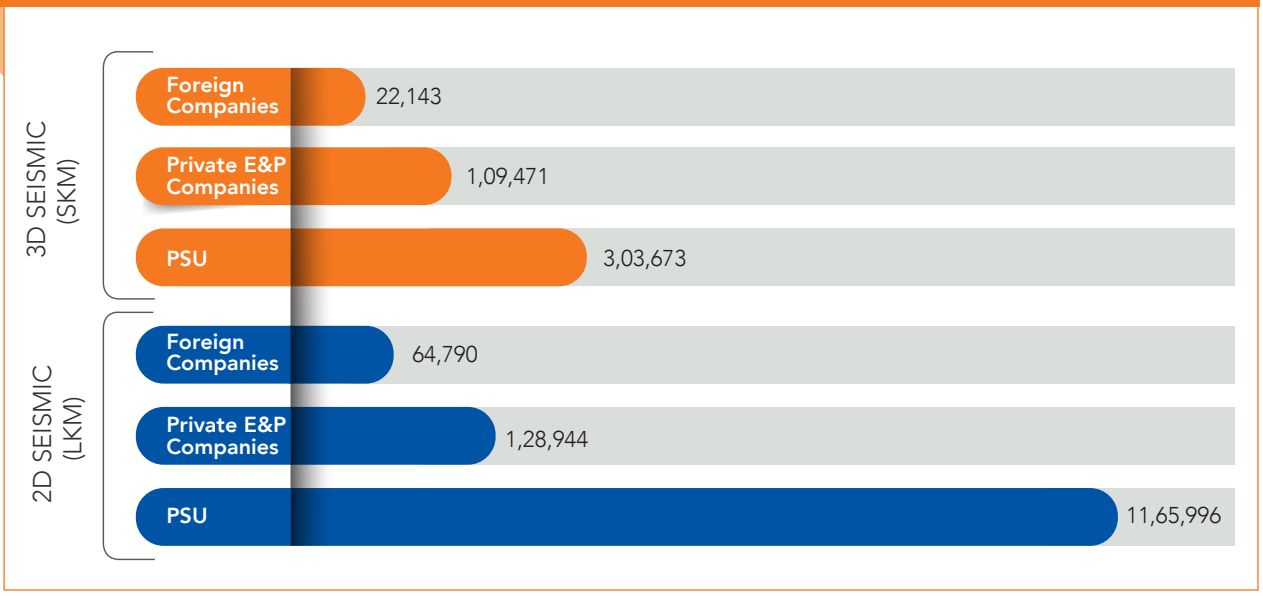


Table 3.3 Exploratory efforts by PSUs (As on 31.03.2018)

No.	Company (Operator)	2D Seismic (LKM)	3D Seismic (SKM)	Exploratory Wells (Nos.)
1	ONGC-Nomination	8,82,592.80	1,24,879.10	5,982
2	Oil India Ltd.-Nomination	73,868.56	12,719.06	392
3	ONGC- PSC regime	2,00,731.40	1,45,323.00	258
4	Oil India Ltd. - PSC regime	2,022.20	7,380.52	90
5	Bharat Petro Resources Ltd.	20.00	221.55	6
6	Gujarat State Petroleum Corporation Ltd.	6,421.00	11,371.00	17
7	Indian Oil Corporation Ltd.	0.00	277.00	7
8	Gail (India) Limited.	0.00	1,077.00	6
9	National Thermal Power Corporation	340.00	425.00	8
PSUs Total		**11,65,996.00**	**3,03,673.20**	**6,766**

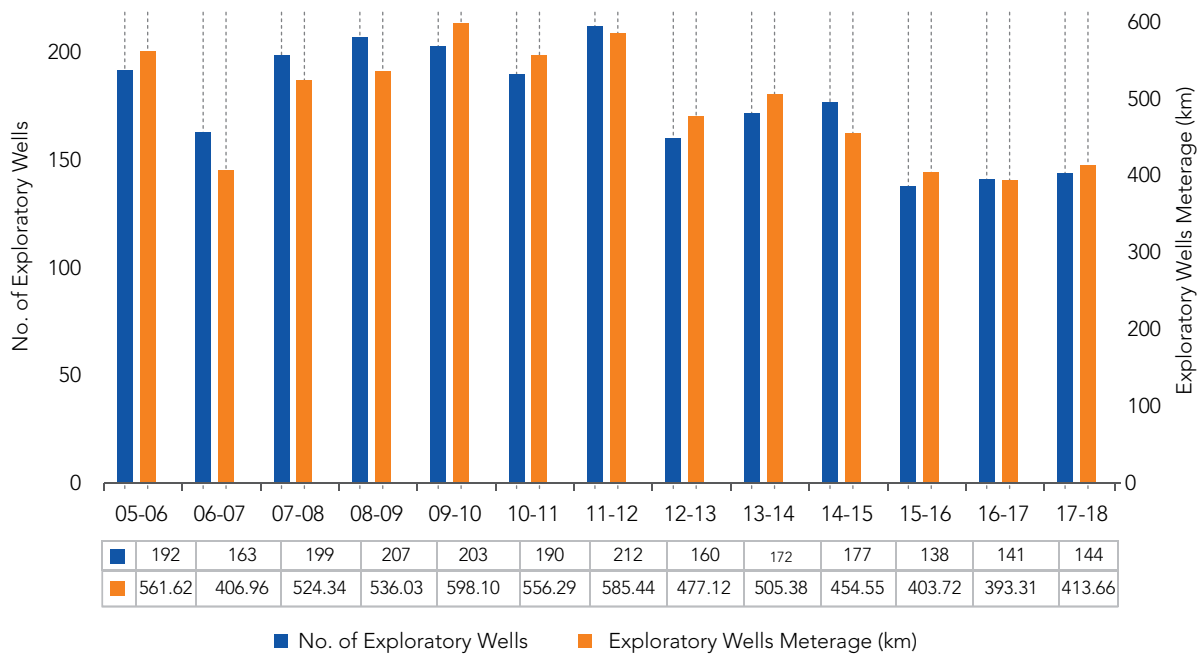
Table 3.4 Exploratory efforts by Private Companies (As on 31.03.2018)

No.	Company (Operator)	2D Seismic (LKM)	3D Seismic (SKM)	Exploratory Wells (Nos.)
1	Adani Welspun Exploration Ltd.	0.00	3,586	0
2	Cairn India	6,833.00	3,240.39	51
3	Essar Oil Ltd.	4,425.00	1,619.00	19
4	Esveegee Steel (Gujarat) Pvt. Ltd.	0.00	135	0
5	Focus Energy Ltd.	26,287.56	5,717.77	102
6	Geo Enpro	52.00	114.00	2
7	Hindusthan Oil Exploration Co Ltd.	736.00	3,011.00	15
8	Interlink Petroleum Ltd.	0.00	64.00	2
9	Jay Polychem (India) Ltd.	0.00	268.00	2
10	Jubilant Oil & Gas Private Ltd.	796.25	638.00	14
11	Mercator Petroleum Private Ltd.	773.00	175.00	8
12	Pan India Consultants	0.00	0.00	2
13	Prize Petroleum Company Ltd.	2,050.00	304.00	2
14	Reliance Industries Ltd.	86,475.00	90,316.00	140
15	Selan Expl. Tech. Ltd.	166.00	132.00	5
16	Omkar Naturals Resources Pvt. Ltd.	350.00	83.00	1
17	Sintex Oil & Gas Pvt. Ltd.	0.00	68.00	2
Private Total		**1,28,943.80**	**1,09,471.20**	**367**

Table 3.5 Exploratory efforts by foreign companies (As on 31.03.2018)

No.	Company (Operator)	2D Seismic (LKM)	3D Seismic (SKM)	Exploratory Wells (Nos.)
1	BHP Billiton Pty. Ltd.	12,806	0	0
2	British Gas Exploration and Production (India) Ltd.	2,006	5,187	15
3	Cairn Energy India Pvt Ltd.	19,925	6,684.39	180
4	Canoro Resources Ltd.	346	104	4
5	ENI (India) Ltd.	5,141	3170	1
6	Geo-Global Resources Inc.	476	0	0
7	Geo-Petrol International Inc.	206	0	0
8	Hardy E&P India Inc.	518	718	4
9	Heramac Ltd.	0	9	2
10	Naftogaz	319	537	8
11	Niko Resources Limited.	161	1,304	26
12	OAO Gazprom	4,932	530	3
13	Oilex-NL Holdings Ltd	0	178	1
14	Okland Offshore Holdings Ltd.	0	0	1
15	Petrogas	440	1,120	3
16	Premier Oil North East India.	261	0	1
17	Santos International Operations Pty. Ltd.	17,253	2,602	0
Foreign Total		**64,790**	**22,143.39**	**249**

Fig 3.2: Year-wise Exploratory wells drilled



	05-06	06-07	07-08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18
No. of Exploratory Wells	192	163	199	207	203	190	212	160	172	177	138	141	144
Exploratory Wells Meterage (km)	561.62	406.96	524.34	536.03	598.10	556.29	585.44	477.12	505.38	454.55	403.72	393.31	413.66

3.2 Development Activities

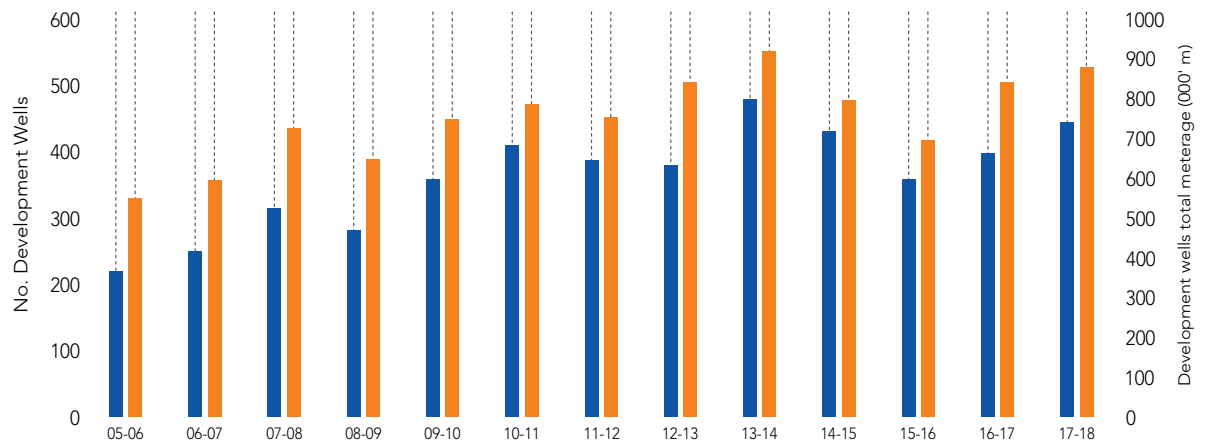
3.2.1. Development wells drilled and meterage in 2017-18

Total 445 development wells were drilled by NOCs and Pvt./JVs in FY 2017-18 with a cumulative development well meterage to 876.56 km. Majority of the wells were drilled by ONGC in its onland nomination areas.

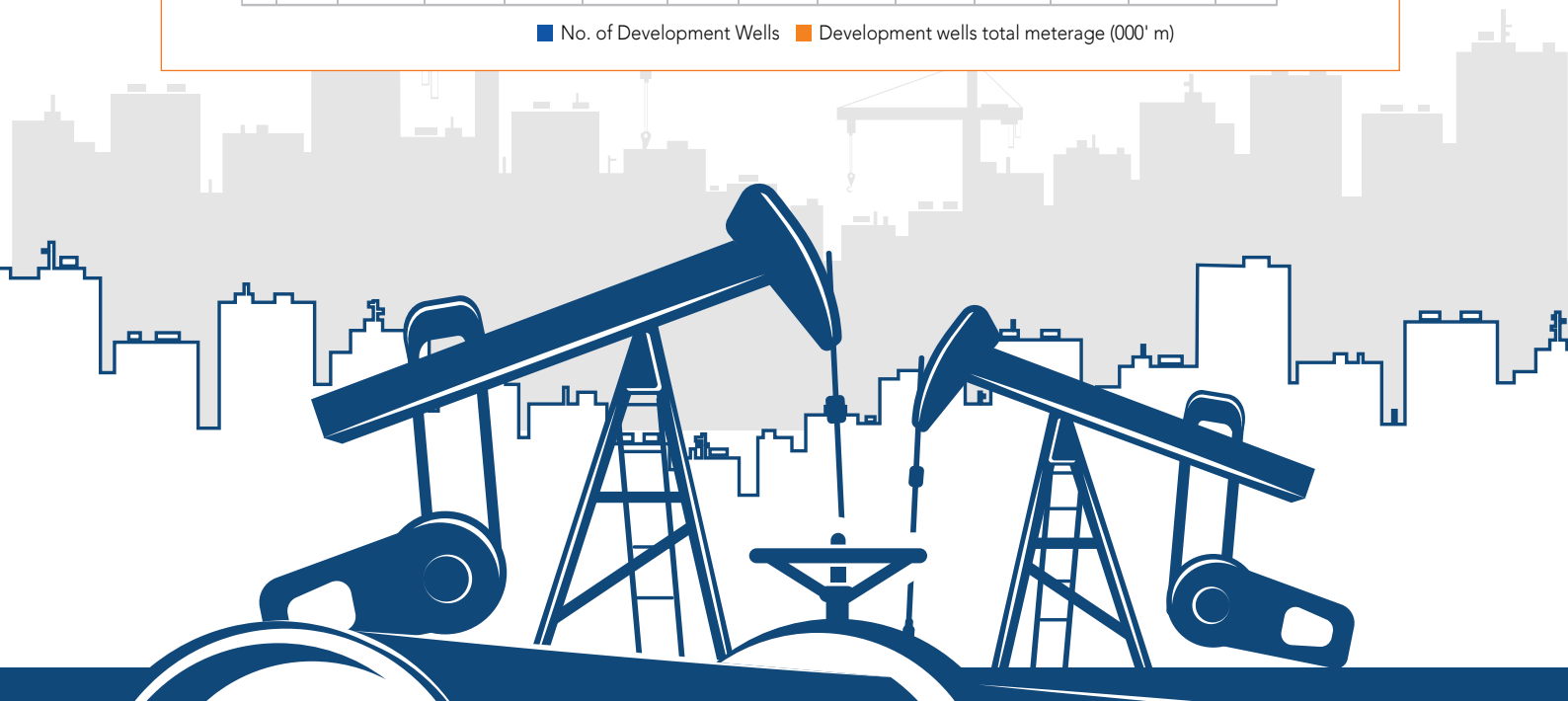
Table 3.6: Development activities in FY 2017-18

Subject	Parameter	ONGC (Nomination)	Oil (Nomination)	Pvt/JVs	Total
Development Wells Drilled	Onland	277	28	36	341
	Offshore	104	-	-	104
	Total	**381**	**28**	**36**	**445**
Development Meterage Drilled	Onland ('000 m)	497.69	80.96	71.90	650.55
	Offshore ('000 m)	226.01	-	-	226.01
	Total	**723.70**	**80.96**	**71.90**	**876.56**

Fig 3.3: Year wise Development wells drilled



	05-06	06-07	07-08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18
No. of Development Wells	220	252	313	282	360	412	389	381	480	430	363	398	445
Development wells total meterage (000' m)	547.86	598.09	715.80	644.84	748.56	778.44	756.27	826.83	912.22	809.68	691.69	841.56	876.56



3.2.2. Discoveries in development phase in FY 2017-18

Twenty six Field Development Plans (FDPs) and Revised FDPs (RFDPs) were approved in FY 2017-18. Details of the approved FDPs are provided in table below:

Table 3.7: FDPs and RFDPs approved during the year 2017-18

No.	Block	Location	Oil/Gas	Operator	Consortium	Round
1	**CB-ONN-2004/3**	Gujarat	Gas	ONGC	Oil and Natural Gas Corporation Ltd. (65%) (Op.), Gujarat State Petroleum Corporation Ltd. (35%)	NELP VI
2	**CY-ONN-2004/2**	Tamil Nadu	Oil	ONGC	Oil and Natural Gas Corporation Ltd. (80%) (Op.), Bharat Petroleum Corporation Limited. (20%)	NELP VI
3	**KG-ONN-2003/1**	Andhra Pradesh	Oil	ONGC	Oil and Natural Gas Corporation Ltd. (51%) (Op.), Cairn Energy India Pty Ltd. (49%)	NELP V
4	**RJ-ON/6**	Rajasthan	Gas	Focus	Focus Energy Ltd. (10%) (Op.), iServices Investment Ltd. (65%), Newbury Oil Company Ltd. (25%)	Pre-NELP
5	**RJ-ON-90/1**	Rajasthan	Oil	Cairn	Cairn Energy India Pty Ltd. (35%) (Op.), Cairn Energy Hydrocarbons Ltd (35%), Oil and Natural Gas Corporation Ltd. (30%)	Pre-NELP
6	**RJ-ON-90/1**	Rajasthan	Oil	Cairn	Cairn Energy India Pty Ltd. (35%) (Op.), Cairn Energy Hydrocarbons Ltd (35%), Oil and Natural Gas Corporation Ltd. (30%)	Pre-NELP
7	**RJ-ON/6**	Rajasthan	Gas	Focus	Focus Energy Ltd. (10%) (Op.), iServices Investment Ltd. (65%), Newbury Oil Company Ltd. (25%)	Pre-NELP
8	**RJ-ON-90/1**	Rajasthan	Oil	Cairn	Cairn Energy India Pty Ltd. (35%) (Op.), Cairn Energy Hydrocarbons Ltd (35%), Oil and Natural Gas Corporation Ltd. (30%)	Pre-NELP
9	**RJ-ON-90/1**	Rajasthan	Oil	Cairn	Cairn Energy India Pty Ltd. (35%) (Op.), Cairn Energy Hydrocarbons Ltd (35%), Oil and Natural Gas Corporation Ltd. (30%)	Pre-NELP
10	**CB-ONN-2003/1**	Gujarat	Oil	RIL	Reliance Industries Ltd. (70%) (Op.), BP Exploration (Alpha) (30%)	NELP V
11	**Baola**	Gujarat	Oil	Sun Petro	Sun Petrochemical Pvt. Ltd. (100%) (Op.)	Field
12	**RJ-ON-90/1**	Rajasthan	Oil	Cairn	Cairn Energy India Pty Ltd. (35%) (Op.), Cairn Energy Hydrocarbons Ltd (35%), Oil and Natural Gas Corporation Ltd. (30%)	Pre-NELP

Development Area (sq. Km.)	G&G Summary
10.73	Uber-2, the discovery well flowed gas from GS-6 sand of Hazad Member of Ankaleshwar Formation (Eocene Age) in Cambay Basin. In absen+I3:I21ce of GWS, gas-shale contact was used to estimate hydrocarbon.
282.49	The Pandanallur area is located on the northern flank of Kumbakonam-Madanam ridge, falls in the southern part of Ariyalur – Pondicherry sub-basin of the Cauvery Basin. The major faults are trending in NE-SW and the cross faults are trending NW-SE. The Basement is Granitic Gneiss of Pre Cambrian Age. Andimadam-Bhuvanagri-Basement petroleum system is envisaged. Deeper shales are major source rock with predominantly Type-III Kerogen. Basement was established as reservoir again after Madanam in Cauvery Basin. The oil is entrapped within Kumbakonam and Madanam Ridges. The Kudavasal Shale acts as lateral seal and Poronova shale and Tertiary shales act as top seal.
54.46	Nagayalanka-1z and Nagayalanka-SE-1 made discoveries from Early Cretaceous Gollapalli Formation and late Cretaceous Raghavpuram Formation respectively. The Gollapalli Formation interpreted to be fluvial deposits draining into marine embayment defined by graben and horst structure. The overlying Raghavpuram shale represents the first marine transgression thinning westward onto the structural highs within basin, where Raghavpuram sandstones are derived. Both Gollapalli and Raghavpuram reservoirs are high pressure (~9000 psi), high temperature (~324° F) and tight in nature which needs massive hydraulic fracturing.
176.00	The field is located in Jaisalmer Sub-basin of Rajasthan Basin which forms part of a prolific hydrocarbon province in the North-western India. The main reservoir in SSG and SSF Field is Baisakhi-Badesir (B&B) formation of Lower Cretaceous Age deposited in river-dominated delta systems. Shallower Pariwar formation is also a major reservoir of this field. Lower Cretaceous shales are source for the gas reservoirs.
3111.17	The Aishwarya-4 field is located in the North Eastern part of Barmer Basin, which is a NNW-SSE trending tertiary rift basin. The Barmer Hill and deeper Fatehgarh formations are the main hydrocarbon reservoirs which are deposited in a lacustrine setting.
3111.17	The Guda field is located on the southern culmination of the Central Basin High (CBH) of Barmer Basin. CBH characterized by series of en-echelon horst blocks. The area has NNW-SSE trending extensional faults. Upper Thumbli, Intra Dharvi Dungar (IDD) & Giral of Eocene age forms the main reservoir which represents Fluvial to Deltaic (Lacustrine) Environment.
176.00	The SGL Field located in Jaisalmer Sub-basin of Rajasthan Basin which forms the key analogue for the development of further targets in this area at the Pariwar reservoir levels. The field is three way closure to the west, north and south generated by an east-west trending, westerly dipping structural arch feature. Sands at the reservoir level are thinly bedded with shales which allow for significant clay-smear on fault surfaces, enhancing their sealing potential at this level.
3111.17	N-I structure is a three-way dip-closure bounded by a major N-S trending extension fault in the west. Fatehgarh (Early – Mid Palaeocene) is Main reservoir in NI Field, deposited in Fluvial environment.
3111.17	The main N-S trending normal fault of the NE structure forms the western boundary of the field, setting up the three way structural fault closure. NE field is separated by Northward NL field by a synclinal low. Fatehgarh, Barmer Hill and early Dharvi Dungar formations were deposited coevally with the rifting. Fatehgarh Group (Main Reservoir) consists thick inter-bedded sandstones and mudstones, deposited in a fluvial environment.
243.00	The main reservoir in CB10 field is Miocene Basal Sand (MBS). The MBS pay forms the lower part of the fluviatile Babaguru sequence where huge influx of coarser clastic were brought into the basin by channel system. These sands deposited in a shallow marine to estuarine / tidal environment. Basement related faults created during basin wide tectonics and block reversals play major role on hydrocarbons entrapment.
4.00	Baola Field is part of Mehsana-Ahmedabad fault block. Baola field is situated in the middle of two depo-centers namely Wavel Depression to north and Tarapur Depression to the South. Cambay Shale, Kalol and Olpad shales form the hydrocarbon source for the field. Sand lenses within Cambay Shale are main reservoir. Tarapur shale acts as regional seal and intra-formational shales are local seals.
3111.17	The Aishwarya field is located in the northern Barmer Basin of Rajasthan. Aishwarya structure is a simple tilted fault block, dipping to the east. The main reservoir unit in Aishwarya is the Fatehgarh Group, consisting of interbedded sands and shales. Lower Fatehgarh is dominated by well-connected sheet flood and braided channel sands, and the Upper Fatehgarh is dominated by sinuous, meandering, fluvial channel sands.

No.	Block	Location	Oil/Gas	Operator	Consortium	Round
13	**KG-DWN-98/3**	Eastern Off-shore	Gas	RIL	Reliance Industries Ltd. (60%) (Op.), BP Exploration (Alpha) (30%), Niko Resources Limited. (10%)	NELP I
14	**KG-DWN-98/3**	Eastern Off-shore	Gas	RIL	Reliance Industries Ltd. (60%) (Op.), BP Exploration (Alpha) (30%), Niko Resources Limited. (10%)	NELP I
15	**KG-DWN-98/3**	Eastern Off-shore	Gas	RIL	Reliance Industries Ltd. (60%) (Op.), BP Exploration (Alpha) (30%), Niko Resources Limited. (10%)	NELP I
16	**CB-ONN-2005/9**	Gujarat	Oil	MPL	Mercator Petroleum Private Limited. (100%) (Op.)	NELP VII
FDPs approved during FY 2017-18 under RSC regime (DSF I)						
17	**MB/OSDSF/ B80/2016**	Mumbai Off-shore	Oil	HOEC+Adhboot	Hindustan Oil Exploration Company (50%)+ Adbhoot Estates Private Limited (50%)	DSF-I
18	**CB/ONDSF/South Patan/2016**	Gujarat	Oil	M/s South asia Consultancy FZE	South Asia Consultancy FZE (100%)	DSF-I
19	**AA/ONDSF/ Charaideo/2016**	Assam	Oil	M/s OilMax	OILMAX ENERGY PRIVATE LIMITED (100%)	DSF-I
20	**AA/ONDSF/ Duarmara/2016**	Assam	Oil	M/s OilMax	OILMAX ENERGY PRIVATE LIMITED (100%)	DSF-I
FDPs/RFDPs approved in connection with PSC extension						
21	**Cambay field**	Gujarat	Oil+Gas	Oilex	Oilex-NL Holdings Ltd (30%) (Op.), Gujarat State Petroleum Corporation Ltd. (55%), Oilex-NL Holdings Ltd (15%)	Field
22	**Bhandut field**	Gujarat	Oil+Gas	Oilex	Oilex-NL Holdings Ltd (40%) (Op.), Gujarat State Petroleum Corporation Ltd. (60%)	Field
23	**Modhera**	Gujarat	Oil	Sun Petro	Sun Petrochemical Pvt. Ltd. (100%) (Op.)	Field
24	**Kanwara Field**	Gujarat	Oil+Gas	GOGL	Gujarat Natural Resources Ltd. (30%) (Op.), Gujarat State Petroleum Corporation Ltd. (70%)	Field
25	**Dholka**	Gujarat	Oil+Gas	JTI	Joshi Tech. Inc. (100%) (Op.)	Field
26	**Wavel**	Gujarat	Oil	JTI	Joshi Tech. Inc. (100%) (Op.)	Field

	Development Area (sq. Km.)	G&G Summary
	1148.12	D-2 and D-22 established gas from wedge out sequence of Late-Miocene intervals and Late Pliocene zones respectively. Late-Miocene reservoir system is deposited as frontal lobe complex in the paleo slope of Godavari basin whereas Late Pliocene reservoir is a part of channel-levee complex with sinuous laterally migrating channels flanked by levees. Homogeneous pelagic mudstone acts as top seal. Hydrocarbon source is biogenic in nature.
	1148.12	The MJ (D-55) field is a footwall complex trap in a half-graben set-up comprising of synrift Lower Cretaceous fluvio-lacustrine sandstone reservoirs, sealed by Upper Cretaceous/ Palaeocene post-rift marine shales. The field is composed of different segments influenced by fault baffles. The field is divided into four segments. Late Jurassic Type-I and Early Cretaceous Type-III kerogen making the source for the discoveries. Dip closer towards south and Southwest makes traps for the gas accumulation.
	1148.12	D-29 and D-30 discoveries encountered gas from Pliocene and Pleistocene channel/ fan complex. The reservoir zones in D-29 are part of channel system consisting of channel sand and layered to amalgamated channelized sheet like deposit over mass transport complex with geometry oriented NW-SE. The Pleistocene reservoirs of D-30 are a sheet like geometry belonging to basal lobe of an early Pleistocene submarine channelized lobe complex. Pelagic, Hemi-pelagic mudstones act as top seal and truncating sands act as lateral seal. The probable source of gas is biogenic.
	31.37	Jyoti field has series of half graben structural setup which has it's own sedimentary fill. The main reservoir in Jyoti field is the H3 sand unit/ zone of Hazad Member of Ankaleshwar Formation. The traps are a combination of structure (either roll over anticlines or fault closure) and stratigraphy (potential up dip pinch out within the half-graben). Juxtaposition of Kanwa Shale against Hazad sands makes lateral sea.
	56.02	B-80 field is located to south of Mukta field in Mumbai offshore basin. Field is a Four way closure associated with a major fault running NW-SE. Panna is primary producing formation which is a synrift tectonic clastic sequence unconformably overlying the Deccan Trap.
	9.88	South Patan field is situated to the south west of the town of Patan, in the state of Gujarat in Cambay basin. The field falls in Ahmedabad-Mehsana tectonic block. Shales deposited in Patan depression are potential source and Olpad Formation is reservoir in the area. The field has a structural entrapment with faults dipping toward basin. Tarapur shale acts as regional cap.
	11.50	The field is located Northeast of the main Geleki Field and South of Lakwa Field. Charaideo structure is a seismic high located in the Nazira Graben. Arenaceous units in Barail group deposited in deltaic and point bar system during Late Eocene to Late Oligocene Age are primary reservoir. Interbedded shales works as seal. Anticlines and faulted anticlines sub-parallel to and associated with the NE trending Naga thrust fault, are the primary traps.
	8.91	The field is located at a distance of 61 km NE of Duliajan and 18 km S of Digboi BUS. continuous and discontinuous sands of Tipam Group deposited in a fluvial system in the form of braided channels during Miocene Age are the main reservoir unit. Overlying marine shales are regional seals. NE trending faults and anticlines forms the trap for hydrocarbon accumulations.
	161.00	The field has plunging anticline trending, NNE-SSW affected by two sets of faults. Prominent N-S trending faults are associated with Cambay structure and E-W trending faults with a curved nature branch off from the main high and extend towards both flanks. The Cambay Field is producing from the Miocene and Oligocene reservoirs.
	6.00	The Bhandut field is located south West of Olpad field and North of Surat in Narmada Block of Cambay Basin. Bhandut field is lying over a Low on the North East and High towards North West and South East. Field is a stratigraphic trap with little structural control. Main oil producing Formations are the Ankaleshwar sands of Middle Eocene age. Cambay shale formation being the main source rock.
	12.70	Modhera field is southwest of Mehsana. Field falls in rising flank of Ahmedabad-Mehsana block. Modhera structure is an anticline having N-S axis which forms entrapment for hydrocarbon. Reservoir sands of Kalol Formation (Middle Eocene Age) is thinning towards east of the structure.
	6.30	Kanwara Field lies in the Western rising flank of Cambay-Tarapur block. Low permeability siltstones of Eocene Age (EP-IV) are main reservoir unit. Overlying shale unit acts as seal.
	48.00	Dholka field is situated North of Tarapur depression and south of Nawagam oil field. The Dholka structure is a basement high having double plunging anticline with major axis trending NNE-SSW direction. Hydrocarbons are found at three horizons of Palaeocene to Eocene ages.
	9.00	Wavel field is located on a NW-SE trending faulted anticline. Three normal faults were identified trending NW-SE. Kalol Formation of Middle Eocene age is main reservoir.

3.2.3. Oil and Gas discoveries in 2017-18

Table 3.8: Oil and Gas discoveries in 2017-18

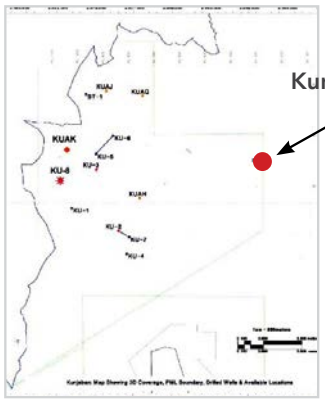
No.	Discovery/Well	Field/ Block	Basin	Operator	Format-A	Oil/Gas	Fomation/ Reservoir
1	GALIYANA-1	CB-ONN- 2010/12	Cambay	GAIL	20.05.2017	Oil	Babaguru Formation (MBS)
2	Borbhuibil-1	Moran PML	Assam Shelf	OIL	26.04.2017	Oil	Lakadong+Theria (Eocene)
3	Hukanguri-2	Dumduma PML	Assam Shelf	OIL	21.12.2017	Oil	Narpuh Formation (Eoecene)
4	Lakwa-Gaon-1	Moran PML	Assam Shelf	OIL	26.04.2017	Oil	Lakadong+Theria (Eocene)
5	South Baghajan-2	Baghjan PML	Assam Shelf	OIL	22.05.2017	Oil	Lakadong+Theria (Eocene)
6	South Chandmari-5	Dumduma PML	Assam Shelf	OIL	21.12.2017	Gas	Lakadong+Theria (Eocene)
7	Anor-1	CB- ONN- 2005/10	Cambay	ONGC	31.08.2017	Oil	Hazad/ GS-3 Sand
8	BUAF/BU-6	Bhubandar PML	A&AA	ONGC	23.03.2018	Gas	Upper Bhuban Early to Mid. Miocene Age
9	G-1-15	G-1 PML	KG	ONGC	11.09.2017	Gas	Godavari Clay (Pliocene Age)
10	GD-10-1	KG-OS-DW-IC3:J17II PEL	KG	ONGC	23.06.2017	Gas	Godavari Clay (Pliocene Age)
11	GS-29-11	GS-29 Ext PML	KG	ONGC	07.06.2017	Oil	Godavari Clay of Pliocene Age
12	GS-29-8	GS-29 Ext PML	KG	ONGC	11.10.2017	Oil	Godavari Clay of Pliocene Age
13	GS-71-2	GS-15/23 PML	KG	ONGC	22.03.2018	Oil	Vadaparru Formation (Eocene Age)
14	KU-8	Kunjaban PML	A&A	ONGC	27.04.2017	Gas	Middle Bhuban (M. Miocene)
15	Mattur West-1	L-II PML	Cauvery	ONGC	19.01.2018	Oil	Nannilam Formation (Upper Cretaceous)
16	VED-1	Godavari Onland PML	KG	ONGC	20.09.2017	Gas	Kommuguden
17	West Matar -1	Matar PML	Cambay	ONGC	08.06.2017	Oil	Hazad Formation
18	WO-24-3	SW MH ML	Mumbai	ONGC	21.06.2017	Oil	Basal Clastic

Object (Interval)	Testing Results (Qo / Qg)
Obj III: (1307-1312.5 m)	1. Qo:120 BPD, through 8/64" Choke, FTHP: 231 PSI, FTHT: 103.6°F 2. Qo:78 BPD through 10/64" Choke, FTHP: 139 PSI, FTHT: 109.4°F
Obj: I (4304.2-4308.2 m)	Qo: 90Klpd through 4.5 mm bean
Obj: I (3882-3885 m)	Qo: 55Klpd through 5 mm bean
Obj: I (3369-3376 m)	Qo: 42Klpd through 4 mm bean
Obj: I (4160.5-4163, 4166-4169 m)	Qo: 100Klpd through 5 mm bean
Obj: I (4293-4295 m)	Qg: 50000 SCMD through 4 mm bean
Obj: I (2834-2836m)	Qo: 53.26 m3 /d, Qg: 5055 m3 /d through 6 mm bean, API: 41.79 @ 15.5°C,
Obj II: (1954-1957 m)	Qg: 14,093 m3/d through 5 mm bean, FTHP: 30 Kg/cm2
Obj: III (2138-2164m MD)	Qg: 135427 m3 /d through 16/64" Choke, FTHP: 3269 PSI, FBHP:3768 PSI, FTHT: 90°F
1. OBJ: I (2316-2321.5m) 2. OBJ: II (2182-2188, 2193-2205m)	1. Qg: 3,90,484.2m3/d through 24/64" choke @ FTHP 3350 psi, SBHP: 4137.9 psi, BHT: 291°F @ 2249m 2. Qg: 2,29,221m3/d through 24/64" choke @ FTHP 3436.6 psi, SBHP: 4136.2 psi, BHT: 290.9°F
Obj: I (2018m-2029.5m)	Qo: 596.66 m3/d, Qg: 133592 m3/day through ½" choke, FTHP: 2089 psi, API: 46.8. GOR: 497, FTHT: 121.8°F, Shale Contact @ 2016.5m TVD
1. Obj: I (2182-2186 & 2195-2200m MD) 2. Obj: II (1906-1911m MD)	1. Qo:3773 BPD, Qg: 90622 m3 /d through 32/64" Choke, FTHP: 1758 PSI, FTHT: 96°F 2. Qo:223 BPD, Qg: 5320 m3 /d through 16/64" Choke, FTHP: 400 PSI, FTHT: 96°F
Obj I: (3437-3440, 3441.5-3444)	Qo: 567 (bopd), Qg: 3,35,365m3/d
Obj: I (3408m-33411m)	Qc: 1 m3/day, Qg: 203615 m3/day through 10mm bean, FTHP: 132 kg.cm2, FBHP: 191.93 kg.cm2, BHT : 97.8°C, GWC: 3414.5m MD
1. Obj I: (1292-1068 m) 2. Obj II: (964-959 m)	1. Qo: 3.7 m3/d as influx 2. Qo: 33 m3/d, Qg: 3500 m3/d through 6 mm bean, FTHP: 450 psi
1. Obj: II (3323m-3333.5 m & 3300-3306m) 2. Obj: IV (3160.5-3168m & 3172.5-3180m)	1. Qg: 7395m3/day through 12/64" choke 2. Qg: 3240m3/day through 16/64" choke
Obj III: (2046-2048 m)	Qo: 111 m3/d, Qg: 5,054 m3/d through 7 mm bean, FTHP:59.2 Kg/cm2
Obj I: (2292-2295m)	Qg: 335269m3/d, Qc: 210 bpd through ½" choke

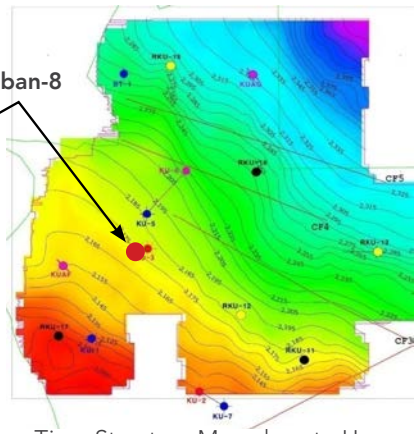
Assam & Assam Arakan Fold Belt Basin

Kunjanban PML/Tripura | Operator: ONGC

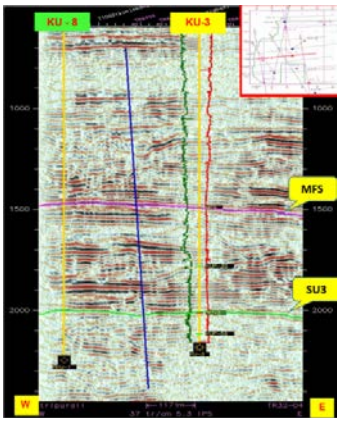
Structure / Location / Well No.	Testing Result	Leads/Exploratory Efficacy
Kunjaban/ KUAF/ Kunjaban-8	**Object-I (3408-3411m; KUP-60):** Flowed Gas @ 203615 m^3/day & Ql @ 5.5 m^3/day with FTHP-132 kg/cm^2 through 10.0 mm bean.	This new pool discovery in Kunjaban structure has further reinforced prospectivity of Bhuban Formation and also to meet ONGC's commitment for sustained gas supply for OTPC and other consumers.



Location map of well Kunjaban-8



Time Structure Map close to Upper Bhuban Top

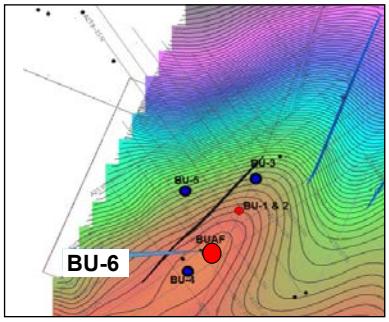


E-W line TR-03-04 passing through well Kunjaban-8

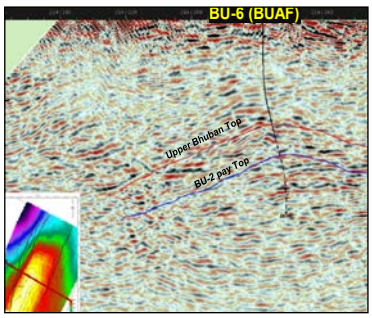
Bhubandar PML/Cachar,Assam | Operator: ONGC

Structure / Location / Well No.	Testing Result	Leads/Exploratory Efficacy
Bhubandar/ BUAF/ Bhubandar-6	**Object-II (1954-1957m; Upper Bhuban):** Flowed gas @ 14,093 m^3/day and Liquid @ 0.14 m^3/day (Oil/Cond.), FTHP-30 kg/cm^2 through 5.0 mm bean	The well BU-6, is part of Feasibility Report for integrated development and monetization of Banaskandi Block-1 and Bhubandar Fields of Cachar. This new pool discovery will lead to an exploration impetus to the area which will give an upside potential.

Location Map of well Bhubandar-6 (BUAF)



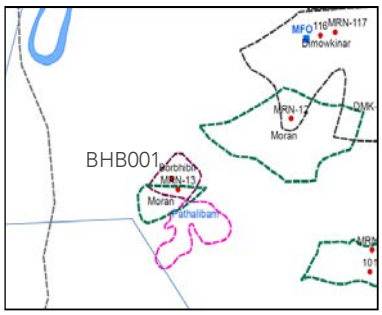
Time Structure map on top of upper Bhuban Formation



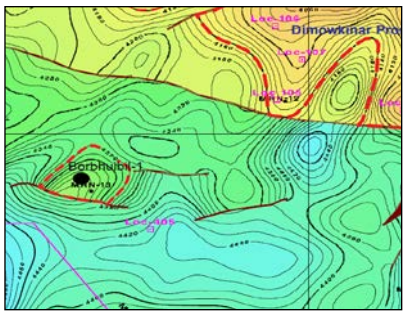
Inline-214 passing through well Bhubandar-6 at surface position

Moran PML / Upper Assam Onshore | Operator: OIL

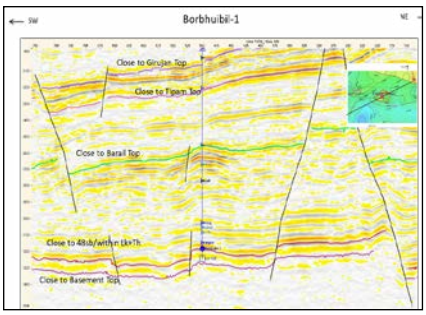
Structure / Location / Well No.	Testing Result	Leads/Exploratory Efficacy
Borbhuibil / BHB001 & Loc. MFJ	**Object I:** (4304.2m-4308.2m) Produced oil@ 90klpd in 4.5 mm bean . Object I produced oil from Eocene Lakadong+Therria Formation.	Oil and gas entrapment in Lakadong+Therria Formation was encountered for the first time in this area. This new prospect discovery in Lakadong+Therria Formation in the area will enhance the prospectively of the area for further exploration.



Location Map of well BHB001



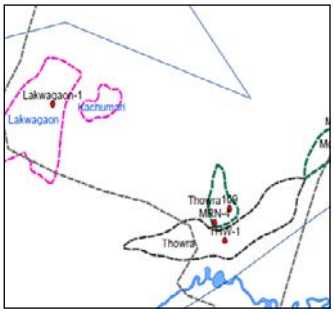
Depth contour map on top of Lk+Th Sand



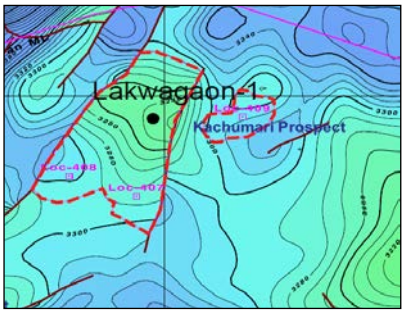
Seismic Inline 139 passing through Well BHB001

Moran PML / Upper Assam Onshore | Operator: OIL

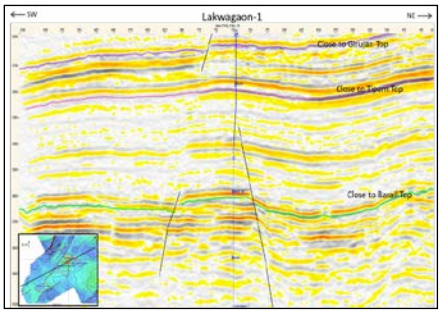
Structure / Location / Well No.	Testing Result	Leads/Exploratory Efficacy
Lakwagaon/LKG001 & Loc. MFK	**Object I:** (3369.0m-3375.0m) Produced oil@ 42 klpd through 4 mm bean. Object I produced oil from Oligocene Barail Formation.	Oil and gas entrapment in Barail Formation was encountered for the first time in this area. This new prospect discovery in Barail Formation in the area will enhance the prospectively of the area for further exploration.



Location Map of well LKG001



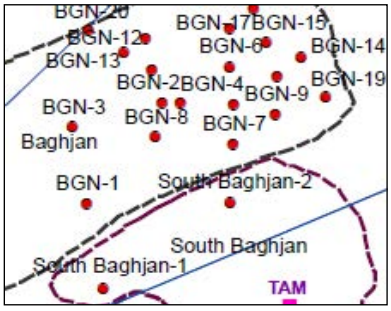
Depth contour map on the Top of Barail Sand



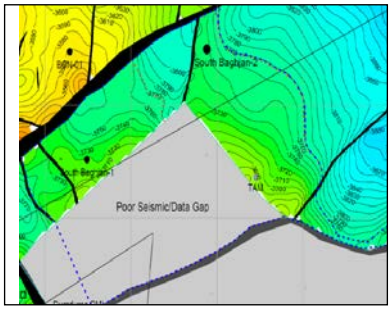
Seismic Inline 70 passing through well LKG001

Baghjan PML / Upper Assam Onshore | Operator: OIL

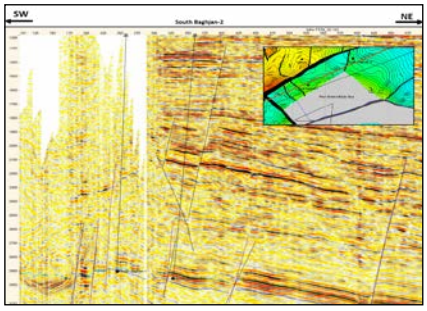
Structure / Location / Well No.	Testing Result	Leads/Exploratory Efficacy
South Baghjan/ SBJ002 & Loc. BGV	**Object I:** (4160.5m-4163.5m, 4166.0m-4169.0m) Produced oil@ 100 klpd through 5 mm bean. Object I produced oil from Eocene Lakadong+Therria Formation.	Oil and gas entrapment in Lakadong +Therria Formation was encountered for the first time in this area. This new prospect discovery in Lakadong+Therria Formation in the area will enhance the prospectively of the area for further exploration.



Location Map of well SBJ002



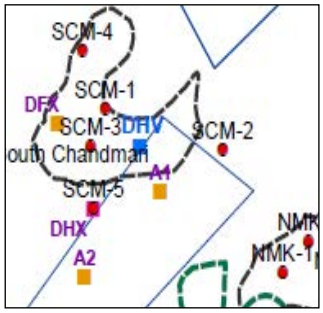
Depth contour map on top of Lk+Th Sand



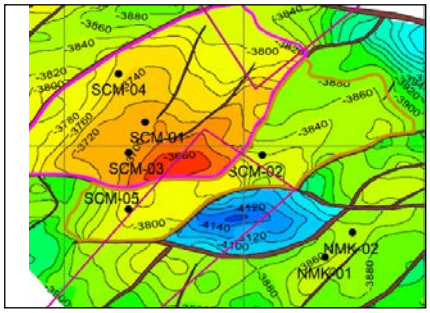
Seismic Inline 163 through Well SBJ002

Dumduma PML / Upper Assam Onshore | Operator: OIL

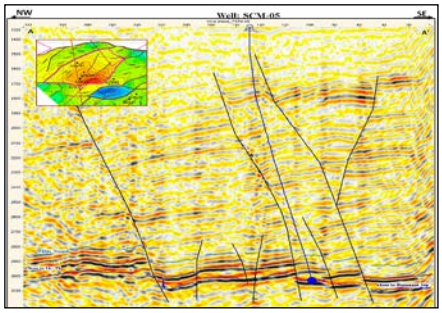
Structure / Location / Well No.	Testing Result	Leads/Exploratory Efficacy
South Chandmari/ SCM005 & Loc. DHX	**Object I:** (4293.0m-4295.0m) Produced gas @ 50000 SCMD through 4mm bean. Object I produced gas from Eocene Lakadong+Therria Formation.	Oil and gas entrapment in Eocene Lakadong+Therria Formation was encountered for the first time in this area. This new prospect discovery in Eocene Lakadong + Therria Formation in the area will enhance the prospectively of the area for further exploration.



Location Map of well SCM005



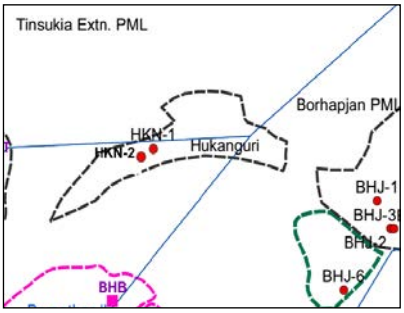
Depth contour map on top of Lk+Th Sand



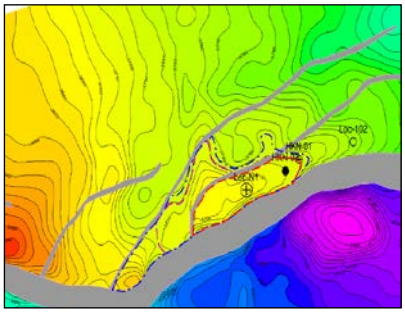
Seismic Inline 49 through Well SCM005

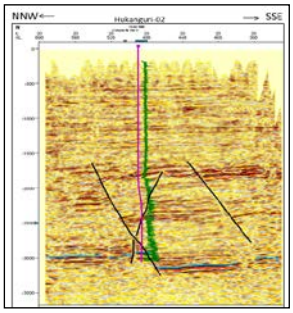
Dumduma PML / Upper Assam Onshore | Operator: OIL

Structure / Location / Well No.	Testing Result	Leads/Exploratory Efficacy
Hukanguri/ HKN002 & Loc. DID	**Object II:** (3882.0m-3885.0m) Produced oil@ 55 klpd through 5mm bean. Object II produced oil from Eocene Narpuh Formation.	Oil and gas entrapment in Eocene Narpuh Formation was encountered for the first time in this area. This new prospect discovery in Eocene Narpuh Formation in the area will enhance the prospectivity of the area for further exploration.



Location Map of well HKN002


Depth contour map on Narpuh

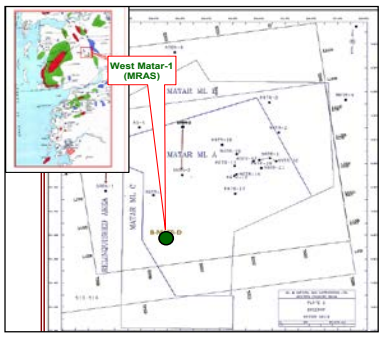


Seismic Inline 20 passing through Well HKN-2

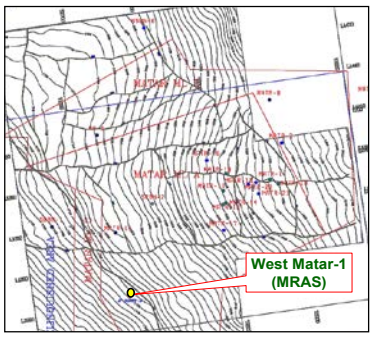
Cambay Basin

Matar PML/Gujarat | Operator: ONGC

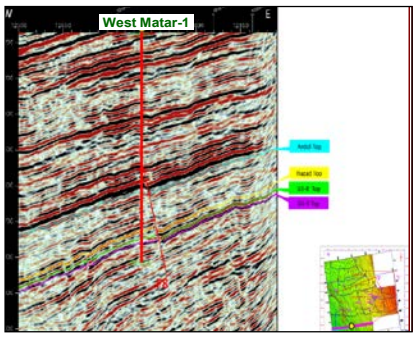
Structure / Location / Well No.	Testing Result	Leads/Exploratory Efficacy
West Matar/West Matar-1 /MRAS	**Object-III (2046-2048.5m; GS-9):** Flowed Oil @ 111 m^3/day & Gas @ 5054 m^3/day with FTHP-59.2 Kg/cm^2 through 7.0 mm bean.	West Matar-1 has established presence of commercial hydrocarbon accumulation in GS-9 sand within Hazad towards western part of Matar field in a separate fault block. The discovery has opened up new area for exploration and exploitation of Hazad sands.



Acreage Map Showing well, West Matar-1



Time Structure Map close to Hazad Top

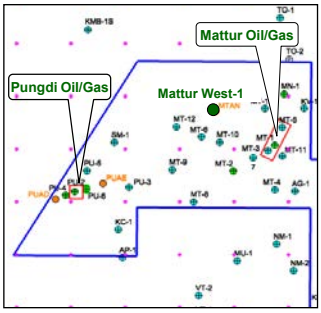


Inline 1297 passing through well, West Matar-1

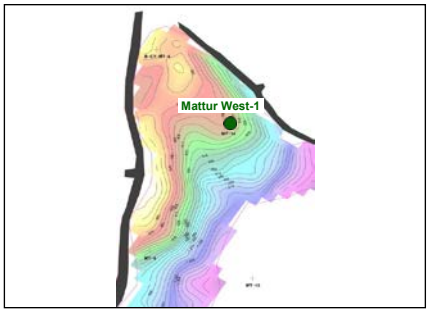
Cauvery Basin

L-II PML/Tamil Nadu | Operator: ONGC

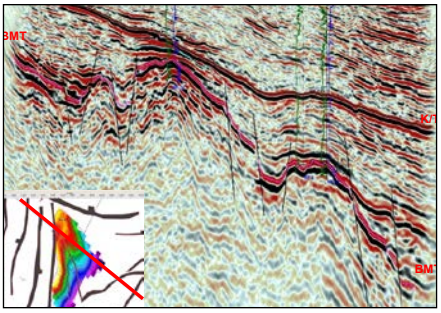
Structure / Location / Well No.	Testing Result	Leads/Exploratory Efficacy
Mattur West / MTAN / Mattur West-1	**Object-I (1292-1068m; Basement):** oil influx of 3.7 m^3. **Object-II (964-959m; Nannilam Formation):** Flowed Oil @ 33.0 m^3/day and Gas @ 3500 m^3/day thru 6.0 mm bean size, FTHP-450 psi.	The lead has established the Nannilam Play to be of commercial interests at a very shallow depth for further exploration in addition to the known Basement play in the Mattur-Pundi area and will also help in conversion of the L-II 7 year PML into long term PML.



Location map of well, Mattur West-1



Depth Map close to top of Nannilam Play

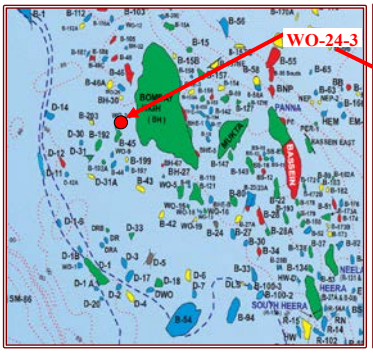


Inline-1378 passing through well, Mattur West-1

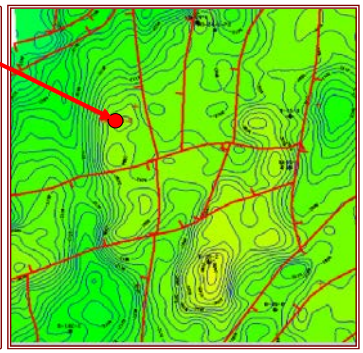
Mumbai Offshore Basin

Mumbai High SW PML |Operator: ONGC

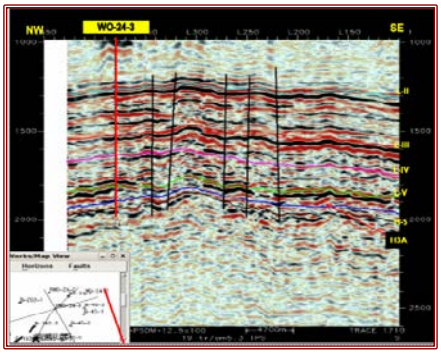
Structure / Location / Well No.	Testing Result	Leads/Exploratory Efficacy
SW WO-24/ WO-24-C/ WO-24-3	**Object-I (2292-2295m; Basal Clastic):** Gas @3,35,269 m^3/day, Cond.@210 bpd, Object-II (2282-2287m; Mukta): Gas @2,24,224 m^3/day, Qc@146 bpd. Object-III (2174-2179m; L-VI Panvel) Gas @43,600 m^3/day, Qc@46.4 bpd, Object-IV(2100-2105m; L-V Panvel) Gas @4729 m^3/day. Object-V (1804-1807, 1808-1811m; L-IV) Oil @ 172 bpd, Gas @10196 m^3/day, Object-VI, VII, VIII and IX (L-III)) flowed oil & gas.	This discovery in the northern part of Cluster-7 development scheme will enhance the production profile and longevity of the Cluster-7 Development Scheme. This Multi-plays lead has opened up new area for exploration.



Map showing location of well, WO-24-3



Depth Map on top of L-VI showing location WO-24-3

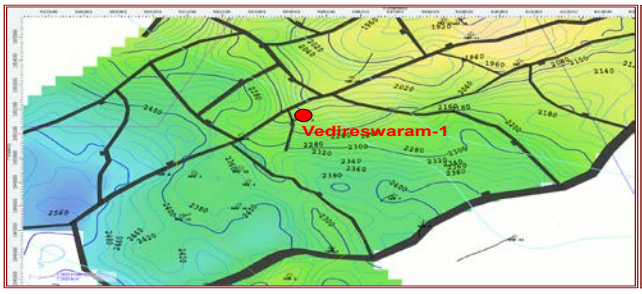


X-line 1710 passing through well, WO-24-3

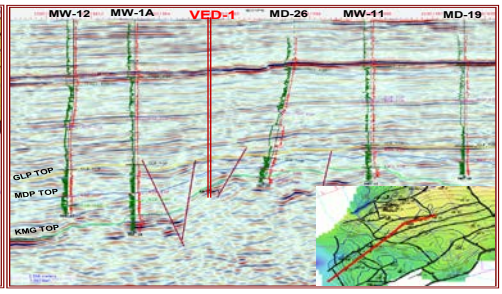
KG Onshore Basin

Godavari Onland PML | Operator: ONGC

Structure / Location / Well No.	Testing Result	Leads/Exploratory Efficacy
Mandapeta/ VED-AA/ Vedireswaram-1	**Object-II** (3333.5-3323 & 3306-3300m; Kommugudem Fm): Well flowed Gas @ 7395 m³/day, FTHP-420 psi thru 12/64" choke. Object-IV (3180-3172.5 & 3168-3160.5m; Kommugudem Fm): Well flowed Gas @ 3240 m³/day, FTHP-90 psi thru 16/64" choke.	The success as new gas pool discovery in Kommugudem Formation has opened up new play in KG Basin.



Time Structure Map on Top of Mandapeta Formation

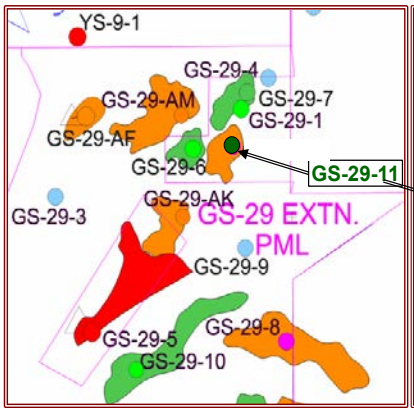


RC line along well MW-12, 1A, VED-1, MD-26, 11, 19

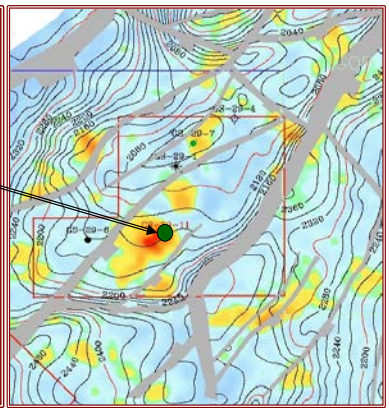
KG Offshore Basin (SW)

GS-29 Extn.PML | Operator: ONGC

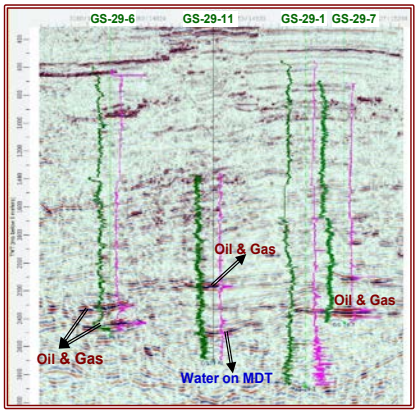
Structure / Location / Well No.	Testing Result	Leads/Exploratory Efficacy
GS-29/ GS-29-AL / GS-29-11	**Object-I (2018-2029.5m; Godavari Clay Formation):** Flowed Oil @ 596.66 m³/day and Gas @ 133592 m³/day with FTHP-2089psi through 1/2" choke.	The well GS-29-11 has established presence of hydrocarbons in Pliocene sequence and has opened up area for further exploration of this play in surrounding areas.



Location map of well, GS-29-11



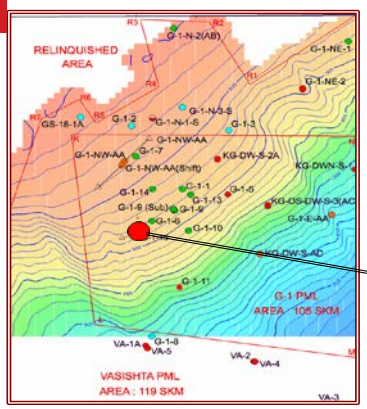
Time Map of a reflector close to GS-29 Shallow Pay



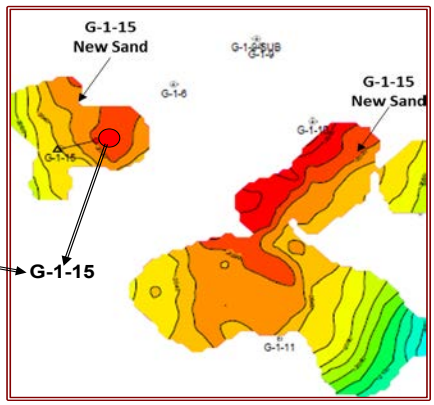
RC line passing through well GS-29-11

G-1 PML | Operator: ONGC

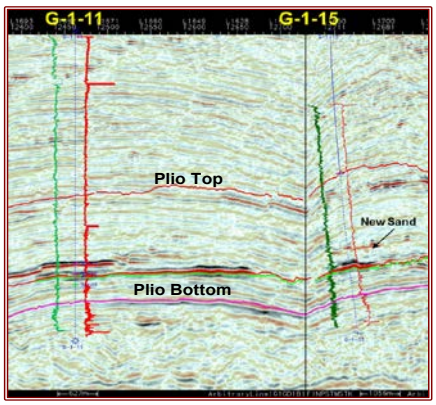
Structure / Location / Well No.	Testing Result	Leads/Exploratory Efficacy
G-1 Field/ G-1-AC / G-1-15 shift	**Object-III (2138-2146m; Godavari Clay Formation):** Well flowed Gas @ 135427 m³/day, FTHP-3269 psi through 1/4" choke.	New Gas Pool discovery will further consolidate the gas reserve base of G-1 field.



Location Map of well G-1-15



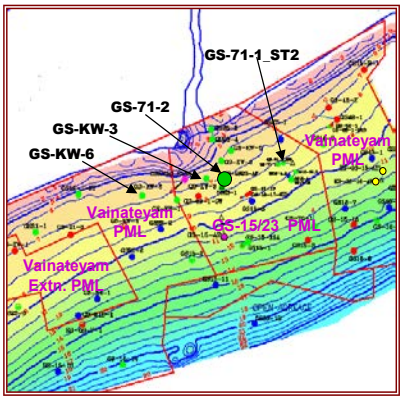
Structure Map on Top of New Sand in well G-1-15 (From Static Model)



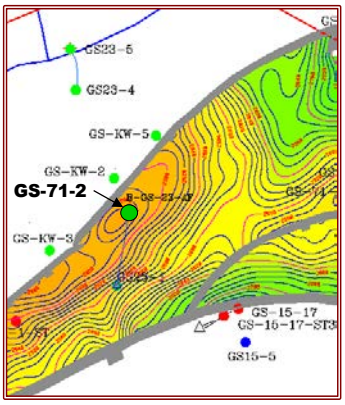
RC Line passing through wells G-1-11 & G-1-15

GS-15 & 23 PML | Operator: ONGC

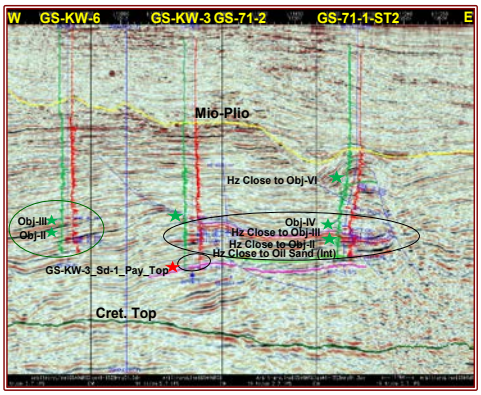
Structure / Location / Well No.	Testing Result	Leads/Exploratory Efficacy
GS-71/ GS-71-AB / GS-71-2	**Object-I (3437-3440 & 3441.5-3444m;** Lower Vadaparru Formation): Flowed oil @ 567 bpd & gas @3,35,365 m³/day with FTHP: 3050 psi through 1/2" choke.	The well GS-71-2 has established presence of hydrocarbons in Early Eocene and has opened up area for further exploration of this play in surrounding areas.



Location map of well GS-71-2 (GS-71-AB)



Time map of horizon close to Obj-II of well GS-71-1-ST2

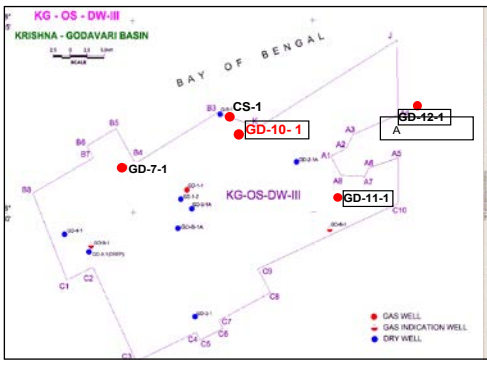


RC through GS-KW-6, GS-KW-3, GS-71-2 & GS-71-1-ST2

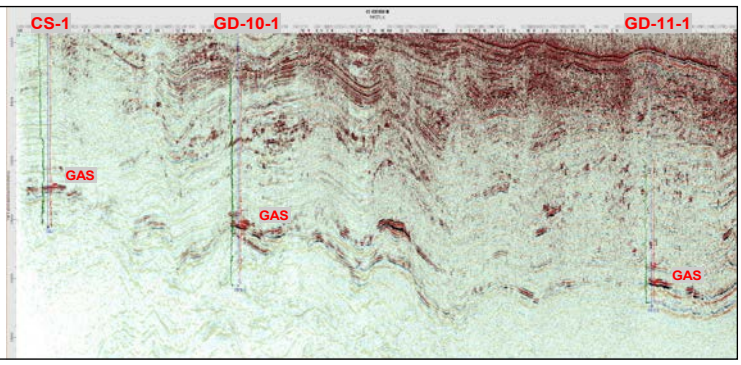
KG Offshore Basin (DW)

KG-OS-DW-III PEL |Operator: ONGC

Structure / Location / Well No.	Testing Result	Leads/Exploratory Efficacy
GD-10/ GD-10-AA / GD-10-1	**Object-I (2316-2321.5m; Godavari Clay Formation):** Flowed Gas @ 390484 m³/day with FTHP-3350psi through 3/8" choke. Object-II (2182-2188 & 2193-2205m; Godavari Clay Formation): Flowed Gas @ 229222 m³/day with FTHP-3436 psi through 20/64" choke	Exploratory well GD-10-1 has opened up an area for further exploration of Pliocene sequence (Chandrika South channel pay equivalent) in KG-OS-DW-III PEL block, KG Deep Water and will help in converting larger area into PML.



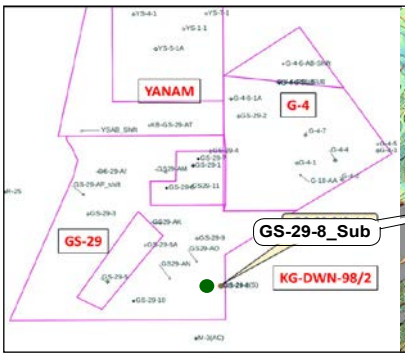
Location map of well, GD-10-1 in KG-OS-DW-III PEL Block



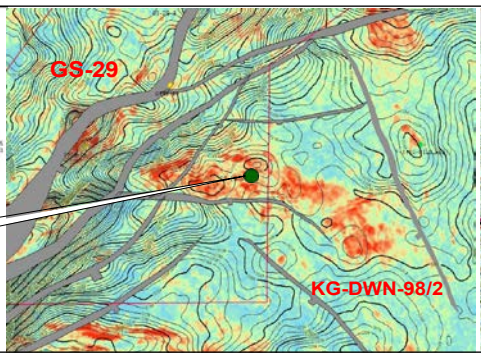
RC Line passing through well Chandrika South-1, GD-10-1 & GD-11-1

GS-29 Extn. PML | Operator: ONGC

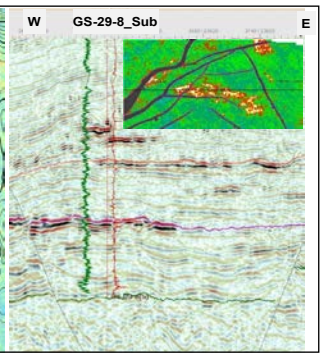
Structure / Location / Well No.	Testing Result	Leads/Exploratory Efficacy
GS-29/ GS-29-AI / GS-29-8 Sub.	**Object-I (2182-2186 & 2195-2200m; Godavari Clay Fm):** Flowed Oil @ 599.9 m³/day and Gas @ 90622 m³/day. thru 1/2" choke, FTHP-1758 psi.	GS-29-8 Sub has further enhanced the potential of GS-29 field and adjoining Cluster-I discovery area of NELP block KG-DWN-98/2.



Location map of well, GS-29-8



Structure Map of Obj-I within Pliocence with RMS Amplitude

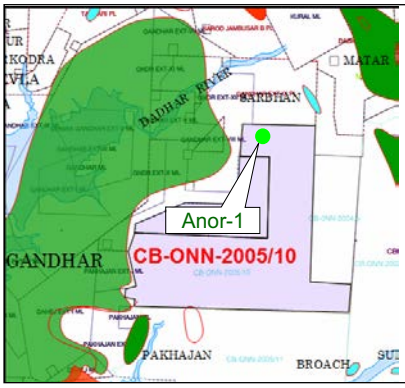


Crossline-13620 passing through well, GS-29-8_Sub

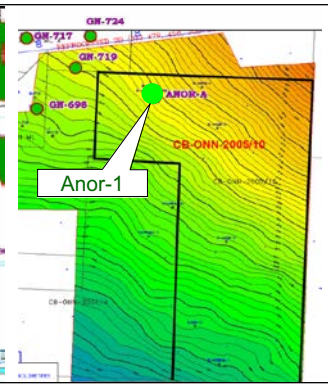
Cambay Basin (NELP)

CB-ONN-2005/10/Gujarat | Operator: ONGC

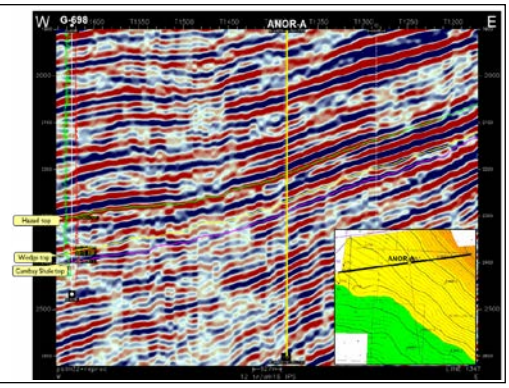
Structure / Location / Well No.	Testing Result	Leads/Exploratory Efficacy
Anor / Anor-1 (ANOR-A)	**Object-I (2834-2836m; GS-3):** Flowed Oil @ 45 m³/day & Gas @ 4195 m³/day with FTHP-45.67 Kg/cm² through 5.0 mm bean.	The testing of well Anor-1 has established oil & gas in GS-3 sand within Hazad Member and has led to the discovery of a new prospect in NELP block CB-ONN-2005/10. This discovery has opened up area for further exploration towards the NE rising flank of Broach.



Location Map of well Anor-1



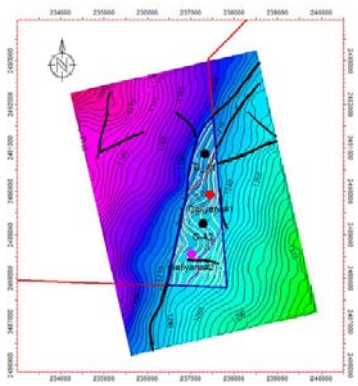
Time structure map close to Hazad Top



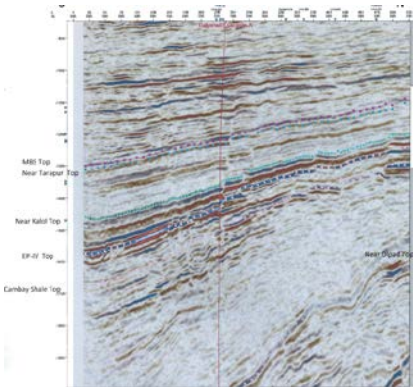
Inline -1347 showing well Anor-1

CB-ONN-2010/11/Gujarat | Operator: GAIL

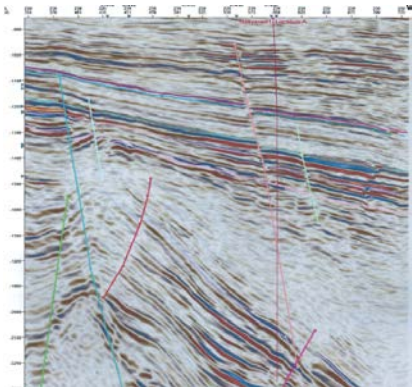
Structure / Location / Well No.	Testing Result	Leads/Exploratory Efficacy
Galiyana-1 (ANOR-A)	**Object-III (1307-1309.5m Md):** Flowed Oil @ 12.4 m³/day with FTHP-139 Psia through 10/64" choke.	The testing of well Galiyana-1 has established oil & gas in Babaguru sand and has led to the discovery in NELP block CB-ONN-2001/11.



Net pay overlaid on depth map near top MBS



X-line-595 Passing through the well Galiyana-I



Inline-230 Passing through the well Galiyana-I

In 2017-18, two discoveries were made in PSC regime taking total discoveries to 242 as on 31st march 2018

Till date 242 discoveries have been made in PSC regime, out of which 24% (57 discoveries) have been put on production, 41% (99 discoveries) are active and yet to be put on production and remaining 35% (86 discoveries) are inactive. The details of these have been shared in table below:

Table 3.9: Breakup of Active and Inactive discoveries under PSC regime

Status of Discovery	Evaluation Status	Oil	Gas	Total
Discoveries which have been put on Production		**42**	**15**	**57**
Discoveries which are under Development or on way to production		**20**	**24**	**44**
Commerciality established (DoC Reviewed)	DoC reviewed by MC and FDP to be submitted by Operator	6	13	19
	FDP submitted under examination at DGH	8	3	11
Commerciality established (DoC Reviewed) Total		**14**	**16**	**30**
Commerciality Proposal (DoC) submitted		**2**	**4**	**6**
Discoveries in Early Stage , DoC to be submitted	New-Discoveries for which appraisal program is to be submitted by operator	3	5	8
	Under appraisal by operator	3	8	11
Discoveries in Early Stage , DoC to be submitted Total		**6**	**13**	**19**
Discoveries not pursued by Operator/ relinquished/proposed for relinquishment	Discoveries which are part of Relinquished Area		4	4
	Discoveries in Relinquished Block/in proposed Relinquished Block	10	20	30
	Discoveries not pursued by Operator	7	15	22
	Discoveries proposed for relinquishment by Operator (As per the DST circular)		3	3
	Proposal for termination notice sent to MoPNG	1		1
Discoveries not pursued by Operator/relinquished/proposed for relinquishment Total		**18**	**42**	**60**
Discoveries that may be monetised under policy for "Exploration in ML area"	Discoveries notified after expiry of the Exploration Period	21	1	22
	Discoveries notified within the Exploration Period	4		4
Discoveries that may be monetised under policy for "Exploration in ML area" Total		**25**	**1**	**26**
Total		**127**	**115**	**242**

Table 3.10: Basin wise discoveries under PSC regime (As on 31.03.2018)

Basin	Oil	Gas	Total
Andaman-Nicobar	-	1	1
Assam Arakan	-	7	7
Cambay	69	14	83
Cauvery	3	6	9
Gujarat Kutch	-	5	5
Gujarat Saurashtra	-	3	3
Krishna Godavari	18	54	72
Mahanadi	-	4	4
Mumbai Offshore	1	4	5
North East Coast	-	9	9
Rajasthan	36	7	43
Satpura-S. Rewa-Damodar	-	1	1
Total	**127**	**115**	**242**

Table 3.11: Region wise discoveries under PSC Regime (As on 31.03.2018)

Location	Oil			Gas			Total
	Pre-NELP Exploration	Pre-NELP Field	NELP	Pre-NELP Exploration	Pre-NELP Field	NELP	
Deep Water	-	-	8	-	-	40	48
On Land	53	2	50	10	-	13	128
Shallow water	3	6	5	5	1	46	66
Total	**56**	**8**	**63**	**15**	**1**	**99**	**242**

Table 3.12: Details of Oil and Gas Discoveries under Pre-NELP (Expl+Field) (As on 31.03.2018)

Operator	Block	Pre-NELP (Expl+Field)	Oil	Gas	Grand Total
Cairn	CB-OS/2	Pre-NELP	2	3	5
	Ravva	Pre-NELP Field	5	1	6
	RJ-ON-90/1	Pre-NELP	35	4	39
ESSAR	CB-ON/3	Pre-NELP	5	-	5
Focus	GK-ON/4	Pre-NELP	-	1	1
	RJ-ON/6	Pre-NELP	-	3	3
GSPC	CB-ON/2	Pre-NELP	11	1	12
HARDY	CY-OS-2	Pre-NELP	-	1	1
HOEC	AAP-ON-94/1	Pre-NELP	-	1	1
	CB-ON/7	Pre-NELP	2	-	2
ONGC	CB-OS/1	Pre-NELP	1	-	1
RIL	SR-OS-94/1	Pre-NELP	-	1	1
Selan	Karjisan	Pre-NELP Field	1	-	1
Shell	Panna-Mukhta	Pre-NELP Field	1	-	1
Sun Petrochemicals	Baola	Pre-NELP Field	1	-	1
Total			**64**	**16**	**80**

Table 3.13: Details of Oil and Gas Discoveries under NELP (As on 31.03.2018)

Operator	Block	PSC Round	Oil	Gas	Grand Total
BPRL	CB-ONN-2010/8	NELP-IX	2	-	2
Focus	CB-OSN-2004/1	NELP-VI	2	3	5
GAIL	CB-ONN-2010/11	NELP-IX	2	-	2
GSPC	CB-ONN-2000/1	NELP-II	4	-	4
	CB-ONN-2002/3	NELP-IV	8	-	8
	CB-ONN-2003/2	NELP-V	2	1	3
	KG-OSN-2001/3	NELP-III	-	9	9
Jay Polychem (India) Pvt. Ltd.	CB-ONN-2009/8	NELP-VIII	1	-	1
JOGPL	AA-ONN-2002/1	NELP-IV	-	3	3
	CB-ONN-2002/2	NELP-IV	2	-	2
	CY-ONN-2002/1	NELP-IV	-	1	1
MPL	CB-ONN-2005/9	NELP-VII	2	-	2
NAFTOGAS	CB-ONN-2004/5	NELP-VI	1	-	1
NIKO	CB-ONN-2000/2	NELP-II	-	2	2

Operator	Block	PSC Round	Oil	Gas	Grand Total
NTPC	CB-ONN-2009/5	NELP-VIII	1	-	1
OIL	KG-ONN-2004/1	NELP-VI	-	1	1
	RJ-ONN-2004/2	NELP-VI	1	-	1
ONGC	AA-ONN-2001/1	NELP-III	-	2	2
	AA-ONN-2001/2	NELP-III	-	1	1
	AN-DWN-2002/1	NELP-IV	-	1	1
	CB-ONN-2001/1	NELP-III	2	-	2
	CB-ONN-2002/1	NELP-IV	1	-	1
	CB-ONN-2004/1	NELP-VI	1	-	1
	CB-ONN-2004/2	NELP-VI	5	-	5
	CB-ONN-2004/3	NELP-VI	-	1	1
	CB-ONN-2005/4	NELP-VII	1	-	1
	CB-ONN-2005/10	NELP-VII	1	-	1
	CB-OSN-2003/1	NELP-V	-	3	3
	CY-ONN-2002/2	NELP-IV	2	1	3
	CY-ONN-2004/2	NELP-VI	1	-	1
	GK-OSN-2009/1	NELP-VIII	-	1	1
	GK-OSN-2009/2	NELP-VIII	-	1	1
	GK-OSN-2010/1	NELP-IX	-	2	2
	GS-OSN-2004/1	NELP-VI	-	2	2
	KG-DWN-2005/1	NELP-VII	-	1	1
	KG-DWN-98/2	NELP-I	6	8	14
	KG-ONN-2003/1	NELP-V	2	-	2
	KG-OSN-2004/1	NELP-VI	-	7	7
	KG-OSN-2009/2	NELP-VIII	1	-	1
	MB-OSN-2005/1	NELP-VII	-	3	3
	MB-OSN-2005/3	NELP-VII	-	1	1
	MN-DWN-98/3	NELP-I	-	2	2
	MN-OSN-2000/2	NELP-II	-	2	2
	NEC-DWN-2002/2	NELP-IV	-	1	1
RIL	CB-ONN-2003/1	NELP-V	8	-	8
	CY-DWN-2001/2	NELP-III	-	2	2
	CY-PR-DWN-2001/3	NELP-III	-	1	1
	GS-OSN-2000/1	NELP-II	-	1	1
	KG-DWN-2001/1	NELP-III	-	1	1
	KG-DWN-2003/1	NELP-V	-	4	4
	KG-DWN-98/1	NELP-I	1	-	1
	KG-DWN-98/3	NELP-I	1	19	20
	KG-OSN-2001/1	NELP-III	-	3	3
	KG-OSN-2001/2	NELP-III	2	-	2
	NEC-OSN-97/2	NELP-I	-	8	8
Total			**63**	**99**	**162**

3.3. Oil and Gas Production

In 2017-18 country has achieved 95.32% of its crude oil production target by producing 35.68 MMT against crude production target of 37.44 MMT, while the domestic gas production stands at 32.65 BCM against target of 35.13 BCM.

There was a marginal decline in crude oil production by 0.91% while the gas production increased by 2.36% compared to previous year.

Table 3.14: Oil production in the country – 2017-18 (TMT)

Operator (Regimes)	2016-17	2017-18			%, Ach w.r.t 16-17
	Actual	Target	Actual	%, Ach w.r.t target	
ONGC (N)	22,218	23,071	22,249	96.40%	100.10%
OIL (N)	3,258	3,734	3,376	90.42%	103.63%
PSC	10,532	10,631	10,059	94.60%	95.50%
Country	**36,008**	**37,436**	**35,684**	**95.32%**	**99.10%**

Table 3.15: Gas production in the country – 2017-18 (MMSCM)

Operator (Regimes)	2016-17	2017-18			%, Ach w.r.t 16-17
	Actual	Target	Actual	%, Ach w.r.t target	
ONGC (N)	22,088	24,208	23,430	96.80%	106.10%
OIL (N)	2,937	3,000	2,881	96%	98.11%
PSC+CBM	6,872	7,926	6,338	80%	92.20%
Country	**31,897**	**35,134**	**32,649**	**92.93%**	**102.36%**

Fig 3.4: Oil Production of Country in 2017-18

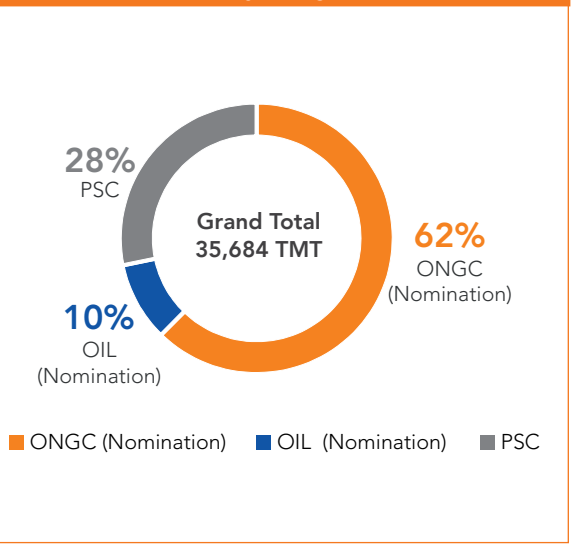


Fig 3.5: Gas Production of Country in 2017-18

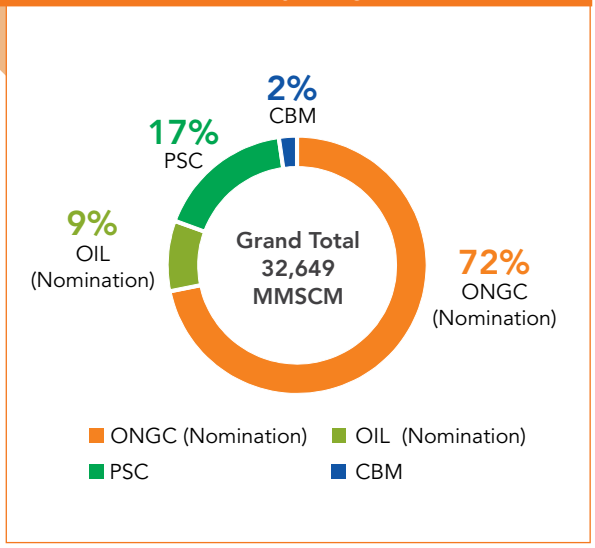


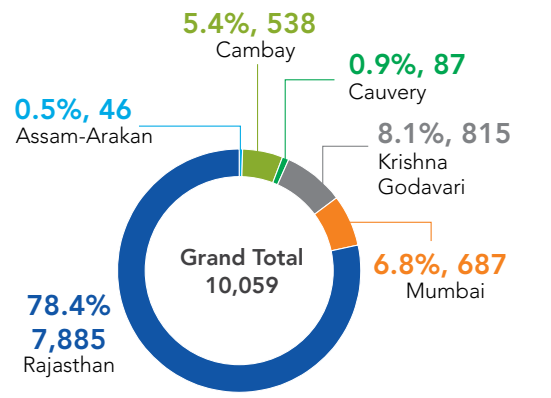
Table 3.16: Basin and Operator-wise production of country in FY 2017-18

Sl. No.	COMPANY/ OPERATOR	BASIN	OIL (MMT)*	GAS (MMSCM)	O+OEG (MMT)
NATIONAL OIL COMPANIES (NOC) - Nomination					
1	ONGC	Assam-Arakan	0.97	1,948.34	2.92
2		Cambay	4.45	1,531.57	5.98
3		Cauvery Onland	0.26	1,193.67	1.46
4		KG (Onland & Offshore)	0.33	1,507.38	1.84
5		Mumbai Offshore	16.23	17,242.94	33.47
6		Rajasthan	0.00	5.56	0.01
TOTAL ONGC			**22.25**	**23,429.47**	**45.68**
7	OIL	Rajasthan	0.00	211.41	0.21
8		Assam-Arakan	3.37	2,670.09	6.04
TOTAL OIL			**3.38**	**2,881.50**	**6.26**
TOTAL NOMINATION			**25.63**	**26,310.96**	**51.94**
NOCs/PVT/JV COMPANIES (PSC)					
9	CEIL	Cambay	0.40	97.69	0.50
10		Krishna Godavari	0.72	214.06	0.93
11		Rajasthan	7.88	813.36	8.69
12	ESSAR	Cambay	0.00	0.00	0.00
13	FOCUS	Rajasthan	0.00	411.61	0.42
14	GEOENPRO	Assam-Arakan	0.04	17.95	0.06
15	GNRL	Cambay	0.00	9.18	0.01
16	GSPC	Cambay	0.04	11.79	0.06
17	HDCPL	Cambay	0.00	0.01	0.00
18	HOEC	Assam-Arakan	0.00	52.52	0.06
19		Cambay	0.01	4.55	0.01
20		Cauvery	0.00	23.54	0.03
21	JTI	Cambay	0.04	12.72	0.05
22	NIKO	Cambay	0.00	26.09	0.03
23	OILEX	Cambay	0.00	1.40	0.00
24	ONGC	Cambay	0.01	0.00	0.01
25		Cauvery	0.08	13.55	0.10
26		Krishna Godavari	0.00	108.52	0.11
27	RIL	Krishna Godavari	0.09	1,922.40	2.02
28	SELAN	Cambay	0.03	9.35	0.04
29	SHELL	Mumbai	0.69	1,853.25	2.54
30	SUNPETRO	Cambay	0.00	0.00	0.00
TOTAL PSC (NOCs/PVT/JVs)			**10.06**	**5,603.54**	**15.66**
COAL BED METHANE (CBM)					
1	ESSAR	Raniganj East		328.45	0.33
2	GEECL	Raniganj South		202.62	0.20
3	ONGC	Jharia		3.96	0.00
4	RIL	Sohagpur East / West		199.77	0.20
TOTAL CBM				**734.80**	**0.73**
INDIA GRAND TOTAL			**35.68**	**32,649.30**	**68.33**

*Note : Figures Inclusive of Condensate (MMT); 1MMT = 1 Bcm

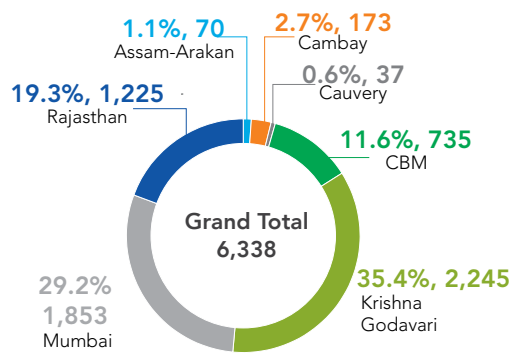
The oil production activity in Cambay and Cauvery basin has seen uptick with Cauvery basin registering a growth of around 80% in production over FY 2016-17. Similarly gas production has shown a growth of around 350% in Assam-Arakan Basin and over 50% in Cauvery basin. Rajasthan continued to dominate the production with around 80% contribution to oil production under PSC regime. Gas production was dominated by offshore areas with Krishna-Godavari and Mumbai Offshore as prominent basins. Even under Nomination regime Mumbai offshore contributes significantly to both oil and gas production.

Fig 3.6: Basin wise Oil Production in PSC Regime in 2017-18 (TMT)



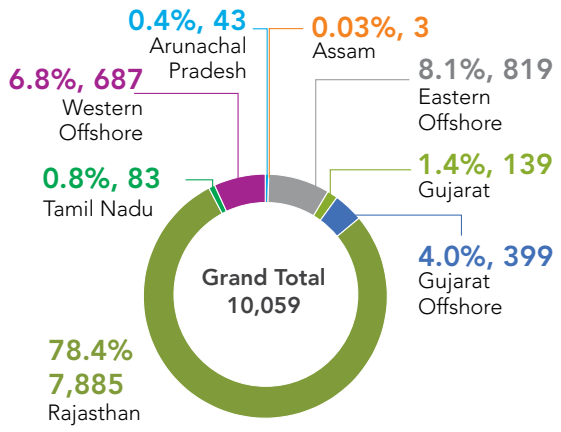
(%, Values)

Fig 3.7: Basin wise Gas Production in PSC + CBM Regime in 2017-18 (MMSCM)



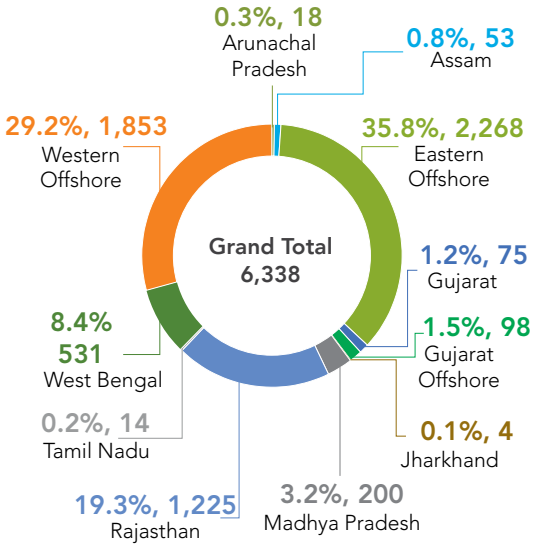
(%, Values)

Fig 3.8: Location wise Oil Production in PSC Regime in 2017-18 (TMT)



(%, Values)

Fig 3.9: Location wise Gas Production in PSC + CBM Regime in 2017-18 (MMSCM)



(%, Values)

The Country oil and gas production has risen consistently under PSC regime starting from year 1994-95 with gas production hitting a peak level during 2010-11 at level of 26.77 BCM and oil production hitting a peak of 12.08 MMT in 2013-14. With a renewed impetus to the sector through HELP, DSF bidding round and upcoming policies supporting enhance recovery from

existing fields, the production figures are likely to hit peak again in near future. The oil production this year has managed to arrest the pace of decline it has been facing over the years with a total production figure of 35.68 MMT, a marginal decline of less than 1% over previous year. While total gas production has increased by 2.36% cloaking a figure of 32.65 BCM.

Table 3.17: Cumulative Oil and gas Production in PSC+CBM Regime

Year	OIL+COND (TMT)		GAS (MMSCM)	
	Current year	Cumulative	Current year	Cumulative
94-95	254	254	88	88
95-96	642	897	334	422
96-97	1,343	2,240	510	932
97-98	2,514	4,754	1,681	2,613
98-99	3,042	7,796	2,874	5,487
99-00	4,018	11,814	3,465	8,952
00-01	4,083	15,897	3,596	12,548
01-02	4,140	20,037	4,054	16,601
02-03	4,088	24,125	5,407	22,008
03-04	4,314	28,440	6,491	28,500
04-05	4,300	32,740	6,784	35,284
05-06	4,552	37,292	7,358	42,641
06-07	4,830	42,122	7,040	49,681
07-08	5,087	47,209	7,727	57,408
08-09	4,674	51,884	8,090	65,498
09-10	5,263	57,146	21,985	87,484
10-11	9,682	66,828	26,774	1,14,258
11-12	10,527	77,355	21,609	1,35,867
12-13	11,640	88,995	14,491	1,50,358
13-14	12,076	1,01,071	9,497	1,59,855
14-15	11,785	1,12,857	8,912	1,68,767
15-16	11,356	1,24,213	8,235	1,77,002
16-17	10,532	1,34,745	6,872	1,83,874
17-18	10,059	1,44,804	6,338	1,90,212

Fig 3.10: Oil and Gas Production in PSC + CBM Contract Regime Since Inception till 2017-18

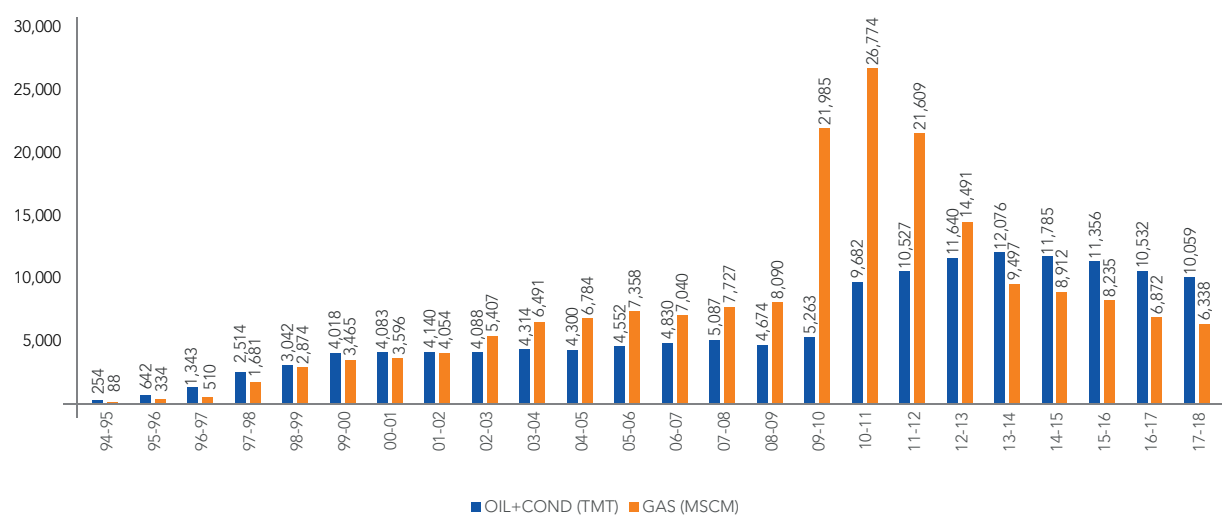


Table 3.18: Location-wise Crude Oil and Natural Gas production under PSC+CBM regime from FY 1994-95 to FY 2017-18

Year	OIL (TMT)					GAS (MMSCM)						
	Off-shore	On-shore	Total	%age of offshore with Total	%age of onshore with Total	Off-shore	On-shore	CBM	Total	%age CBM of Total	%age of off-shore with Total	%age of on-shore with Total
1994-95	250	4	254	98%	2%	88	-	-	88	0%	100%	0%
1995-96	617	25	642	96%	4%	324	10	-	334	0%	97%	3%
1996-97	1,305	38	1,343	97%	3%	479	31	-	510	0%	94%	6%
1997-98	2,472	43	2,514	98%	2%	1,615	66	-	1,681	0%	96%	4%
1998-99	2,965	76	3,042	97%	3%	2,747	128	-	2,874	0%	96%	4%
1999-00	3,924	94	4,018	98%	2%	3,268	197	-	3,465	0%	94%	6%
2000-01	4,006	77	4,083	98%	2%	3,286	310	`	3,596	0%	91%	9%
2001-02	4,070	71	4,140	98%	2%	3,430	624	-	4,054	0%	85%	15%
2002-03	4,013	75	4,088	98%	2%	4,295	1,112	-	5,407	0%	79%	21%
2003-04	4,240	75	4,314	98%	2%	5,184	1,307	-	6,491	0%	80%	20%
2004-05	4,226	74	4,300	98%	2%	5,357	1,427	-	6,784	0%	79%	21%
2005-06	4,451	101	4,552	98%	2%	5,801	1,557	-	7,358	0%	79%	21%
2006-07	4,669	161	4,830	97%	3%	5,908	1,131	-	7,040	0%	84%	16%
2007-08	4,895	192	5,087	96%	4%	6,861	867		7,727	0%	89%	11%
2008-09	4,431	243	4,674	95%	5%	7,348	722	20	8,090	0%	91%	9%
2009-10	4,529	734	5,263	86%	14%	21,350	597	38	21,985	0%	97%	3%
2010-11	4,282	5,400	9,682	44%	56%	26,054	679	41	26,774	0%	97%	3%
2011-12	3,733	6,794	10,527	35%	65%	20,910	615	84	21,609	0%	97%	3%
2012-13	2,804	8,836	11,640	24%	76%	13,700	684	107	14,491	1%	95%	5%
2013-14	2,663	9,414	12,076	22%	78%	8,428	904	166	9,497	2%	89%	10%
2014-15	2,729	9,056	11,785	23%	77%	7,589	1,095	228	8,912	3%	85%	12%
2015-16	2,546	8,810	11,356	22%	78%	6,605	1,236	393	8,235	5%	80%	15%
2016-17	2,137	8,396	10,532	20%	80%	5,155	1,152	565	6,872	8%	75%	17%
2017-18	1,905	8,154	10,059	19%	81%	4,219	1,384	735	6,338	12%	67%	22%

Fig 3.11: Location wise Oil Production in PSC Regime from 2007-08 to 2017-18 (TMT)

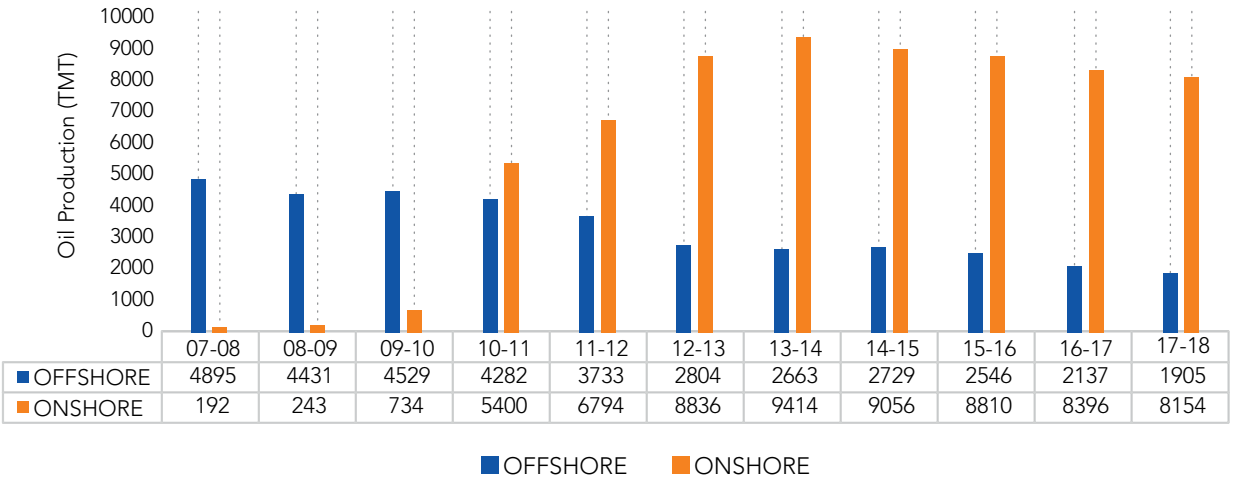
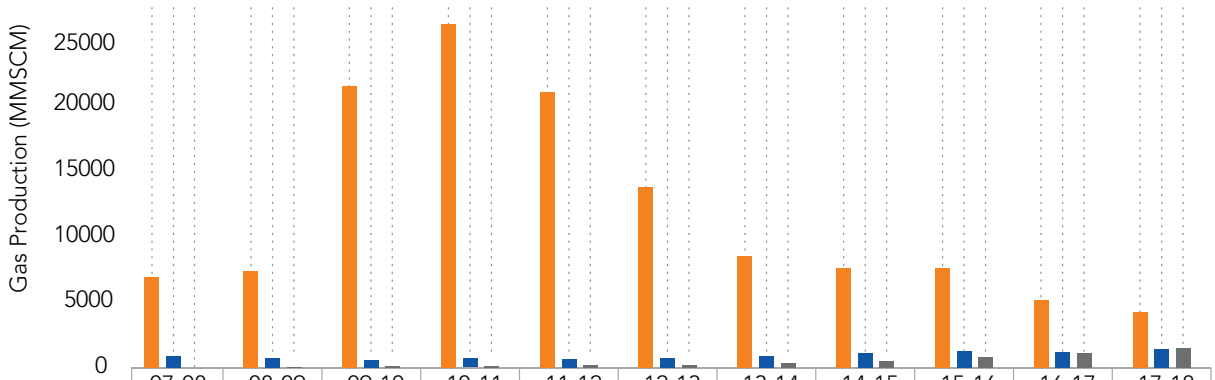


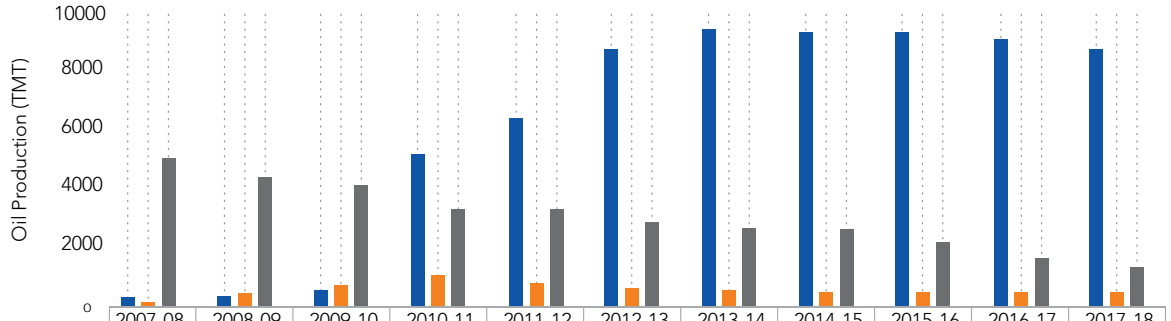
Fig 3.12: Location wise Gas Production in PSC+CBM Regime from 2007-08 to 2017-18 (MMSCM)



	07-08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18
OFFSHORE	6861	7348	21350	26054	20910	13700	8428	7589	6605	5155	4219
ONSHORE	867	722	597	679	615	684	904	1095	1236	1152	1384
CBM	-	20	38	41	84	107	166	228	393	565	735

OFFSHORE ONSHORE CBM

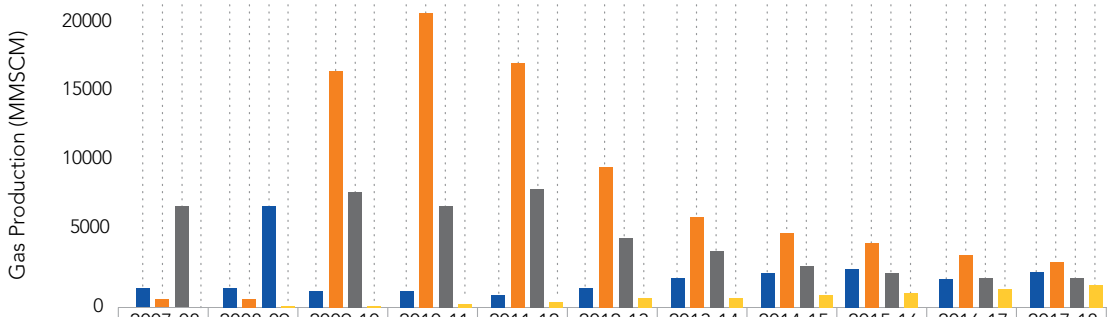
Fig 3.13: Crude Oil Production in various Regime from 2007-08 to 2017-18 (TMT)



	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18
Pre-NELP	412	477	952	5638	6856	8817	9552	9254	9029	8562	8302
NELP	21	160	533	1112	727	440	323	313	263	241	223
Field	4654	4038	3777	2932	2944	2383	2202	2218	2064	1729	1534

Pre-NELP NELP Field

Fig 3.14: Natural Gas Production in various regime from 2007-08 to 2017-18 (MMSCM)



	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18
Pre-NELP	475	446	341	602	579	622	886	1088	1204	1132	1386
NELP	102	177	15196	20457	15645	9530	5052	4574	4077	2998	2046
Field	7150	7447	6410	5674	5301	4231	3394	3022	2561	2178	2172
CBM		20	38	41	84	107	166	228	393	565	735

Pre-NELP NELP Field CBM

Fig 3.15: Trend in Oil Production in PSC Regime from 2005-06 to 2017-18

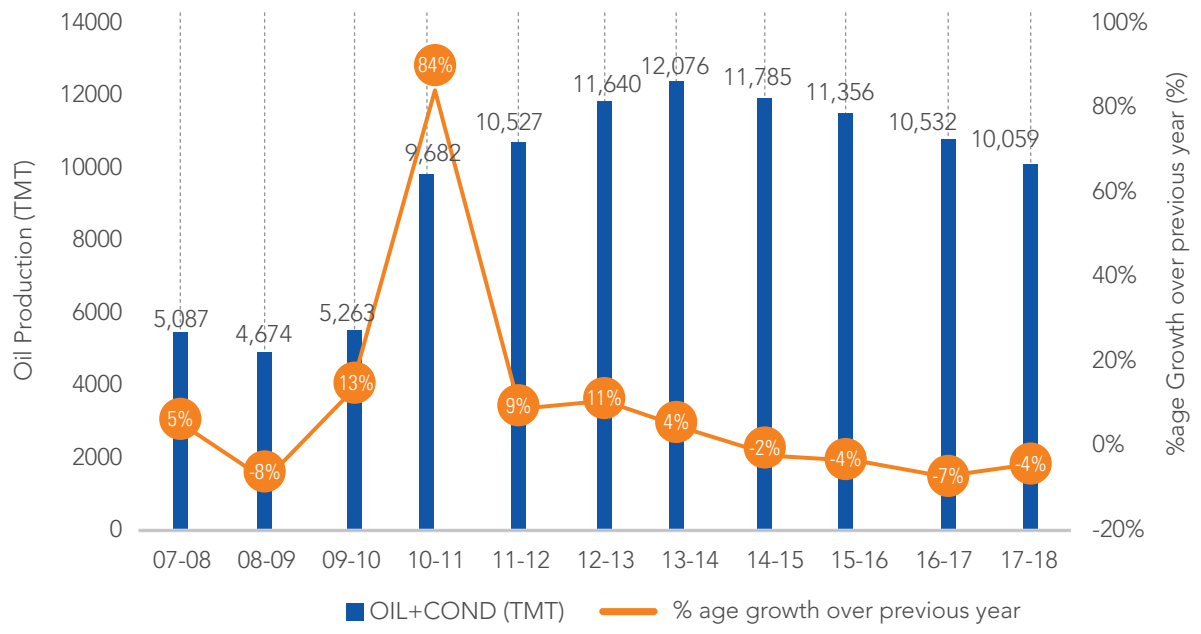
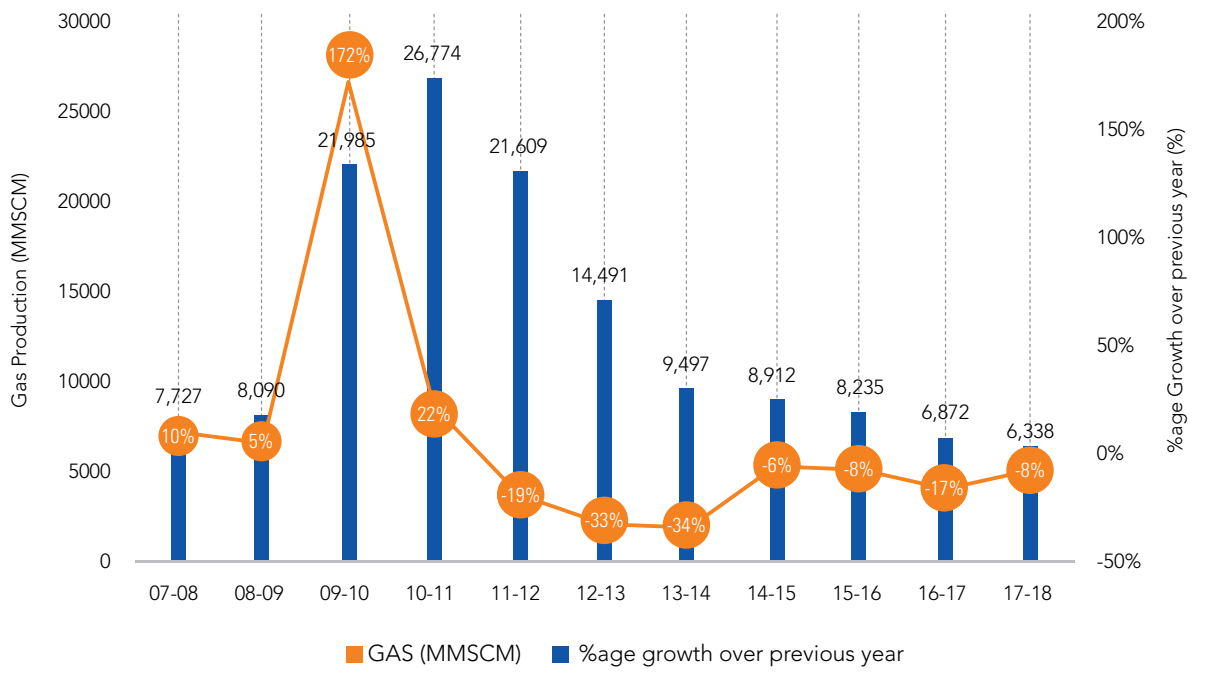
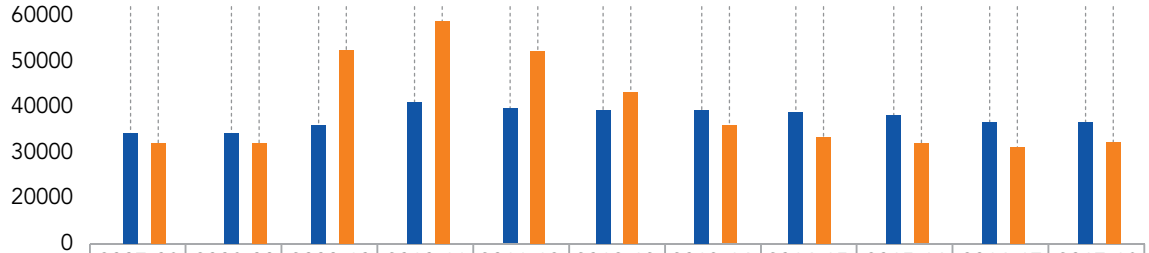


Fig 3.16: Trend in Gas Production in PSC + CBM Regime from 2005-06 to 2017-18



The country oil and gas production under PSC regime has been more or less consistent over past 5 years. There is slight variation in proportion from onshore and offshore areas for oil production, while gas production has seen shift from offshore to onshore area with CBM emerging as major contributor with growth of 30% over previous year, CBM production has grown over 3 times over last 3 years.

Fig 3.17: Country Total Oil & Gas Production from 2007-08 to 2017-18



	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18
OIL TMT	34118	33508	33690	37684	38090	37862	37788	37461	36950	36010	35684
GAS MMSCM	32417	32458	47496	52219	47559	40679	35407	33657	32249	31897	32649

OIL (TMT) GAS (MMSCM)

Table 3.19: Contribution by ONGC, OIL and Pvt./JVs in country's Oil and Gas production

Year	Oil Production (MMT)				Gas Production (BCM)			
	ONGC (Nomination)	OIL (Nomination)	Pvt/JVs (PSC)	Oil Total	ONGC (Nomination)	OIL (Nomination)	Pvt/JVs (PSC& CBM)	Gas Total
2011-12	23.71	3.85	10.53	38.09	23.32	2.63	21.61	47.56
2012-13	22.56	3.66	11.64	37.86	23.55	2.64	14.49	40.68
2013-14	22.25	3.47	12.08	37.79	23.28	2.63	9.50	35.41
2014-15	22.26	3.41	11.79	37.46	22.02	2.72	8.91	33.66
2015-16	22.37	3.23	11.36	36.96	21.18	2.84	8.23	32.25
2016-17	22.22	3.26	10.53	36.01	22.09	2.94	6.87	31.90
2017-18	22.25	3.38	10.06	35.68	23.43	2.88	6.34	32.65

Fig. 3.18: Trend in Oil Production in the country (in MMT)

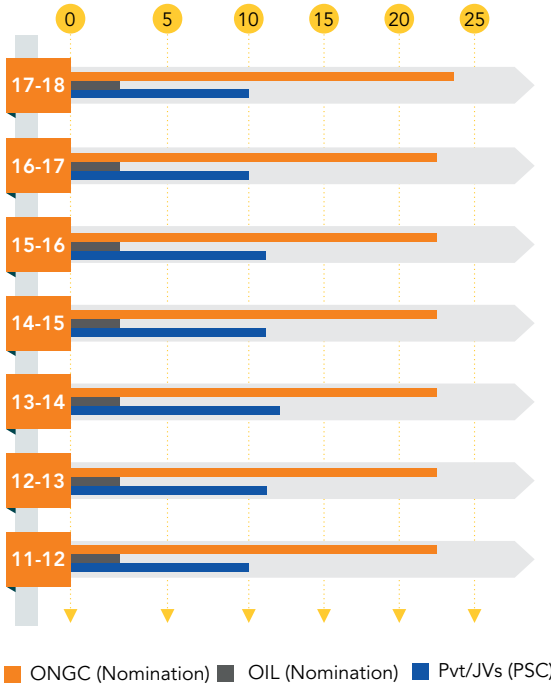
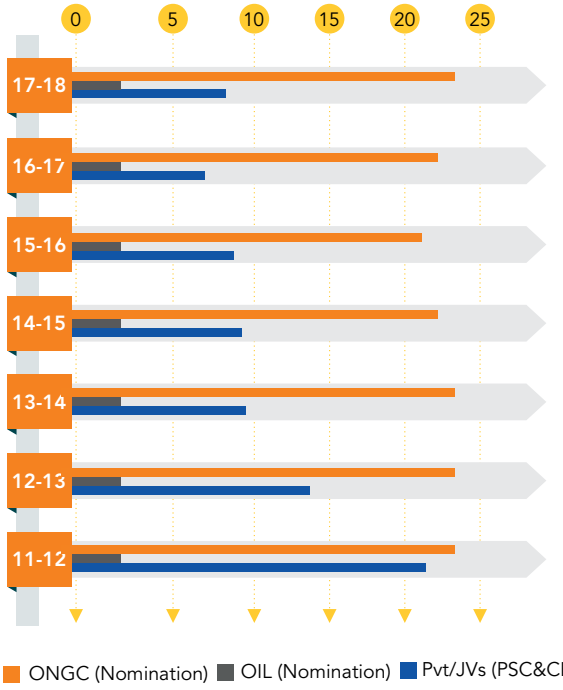


Fig. 3.19: Trend in Gas Production in the country (in BCM)



Sedimentary Basins
National Seismic Programme
Resource Reassessment Study

25 YEARS OF DGH

CHAPTER 4

GEOSCIENTIFIC STUDIES

CHAPTER 4

Geoscientific Studies

Since the first well was drilled in 1889, lot of data was generated over time and was lying with individual companies. Availability, ease of access and quality of E&P data are key aspects that attract investments into exploration and production activities. In consideration of the same, Government of India (GoI) has unveiled a series of initiatives for enhancing exploration activities in the country, "Hydrocarbon Resource Assessment of Indian Sedimentary Basins" and "National Seismic Programme" are two major initiatives of GoI in this direction.

Sufficient knowledge of hydrocarbon potential of a basin is necessary for any meaningful attempt towards exploration of oil and gas. In India, a basin-wide assessment of hydrocarbon resources was last carried out during 1995-96 and 15 sedimentary basins including deepwater areas were assessed based on available geo-scientific data and methodologies, and true potential of Indian sedimentary basins could not be revealed due to limited geoscientific and engineering data available at that point of time.

During the last two decades, geo-scientific data grew in volume due to activities pertaining to exploration, development and production. Use of new technologies furthered opening up of new hydrocarbon plays (petroleum habitat with favorable geological conditions, occupying specific stratigraphic levels) and improved assessment tools for estimating hydrocarbon potential. Driven by the philosophy of realizing the potentials of Indian sedimentary basins for bidding out oil and gas acreage, an idea was mooted for a comprehensive evaluation of all 26 sedimentary basins with a re- assessed estimate.

Thus a re-assessment study was undertaken for the first time in last two decades. The total conventional hydrocarbon reassessed volumes estimated for 26 sedimentary basins and offshore areas is approx. 42 Billion Ton Oil-Equivalent (BTOE) as compared to the Hydrocarbon resource of 28 BTOE assessed earlier, signifying an increase of 49.1% in resource estimates.

The reassessment study focused on a fact that future bidding should be strengthened with more realistic assessment of Indian sedimentary basins and the results could be readily available to the bidders. With

HELP ("Hydrocarbon Exploration and Licensing Policy") and OALP ("Open Acreage Licensing Programme") already launched and operational along with NDR ("National Data Repository"), the project outcome of hydrocarbon play information would significantly expand and enrich the geo-scientific database, essentially required for any meaningful and wiser foray into exploration business.

4.1. Hydrocarbon Resource Assessment of Indian Sedimentary Basins:

In January 2014, Government of India issued an order and constituted a National Steering Committee ("NSC"), headed by Secretary, Ministry of Petroleum & Natural Gas ("MoP&NG") to administer the re-assessment of hydrocarbon resources (in general parlance, but technically, the petroleum in-place) of all sedimentary basins and deepwater areas of India. ONGC ("Oil and Natural Gas Corporation Limited", a national oil company) proposed to carry out this project in-house in association with OIL ("Oil India Limited", other national oil company) and DGH ("Directorate General of Hydrocarbons", upstream technical arm under MoP&NG) under the guidance of international domain experts.

Thus the project titled, "Re-assessment of Hydrocarbon Resources for Sedimentary Basins and Deepwater Areas of India" was carried out by Multi-Organization Team ("MOT") of ONGC-OIL-DGH. The project started on 01.09.2015 and completed on 30.11.2017 through the engagement of 12 teams of 60+ professionals located at 7 work centers of ONGC.

Apart from supervision at apex level by National Steering Committee ("NSC"), the project was closely monitored by Technical Monitoring Group ("TMG") and MOT for technical review, quality check and data secrecy. International domain experts and Indian basin specialists were engaged for review of procedures and technical assurance of the results.

Key features of the reassessment study are:

1. **Comprehensive resource database:** Basin-wise portfolio of available technical data has been prepared, including future data requirement in unexplored basins.
2. **Assessment at play level:** Multiple petroleum system have been assessed to estimate and report

hydrocarbon resources at play level, in order to have deeper insight into plausible hydrocarbon accumulation.

3. **Assessment at unit level:** Resource assessment has been carried out in sectors across basin in line with the merit of geo-scientific data and their influence into other parts of the basin.

4. **Play maps across basins:** Individual plays of each basin have been assessed based on multi-sourced geo-scientific and engineering data, resulting in play/ prospectivity maps prepared at various stratigraphic levels across the basin.

The study methodologies were decided in consultation with international domain experts based on data availability. Though it was limited to re-assessment of conventional hydrocarbons, its initial part can be extended to unconventional hydrocarbons, particularly the shale hydrocarbons.

Most rigorous methodology as per global industry standards was used for most of the basins where adequate geoscientific data, which was just fairly known during 1995- 96 assessments, were sufficiently available.

For rest of the basins, where data are scanty to nil, re-assessment was done through a simpler method, which was also used during the earlier assessment due to limited set of geo-scientific data.

4.1.1. Project Schedule and Execution:

Starting in September 2015, ONGC built the project by collating data from the nomination/ lease areas (held by ONGC and OIL) and DGH shared the data from contract areas (held by contractors, consortium or joint venture entities). The project was completed well within timeline of 27 months (September 2015 – November 2017) and DGH sourced the necessary fund for the project on behalf of government.

NSC, as the apex body administered the overall progress of the project. MOT was constituted with members from ONGC-OIL-DGH, the key stakeholders to assure data secrecy and quality of output. A team of four international domain experts along with national basin specialists were engaged periodically for critical review at all key project milestones. The project was carried out using industry standard latest software as per global practices. Technical Monitoring Group ("TMG") with experts from three project stakeholders (ONGC, OIL and DGH) reviewed the project technically every two months.

4.1.2. Assessment Methodologies

Two methodologies were adopted namely 3D Petroleum System Modeling ("PSM") for 13

Table 4.1: Basin wise Petroleum System Modeling

No.	Basin	Petroleum System Modeling		
		1D	2D	3D
1	Cambay	1D		3D
2	AssamShelf	1D	2D	3D
3	Mumbai	1D		3D
4	KG	1D		3D
5	Cavery	1D		3D
6	AAFB	1D	2D	3D
7	Rajasthan	1D		3D
8	Kutch	1D	2D	3D
9	Mahanadi	1D		3D
10	Andaman	1D	2D	3D
11	Himalayan Foreland	1D		
12	Ganga-Punjab	1D		
13	Vindhyan	1D		
14	Saurashta	1D		3D
15	Kerala-Konkan	1D		3D
16	Bengal	1D		3D
17	Karewa	1D		
18	Spiti-Zanskar	1D		
19	Satpura-S.Rewa-Dam	1D	2D	
20	Narmada	1D		
21	DeccanSyneclise	1D		
22	Bhima-Kaladgi	1D		
23	Cuddapah	1D		
24	PG	1D		
25	Bastar	1D		
26	Chhattisgarh	1D		

basins with adequate geological information and Areal Yield ("AY") method for the remaining 13 basins with relatively less to scanty to even no data. For these basins with less data, analogous basin information from India and abroad was used and hydrocarbons were estimated through petroleum yield per unit area. First method is more rigorous and data-driven, while second method is simpler based on analogies. Hydrocarbon plays belong to Tertiary, Mesozoic, Paleozoic and Pre-Cambrian and are identified and documented across all 26 basins.

Depending on the availability of suitable datasets, PSM was also done along lines (1D) and sections (2D) in addition to 3D modeling. Both PSM and AY methods were used for some basins where data was available in some parts and unsuitable in other parts of the basin. These are Andaman, Kutch, Saurashtra and Assam-Arakan Fold Belt. In another case, Kutch and Saurashtra basins were combined for PSM due to apparent commonality of geological parameters.

For both the approaches, available data were analyzed to create comprehensive geological models based on basin tectonics and structural framework, stratigraphic make-up and supplemented with geochemical analysis and thermal maturity model.

For PSM approach, geological models were integrated with thermal models to build petroleum generation-expulsion scenario and to analyze petroleum system elements for inclusive assessment of petroleum accumulation and source rock tracking. For AY method, the geological models were scaled to analogous basins of India and abroad, on the basis of similarity of geological parameters.

Conventional reservoirs (mostly discrete with finite boundaries) that are developed in clastic and carbonate deposits of sedimentary rocks were primarily assessed.

Nevertheless, fractured reservoirs that are present in the basement deposits of igneous rocks were also included. The thermogenic generation of hydrocarbon (under optimum temperature window), its expulsion out of source rocks, migration and accumulation within reservoir rocks were all rigorously modeled using petroleum system modeling software. Nevertheless, biogenic hydrocarbon plays (mostly methane gas) were also estimated.

4.1.3. Project Outcome

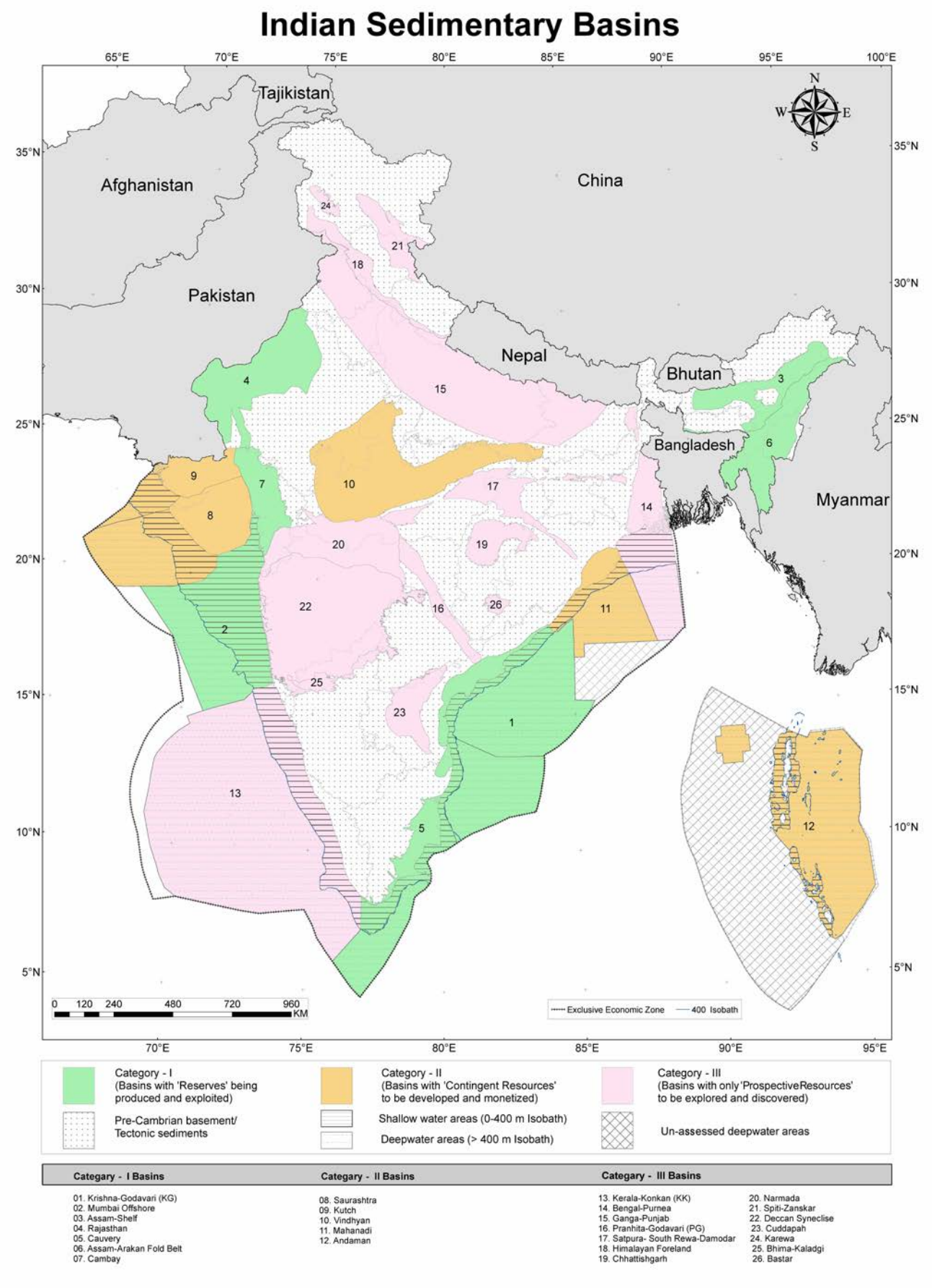
The project has pooled in a huge amount of geo-scientific data, close to 4,500 wells, 1,50,000 LKM of 2D seismic and 7,50,000 SKM of 3D seismic data from different campaigns/vintages.

The 3D PSM methodology has integrated vast amount of laboratory data of bio-stratigraphy, sedimentology and geochemical information in building the comprehensive geological models. In basins where limited data was present, the basic information was gathered from the public domain and selection of analogous basin was thereafter chosen on similarity of geological parameters.

In an extended approach post reassessment study, the basin categories were simplified into three categories in line with the global industry standard of PRMS (Petroleum Resources Management System) guidelines on petroleum resources reporting as follows:

- **Category 1**:Basins with Reserves, being produced and remaining for increased recovery (7 basins),
- **Category 2:** Basins with Contingent Resources to be developed and produced (5 basins) and
- **Category 3:** Basin with only Prospective Resources, to be explored and discovered (14 basins)

Fig 4.1: Indian Sedimentary basins (3-tier category in line with industry-standard PRMS philosophy)



The total basin area of the 26 sedimentary basins of India is close to 3.36 million sq km with onland area of 1.63 million sq km, shallow-water area of 0.41 million sq km and deepwater area of 1.32 million sq km.

During the 1995-96 exercise, deepwater areas were not assigned to respective basins and instead, a gross volume was put against deepwater areas between 200m bathymetry and EEZ limit. In the 2017 study, deepwater areas were redefined between 400m bathymetry and EEZ limit and the same has been proportioned with respective basins falling into deepwater.

Table 4.2: Indian Sedimentary basins-Estimate of Hydrocarbons Inplace (excluding unconventional Hydrocarbons)

Sl. No.	Sedimentary Basin Name	Category	Total Area (Sq Km)	Total Inplace (MMTOE)	Discovered Inplace (MMTOE)	Undiscovered Inplace (MMTOE)
1	Krishna-Godavari (KG)	1	2,30,000	9,555	1,977	7,578
2	Mumbai Offshore	1	2,12,000	9,646	4,794	4,852
3	Assam Shelf	1	56,000	6,001	1,868	4,133
4	Rajasthan	1	1,26,000	4,126	938	3,188
5	Cauvery	1	2,40,000	1,964	292	1,672
6	Assam-Arakan Fold Belt (AAFB)	1	80,825	1,633	178	1,455
7	Cambay	1	53,500	2,586	1,800	786
8	Saurashtra	2	1,94,114	1,325	79	1,246
9	Kutch	2	58,554	898	71	827
10	Vindhyan	2	2,02,888	632	1	631
11	Mahanadi	2	99,500	651	77	574
12	Andaman	2	2,25,918	371	2	369
13	Kerala-Konkan (KK)	3	5,80,000	1,245	0	1,245
14	Bengal-Purnea	3	1,21,914	828	0	828
15	Ganga-Punjab	3	3,04,000	128	0	128
16	Pranhita-Godavari (PG)	3	30,000	95	0	95
17	Satpura-South Rewa-Damodar	3	57,180	63	0	63
18	Himalayan Foreland	3	30,110	44	0	44
19	Chhattisgarh	3	32,000	25	0	25
20	Narmada	3	95,215	18	0	18
21	Spiti-Zankskar	3	32,000	11	0	11
22	Deccan Syneclise	3	2,37,500	11	0	11
23	Cuddapah	3	40,100	5	0	5
24	Karewa	3	6,671	4	0	4
25	Bhima-Kaladgi	3	14,100	3	0	3
26	Baster	3	5,360	1	0	1
TOTAL			33,65,449	41,872	12,076	29,796

(Total figures for Inplace may not match due to rounding at basin level)

Note: Basins have been re-categorized post-study (2017) into 3-tier based on PRMS philosophy. Category I basins have recoverable commercial discovered inplace (reserves), Category II have recoverable sub-commercial discovered inplace (contingent resources) and Category III have only recoverable undiscovered inplace (prospective resources)

PRMS PRMS is the industry-standard practice of reporting petroleum inplace through analysis of data uncertainty and project risk matrix.

Significant upsides are seen in basins such as KG, Mumbai Offshore, Assam Shelf, AAFB, Cauvery, Rajasthan, Saurashtra and KK. The basins like Vindhyan and Saurashtra have reported discoveries and hence ranked in Category II.

The project outcomes will serve as a guiding tool for re-aligning the exploration strategy for Indian sedimentary basins across areas that are explored, poorly explored or even unexplored. Once it is integrated with NDR, this would significantly enrich the existing database and make the bidding process more equipped, elaborate and attractive.

As a part of immediate implementation of the study findings, the simplified 3-tier basin categorization, the results of updated petroleum resources and the refined basin understandings have already been put to use for all ongoing projects. Government policies like OALP and DSF bid rounds, NSP ("National Seismic Programme") campaign can be aligned with the new category of basins, which have direct bearing on petroleum resource potential and project maturation. Production enhancement efforts, currently contemplated by GoI do target on Category 1 basins which have reserves that are producing as well as remaining for increased recovery.

4.2 National Seismic Programme (NSP)

Geophysical data Acquisition, Processing & Interpretation (API) is one of the most important aspects in the process as it helps in giving the initial insight into the prospectivity assessment and also helps in planning the future activities. As a base to launch future E&P activities, appraisal of unapprised areas was considered an important task.

To achieve this, MoP&NG formulated a plan to conduct 2D seismic surveys within timeframe of five years at an estimated cost of INR 2932.99 Crores in all sedimentary basins of India where no/scanty data is available. Directorate General of Hydrocarbons (DGH) identified the need of about 48,243 line kilometer (LKM) 2D seismic data for appraisal of these areas. The project was introduced under the broad policy framework of Geo-Scientific Data Generation for Hydrocarbons in Indian Sedimentary Basins to appraise the un- appraised onland areas in 26 sedimentary basins and was notified on 20th May 2014.

The project is being implemented through National Oil Companies (NOCs) OIL and ONGC through service providers in north- eastern states and rest of India respectively. OIL has been assigned to carry out 2D seismic API of 7,408 LKM falling in North eastern part of India covering states of Assam, Arunachal Pradesh, Nagaland, Manipur, Tripura and Mizoram and ONGC has been assigned to carry out 2D seismic API of approx. 40,835 LKM seismic data in onland part of 22 sedimentary basins of India.

So far, out of 24 states, in-principal approval from 22 states and forest permissions from 19 states have been obtained. Also during the FY 2017-18, 16,135 LKM of data has been acquired which is significant 33% of total target under NSP programme.

Table 4.3: Work Progress of ONGC and OIL

Sector	Area	Target (LKM)	Coverage in FY 2016-17 (LKM)	Coverage in FY 2017-18 (LKM)	Cumulative coverage since inception (LKM)
ONGC Work Progress					
1	Cambay	1,240	658.20	1,214.22	1,872.42
	Saurashtra	2,280			
2	Kutch	1,760	830.28	1,782.54	2,612.82
	Rajasthan	2,260			
3	Krishna Godavari	600	-	901.86	901.86
	Pranhita Godavari	350			
	Cauvery	1,900			
	Cudappah	850			
	Bastar	240			
4	Andaman & Nicobar	310	-	-	-
5	Bengal	860	1,072.86	1,253.22	2,326.08
	Mahanadi	2,530			
6	Ganga	3,130	-	886.50	886.50
7	Deccan Synclise-North	5,683	1,119.30	2,143.32	3,262.62
8	Deccan Synclise-South	5,127	444.66	2,341.50	2,786.16
	Bhima	280			
	Kaladgi	310			
9	Vindhyan-A	4,953	797.40	2,546.16	3,343.56
	Narmada	667			
	Satpura	245			
10	Vindhyan-B	300	-	1,292.10	1,292.10
	South Rewa-Damodar	1,460			
	Chhattisgarh	1,400			
11	Himalayan Foreland	1,300	110.82	259.56	370.38
	Spiti-Zanskar	500			
	Karewa	300			
Total (ONGC)		**40,835**	**5,033.34**	**14,620.98**	**19,654.50**
OIL Work Progress					
Area-1 Sector-II	Assam & Arunachal Pradesh	2,360	584.88	1,150.02	1734.90
Area-1 Sector-II	Assam & Arunachal Pradesh	870	4.08	94.62	98.70
Area-2 Sector-I	Nagaland	670	-	-	-
Area-2 Sector-II	Manipur	870	-	4.74	4.74
Area-2 Sector-III	Karbi-Anglong & North Cachar Hills	875	-	103.68	103.68
Area-2 Sector-IV	Mizoram & Tripura	1763	48.96	161.22	210.18
Total (OIL)		**7,408**	**637.92**	**1,514.28**	**2,152.20**
Grand Total (ONGC + OIL)		**48,243**	**5,671.26**	**16,135.26**	**21,806.70**

The data acquired in the process would help in identifying the prospective areas and to generate interest of bidders in Open Acreage Licensing Policy (OALP) etc. Therefore, this will be of help in deciding the focus areas of the exploration activities in the country and on the basis of this primary data, E&P companies would take up further exploration activities in the acreages awarded to them.

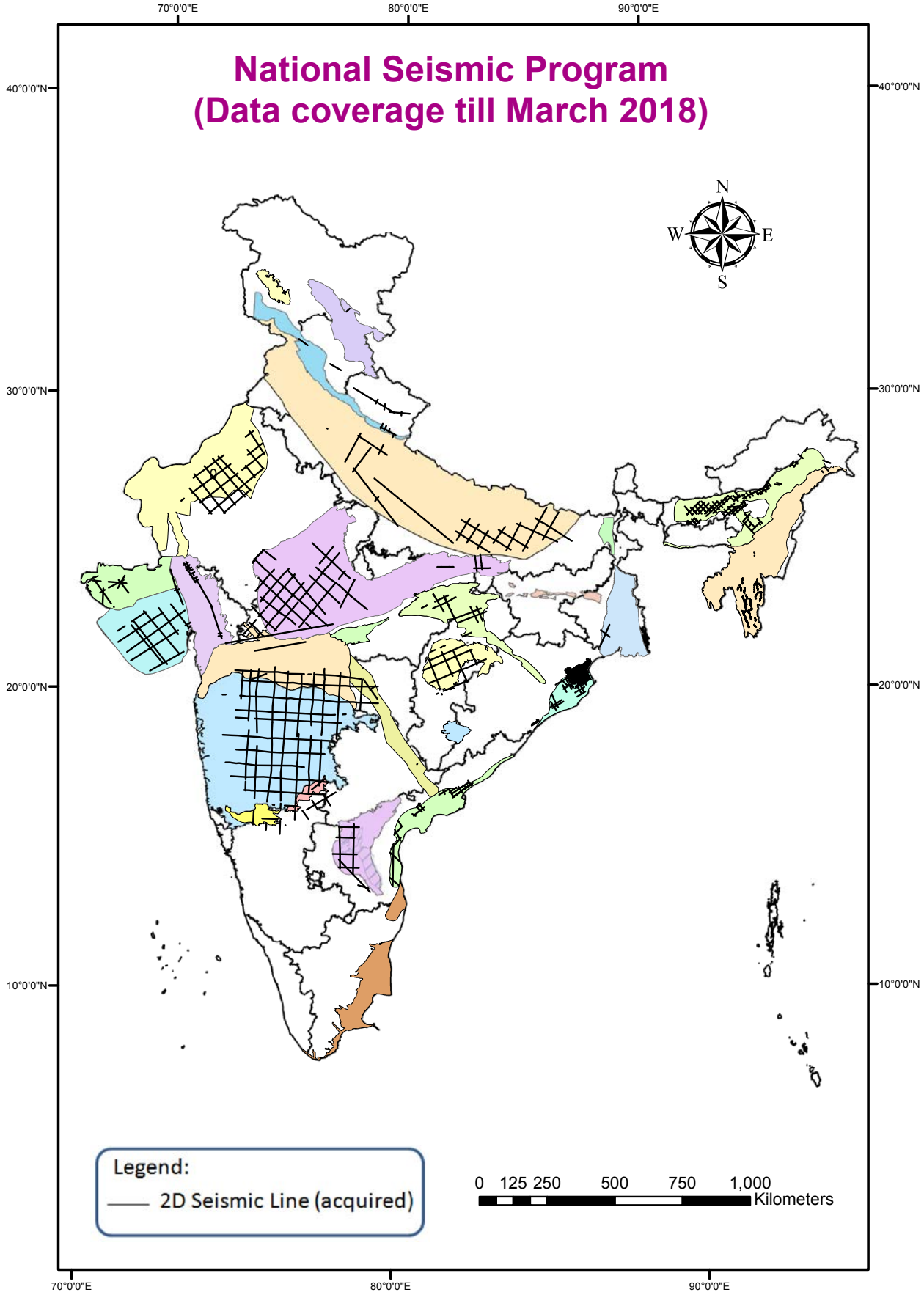
Table 4.4: Target & Timeline

Agency	Activity		Timeline	
	Acquisition (LKM)	Processing & Interpretation (LKM)	Acquisition	Processing & Interpretation
ONGC	40,835	40,835	March 2019	July 2019
OIL	7,408	7,408	December 2018	February 2019

Table 4.5: 2D Seismic Data Acquisition

Agency (Total Target)	FY 2017-18		Cumulative Achievement since inception (LKM) (% w.r.t Total target)
	Annual Target (LKM)	Achievement (LKM) (w.r.t to FY target)	
ONGC (40,835 LKM)	17,060	14,620.98 (85.70%)	19,654.50 (48.13%)
OIL (7,408 LKM)	3,478	1,514.28 (43.53%)	2,152.20 (29.05%)
Total (48,243 LKM)	**20,538**	**16,135.26 (78.56%)**	**21,806.70 (45.20%)**

Fig 4.2: 2D Seismic Survey in "To be Appraised Areas " of Indian Sedimentary Basins



Hydrocarbon Reserves Status

Reserve Replacement Ratio

Basin-wise in-place Volume & Reserves

CHAPTER 5

PETROLEUM RESOURCES AND RESERVES IN INDIA

CHAPTER 5

Petroleum Resources and Reserves in India

5.1 Conventional Hydrocarbons

Assessment of Resource potential of Indian sedimentary basin was carried out by ONGC in 1995-1996 in which 15 basins were covered using areal yield method. Total hydrocarbon assessed resources (in place) estimated for 15 sedimentary basins across Onland, shallow water & deep-water area was 28.1 billion tonnes of oil & Oil Equivalent of Gas (O+OEG). The resources in the offshore are 18.82 Billion Tonnes of O+OEG out of which deep-water areas account for 7 Billion Tonnes.

Due to limitations in the technology full potential of Indian sedimentary basins was not discovered. To understand the hydrocarbon potential of India, reassessment of the basins was required so that the potential bidders can assess the Indian hydrocarbon sector. The Minister of Petroleum & Natural Gas (MoPNG) issued an office order in January, 2014 to carry out reassessment of Hydrocarbon Resources for Sedimentary Basins of India including Deepwater Areas. The work of hydrocarbon resource assessment was carried out under the leadership of ONGC's Institute KDMIPE (Keshava Deva Malaviya Institute of Petroleum Exploration) at Dehradun and Multi-Organization Teams were formed to carry out this exercise.

National Steering Committee in its second meeting held on 16.07.2015 and concluded that the mandated exercise of 're-assessment of hydrocarbon resources for sedimentary basins and deepwater areas of India' was taken up in-house by ONGC in association with OIL and DGH. The project entitled, "Re-assessment of Hydrocarbon Resources for Sedimentary Basins and Deepwater Areas of India" was carried out by Multi-Organization Team ("MOT") of ONGC-OIL-DGH. Started on 01.09.2015, the project completed on 30.11.2017 through the engagement of 12 teams of 60+ professionals located at 8 work centres of ONGC which are tabulated below.

Table 5.1: ONGC work centres for reassessment study

Basin	ONGC work center
Mumbai Offshore, Assam-Arakan Fold Belt (AAFB), Chhattisgarh	KDMIPE
Kerala-Konkan, Kutch	Mumbai
Krishna-Godavari, Cauvery	Chennai
Mahanadi, Bengal	Kolkata
Cambay	Vadodara
Rajasthan	New Delhi
Vindhyan	GEOPIC
Assam Shelf	Jorhat

Total hydrocarbon reassessed resources (inplace) estimated for 26 sedimentary basins across onland, shallow water and deepwater areas is 41,872 MMTOE which is 49.1% increase from the previous assessment carried out in 1996.

Apart from supervision at apex level by National Steering Committee ("NSC"), chaired by Secretary, MoP&NG, the project was closely monitored by Technical Monitoring Group ("TMG") and MOT for technical review, quality check and data secrecy. International domain experts and Indian basin experts were engaged for review of procedures and technical assurance of the results. The project was completed and results presented to NSC on 03.10.2017.

The basin-wise reports was formally submitted at DGH on 19.01.2018. The final copy of all-basin comprehensive report was submitted to MoP&NG on 26.02.2018 and individual basin reports were kept at DGH for technical reference to all future readers and potential oil and gas bidders. The soft copies of the reports and project datasets were submitted to DGH on 14.03.2018.

The results of hydrocarbon reassessment proved useful in ongoing projects, including the rounds of OALP-I, upcoming DSF-II bidding and NSP (National Seismic Programme). Following the best practices of oil & gas industry globally, the basin categories are simplified into three categories in line with PRMS (Petroleum Resources Management System) as Reserves, to be produced (Category I, 7 basins), Contingent Resources to be monetized (Category II, 5 basins) and Prospective Resources, to be explored (Category III, 14 basins).

Table 5.2: Categorization of sedimentary basins of India

Category I (Commercially established & producing basins)	Assam shelf, Assam arakan fold belt, Cambay, Cauvery, Krishna Godavari, Mumbai offshore & Rajasthan Basin	7
Category II (Prospectivity identified)	Andaman, Kutch, Mahanadi, Saurashtra & Vindhyan	5
Category III (Prospective)	Bengal-Purnea, Himalayan Foreland, Ganga Punjab, Kerala-Konkan, Karewa, Spiti-Zanskar, Satpura-South Rewa-Damodar, Narmada, Deccan Syneclise, Bhima-Kaladgi, Cuddapah, Pranhita-Godavari, Bastar, Chattisgarh	14

Table 5.3: Assessment Result Comparison 1995-96 vs 2017 (Excluding unconventional hydrocarbons)

No.	Basin	Prognosticated Resource (1995-96)	Prognosticated Resource Present Study (2017)			Discovered Resources	Undiscovered Resource
			3D PSM	Areal Yield	Total		
1	Cambay	2,050	2,586	-	2,586	1,800	786
2	Assam Shelf	3,180	6,001	-	6,001	1,868	4,133
3	Mumbai Offshore	9,190	9,646	-	9,646	4,794	4,852
4	Krishna Godavari	1,130	9,555	-	9,555	1,977	7,578
5	Cauvery	700	1,964	-	1,964	292	1,672
6	Assam Arakan Fold Belt	1,860	1,233	400	1,633	178	1,455
7	Rajasthan	380	4,126		4,126	938	3,188
8	Kutch	760	862	36	898	71	827
9	Mahanadi	145	651		651	77	574
10	Andaman	180	359	12	371	2	370
11	Himalayan Foreland	150	-	44	44	0	44
12	Ganga	230	-	128	128	0	128
13	Vindhyan	Not Studied	-	633	633	1	632
14	Saurashtra	280	1,294	31	1,325	79	1,246
15	Kerala Konakan	660	1,245	-	1,245	0	1,245
16	Bengal	190	828	-	828	0	828
17	Karewa	Not Studied	-	4	4	0	4
18	Spiti-Zanskar	Not Studied	-	11	11	0	11
19	Satpura-S. Rewa-Damodar	Not Studied	-	63	63	0	63
20	Narmada	Not Studied	-	18	18	0	19
21	Deccan	Not Studied	-	11	11	0	11
22	Bhima-Kaladgi	Not Studied	-	3	3	0	3
23	Cuddapah	Not Studied	-	5	5	0	5
24	Pranhita Godavari	Not Studied	-	95	95	0	95
25	Bastar	Not Studied	-	1	1	0	1
26	Chhattisgarh	Not Studied	-	25	25	0	25
27	Deep Water Areas	7,000	Deep Water area estimated basin-wise and resources added to respective basins				
Total (MMTOE)		**28,085**	**40,350**	**1,522**	**41,872**	**12,076**	**29,796**

*All resource figures are in MMTOE

5.2 Hydrocarbon reserves of India

In-place hydrocarbon volume of 10,960.05 MMT of Oil and Oil Equivalent Gas (O+OEG) have been established by ONGC, OIL and Pvt./JVs under PSC and CBM regime. Ultimate reserves are 4203.64 MMT O+OEG and accretion in ultimate reserves is 108.76 MMT O+OEG. Balance recoverable reserves is 1917.47 MMT O+OEG. Details are as below:

Table 5.4: 2P Reserves status during the year 2017-18 (As on 31.03.2018)

No.	Subject	Parameter	ONGC (Nomination)*	OIL (Nomination)*	PSC + CBM regime	Total
1	Initial In-place volume	Gas (BCM)	2,203.89	383.54	1526.06	4113.49
		Oil (MMT)	5,009.09	805.91	1080.89	6895.89
		O+OEG (MMT)	**7,212.98**	**1,140.12**	**2,606.95**	**10,960.05**
2	Accretion of In-place volume	Gas (BCM)	19.81	9.24	58.71	87.76
		Oil (MMT)	80.60	-0.13	72.56	153.03
		O+OEG (MMT)	**100.42**	**8.19**	**131.27**	**239.88**
3	Ultimate Reserves	Gas (BCM)	1,249.42	216.73	846.62	2312.77
		Oil (MMT)	1,433.40	252.33	234.04	1919.78
		O+OEG (MMT)	**2,682.82**	**440.16**	**1,080.67**	**4,203.64**
4	Accretion of Ultimate Reserves	Gas (BCM)	51.52	4.21	28.01	83.74
		Oil (MMT)	15.80	3.29	6.41	25.49
		O+OEG (MMT)	**67.32**	**7.01**	**34.42**	**108.76**
5	Balance Recoverable Reserves	Gas (BCM)	560.31	124.98	654.18	1,339.47
		Oil (MMT)	431.45	78.59	84.46	594.50
		O+OEG (MMT)	**991.76**	**187.08**	**738.63**	**1,917.47**

Note : Conversion factor 1 MMT = 1 BCM for ONGC (Nomination and PSC+CBM Blocks)

O+OEG- Oil and Oil Equivalent of Gas. * As Provided by ONGC & OIL

5.3 Reserves established under PSC+CBM regime

E&P activities were accelerated under PSC+CBM regime and in-place reserves have steadily increased over the years. The trend of In-place volume and Ultimate reserves of crude oil and natural gas under the PSC+CBM regime during the period 2008-09 to 2017-18 along with the growth with base year as 2008-09 is provided. In-place has recorded growth of 61% and Ultimate reserves have recorded growth of 49%. Details are as below:

Table 5.5: In-place volume trend (PSC + CBM regime)

As on	OIL+COND (MMT)	Gas (BCM)	O + OEG (MMT)	%Growth with Base Year 2008
01.04.2008	639	980	1,619	-
01.04.2009	658	982	1,640	1%
01.04.2010	814	1,148	1,963	21%
01.04.2011	821	1,209	2,029	25%
01.04.2012	817	1,255	2,072	28%
01.04.2013	830	1,292	2,122	31%
01.04.2014	972	1,318	2,290	41%
01.04.2015	975	1,460	2,436	50%
01.04.2016	995	1,362	2,357	46%
01.04.2017	1,008	1,467	2,476	53%
01.04.2018	1,081	1,526	2,607	61%

Fig 5.1: In-place volume trend (PSC+CBM regime)

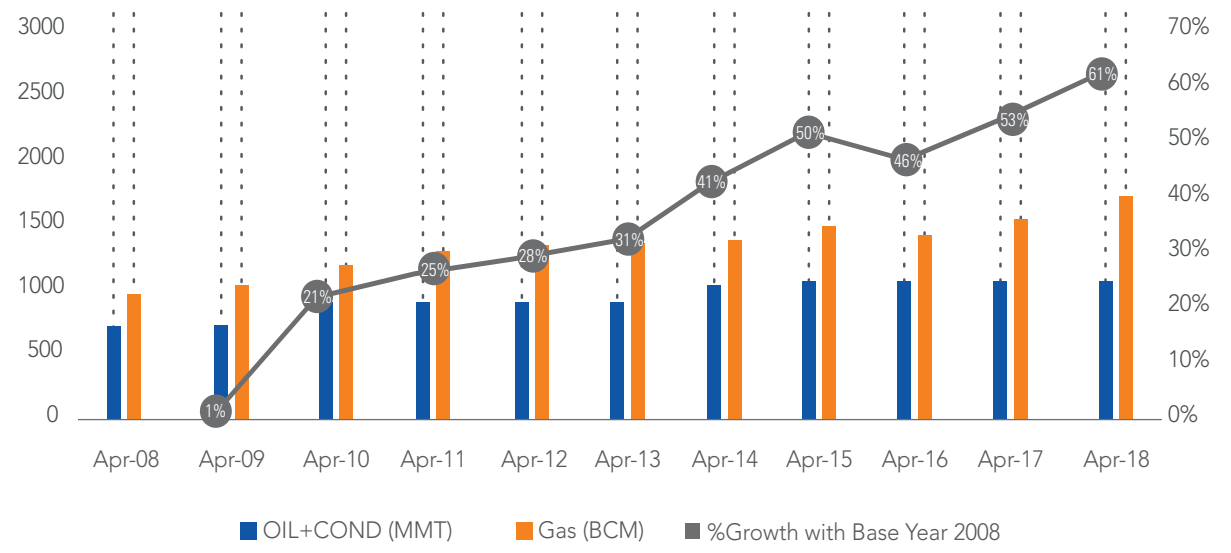
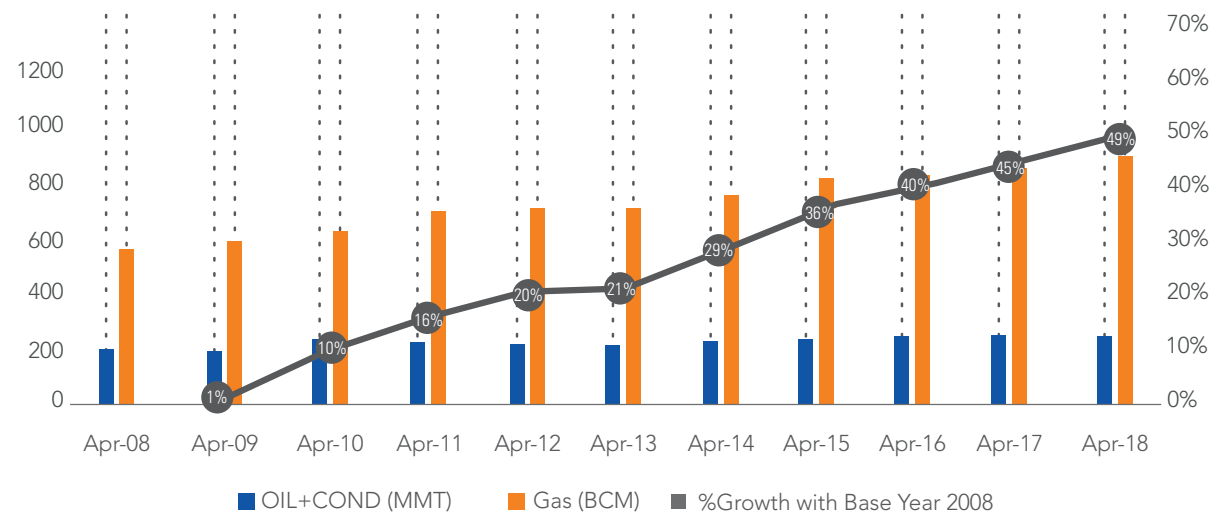


Table 5.6: Ultimate reserve trend (PSC+CBM regime)

FY	OIL+COND (MMT)	Gas (BCM)	O + OEG (MMT)	%Growth with Base Year 2008
01.04.2008	172	551	723	-
01.04.2009	178	550	728	1%
01.04.2010	194	601	795	10%
01.04.2011	195	641	836	16%
01.04.2012	195	677	871	20%
01.04.2013	197	680	877	21%
01.04.2014	215	716	930	29%
01.04.2015	215	767	983	36%
01.04.2016	225	786	1011	40%
01.04.2017	228	819	1046	45%
01.04.2018	234	847	1081	49%

Fig 5.2: Ultimate reserves trend (PSC+CBM regime)



In-place volume and Ultimate reserves (PSC+CBM regime)

India has 26 sedimentary basins covering an area of 3.36 million square kilometres. The sedimentary basins of India, onland have an aerial extent of about 1.63 million sq. km. and offshore up to the 400-m isobath, have an areal extent of about 0.41 million sq. km. In the deepwater beyond the 400-m isobath, the sedimentary area has been estimated to be about 1.32 million sq. km. Major basins where hydrocarbon potential has been established under the PSC regime are Assam- Arakan, Cambay, Cauvery, Krishna Godavari, Mahanadi, Mumbai and Rajasthan. In-place volume and ultimate reserves in the prospective sedimentary basins of India, various bidding rounds are provided below.

Table 5.7: Distribution of In-place volume and Ultimate reserves in sedimentary basins of India

Basin	In-Place MMT (O+OEG)	Ultimate MMT (O+OEG)
Krishna Godavari	969	583
Mumbai	512	131
Rajasthan	477	135
CBM	280	108
Cambay	156	42
Cauvery	87	25
Assam-Arakan	83	24
Mahanadi-NEC	37	26
Saurashtra	7	5

For the very first time, since last 10 years Initial oil in place has been discovered in prospective sedimentary basin of Saurashtra. In previous years, Saurashtra basin has shown 0 MMT (O+OEG) initial oil in place but in FY 2017-18 7 MMT (O+OEG) initial oil in place with ultimate reserve of 5 MMT (O+OEG) has been explored which has added value to Indian hydrocarbon potential.

Fig 5.3: Basin-wise In-place volume (O + OEG (MMT)) Distribution under PSC, RSC & CBM Regime (As on 31.03.2018)

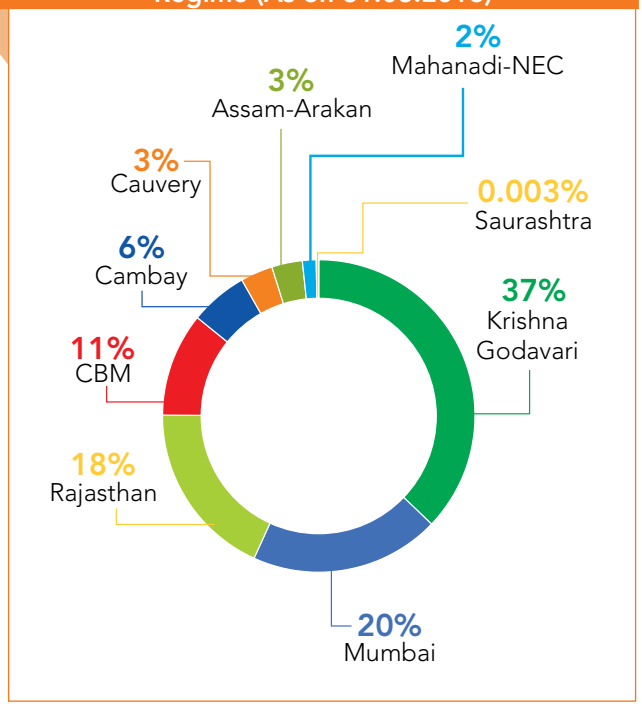


Fig 5.4: Basin-wise Ultimate Reserves (O + OEG (MMT)) Distribution under PSC, RSC & CBM Regime (As on 31.03.2018)

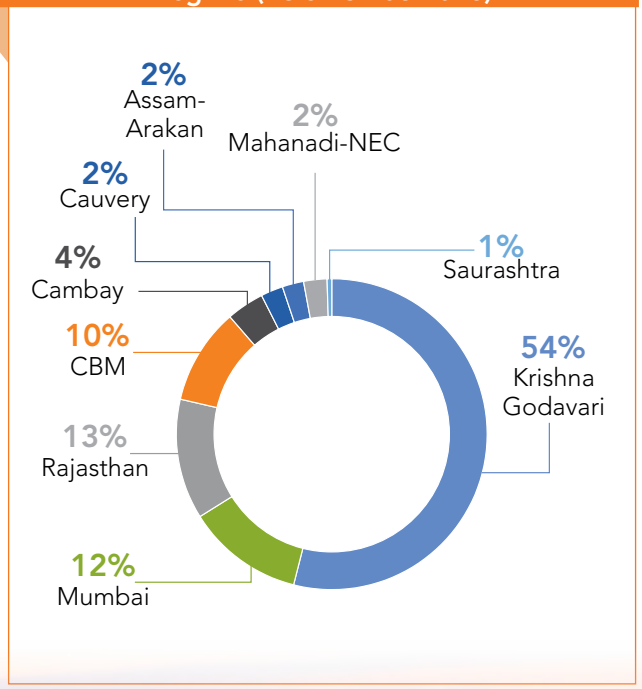


Fig 5.5: Reserves established in Cambay

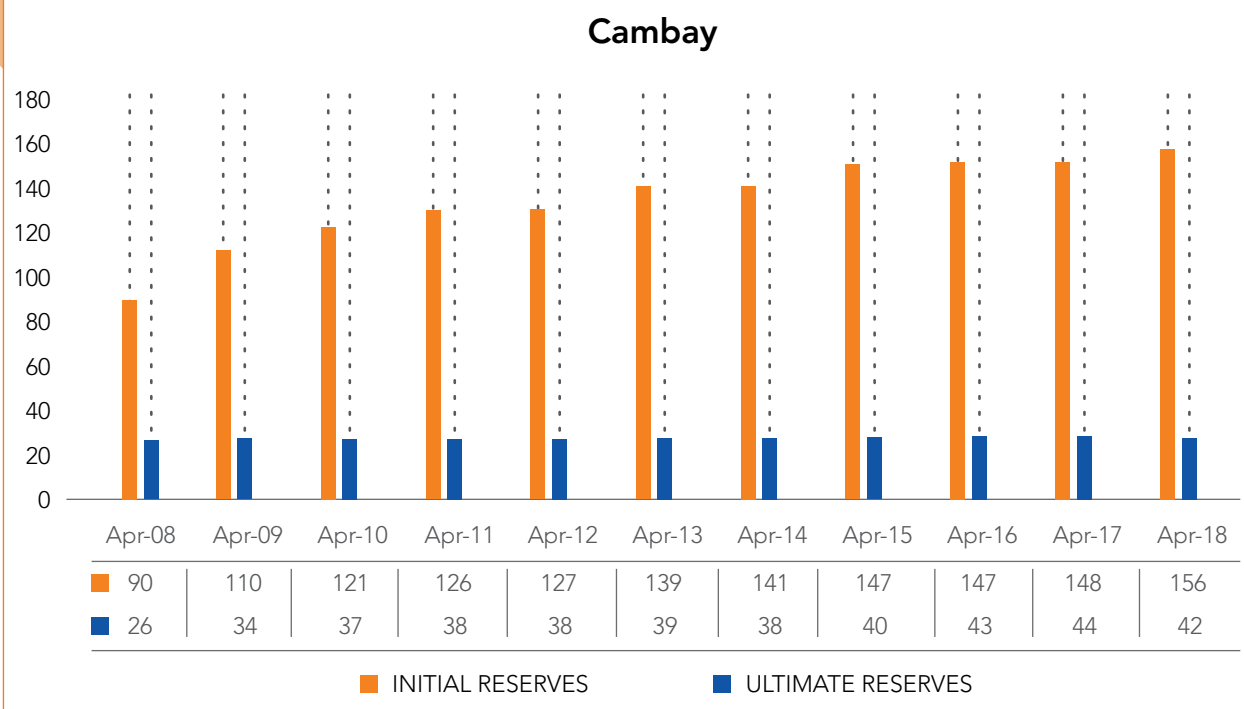


Fig 5.6: Reserves established in Assam-Arakan

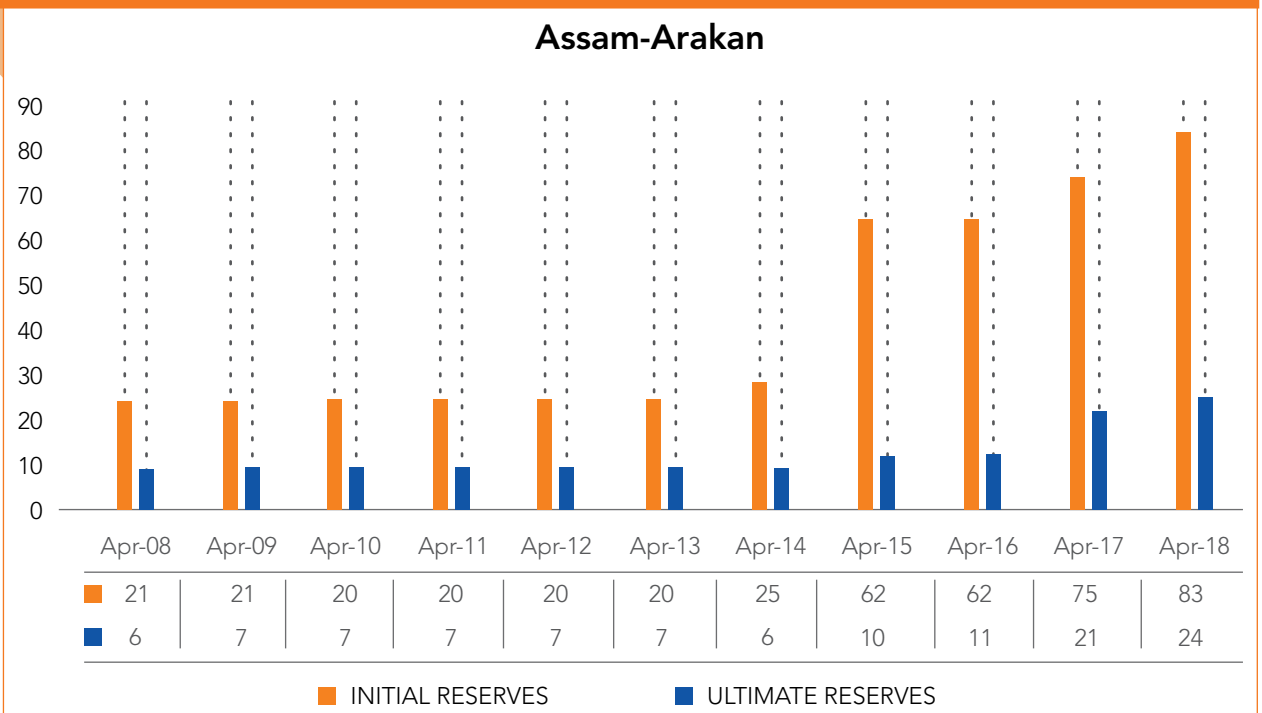


Fig 5.7: Reserves established in Mumbai

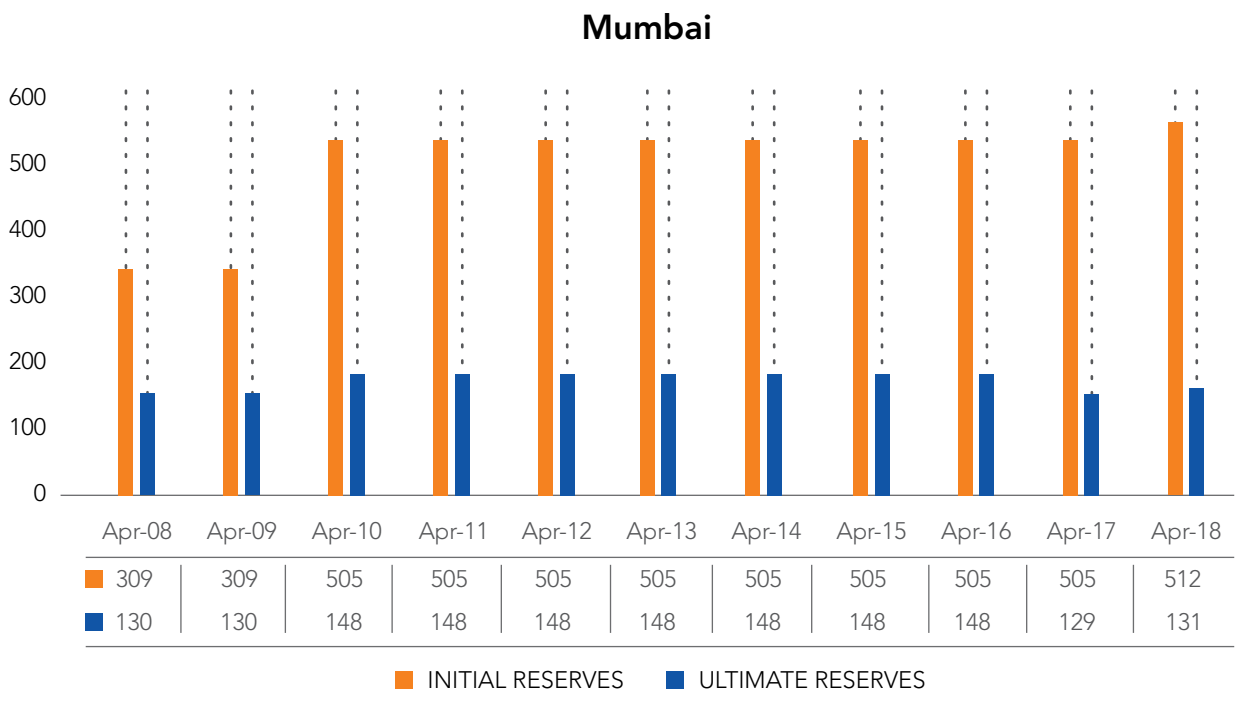


Fig 5.8: Reserves established in Mahanandi-NEC

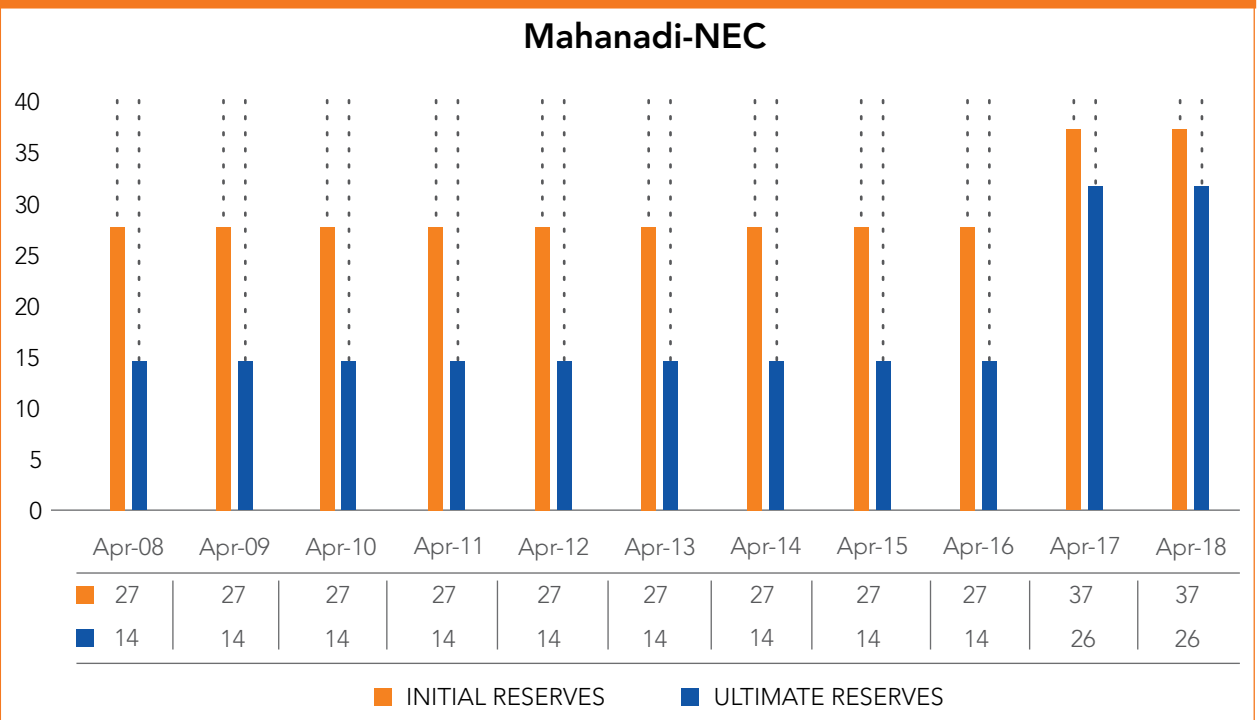


Fig 5.9: Reserves established in Cauvery

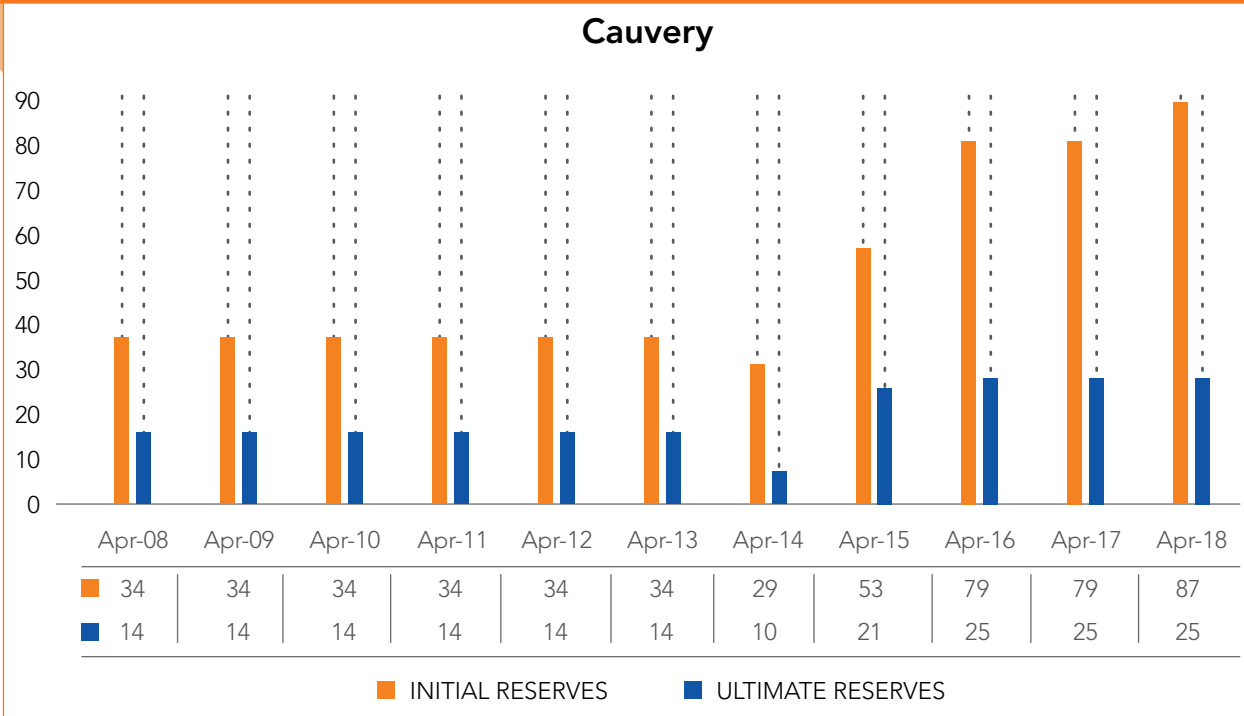


Fig 5.10: Reserves established in Godavari

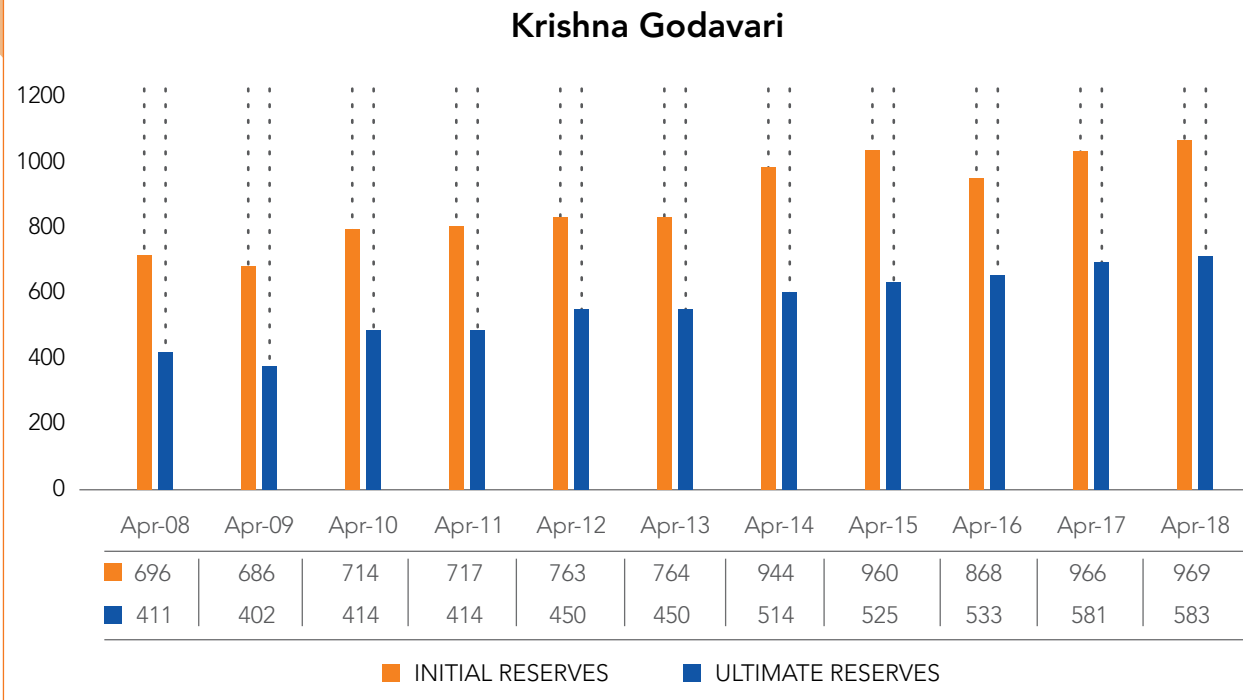


Fig 5.11: Reserves established in Rajasthan

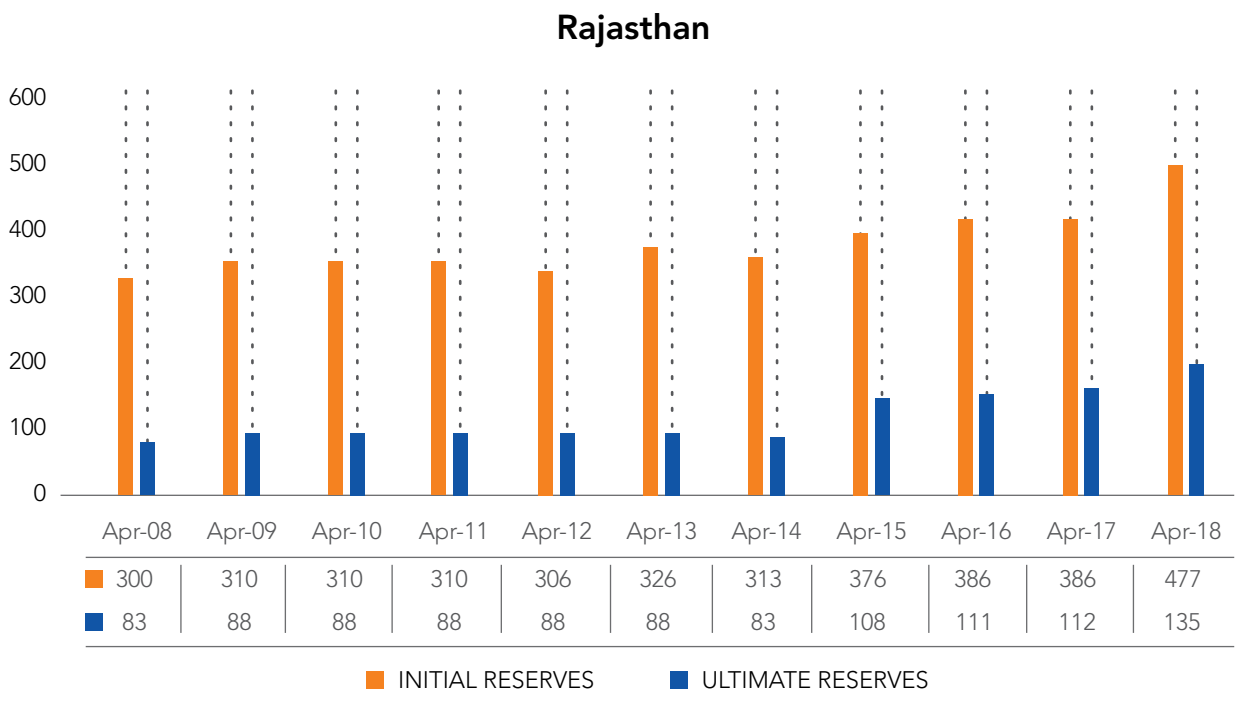


Fig 5.12: Reserves established in Saurashtra

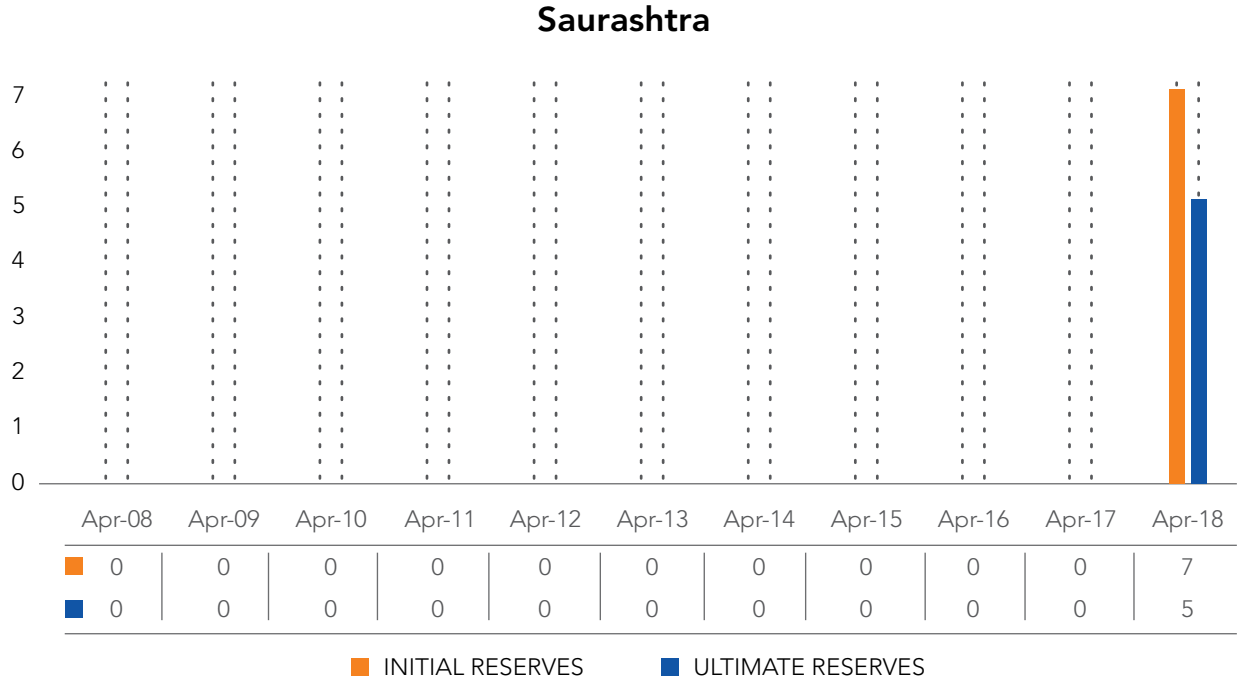


Table 5.8: Distribution of In-place volume and Ultimate reserves in various bidding rounds

Bidding Round	In-Place	Ultimate
NELP	1,069	604
Field	699	207
Pre-NELP	541	157
CBM	280	108
RSC-DSF-1	17	5

Fig 5.13: Bidding Round-wise In-place volume Distribution under PSC, RSC & CBM Regime *(As on 31.03.2018)*

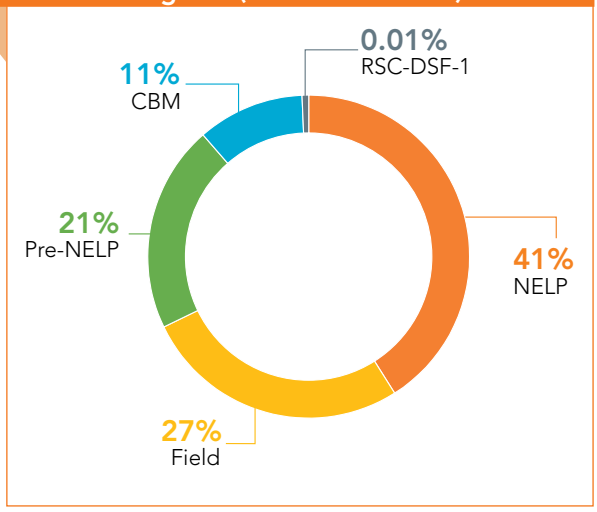


Fig 5.14: Bidding Round-wise Ultimate Reserves Distribution under PSC, RSC & CBM Regime *(As on 31.03.2018)*

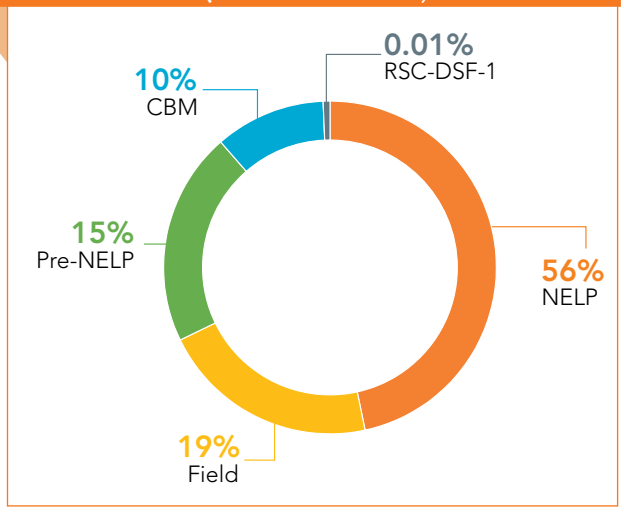


Table 5.9: Contribution to accretion of In-place and Ultimate reserves (FY 2017-18)

Blocks	Basin	In-place Accretion	Ultimate Accretion	Details
RJ-ON-90/1	Rajasthan	54.489	1.236	MC approved for Aishwarya RFDP Rev-2 (2018), ABH Hill FDP (2017), NI RFDP (2017), NE RFDP (2017), Guda FDP (2017).
RJ-ON/6	Rajasthan	36.923	21.496	MC approved RFDP of SGL dated 27.12.2017 and FDP of SSF-2 and SSG-1 dated 23.06.2017
CY-ONN-2004/2	Cauvery	7.922	0.343	MC approved FDP of PN#8 dated 13.07.2017
MB/OSDSF/ B80/2016	Mumbai	6.840	1.897	MC approved reserves of B80 dated 27.12.2017.
GS-OSN-2004/1	Saurashtra	6.650	5.200	MC approved DOC for GSS041NAA-2 dated 04.05.2017
CB-ONN-2005/9	Cambay	5.634	3.246	MC approved FDP of Jyoti#1 &2 dated 26.02.2018
AA/ONDSF/ DUARMARA/2016	Assam-Arakan	4.493	2.533	MC approved reserves of Duarmara dated 26.03.2018
AA/ONDSF/ CHARAIDEO/2016	Assam-Arakan	3.633	0.769	MC approved reserves of Charaideo dated 26.03.2018
KG-DWN-98/3	Krishna Godavari	2.519	-	MC approved D-29D-30 FDP (26.02.2018), D-55 FDP (31.01.2018).
CB/ONDSF/SOUTH PATAN/2016	Cambay	2.142	0.206	MC approved reserves of south Patan dated 27.03.2018
CB-ONN-2003/1	Cambay	1.001	0.471	MC approved as per the FDP of D-43, 46, 47, 48, 49, 50, 51 dated 05.12.2017
KARJISAN	Cambay	0.846	0.159	MC approved DOC of Karjisan Oil discovery dated 16.08.2017
BAOLA	Cambay	0.491	0.085	MC approved FDP of Baola dated 27.12.2017

5.4 Reserve Replacement Ratio (RRR)

The RRR (Reserve Replacement Ratio) is a metric to assess the operating performance of an oil and gas exploration and production company. It is the amount added to its reserves divided by the amount extracted. As discoveries are made and reserve estimates are revised every year it is a practice to calculate RRR over several years.

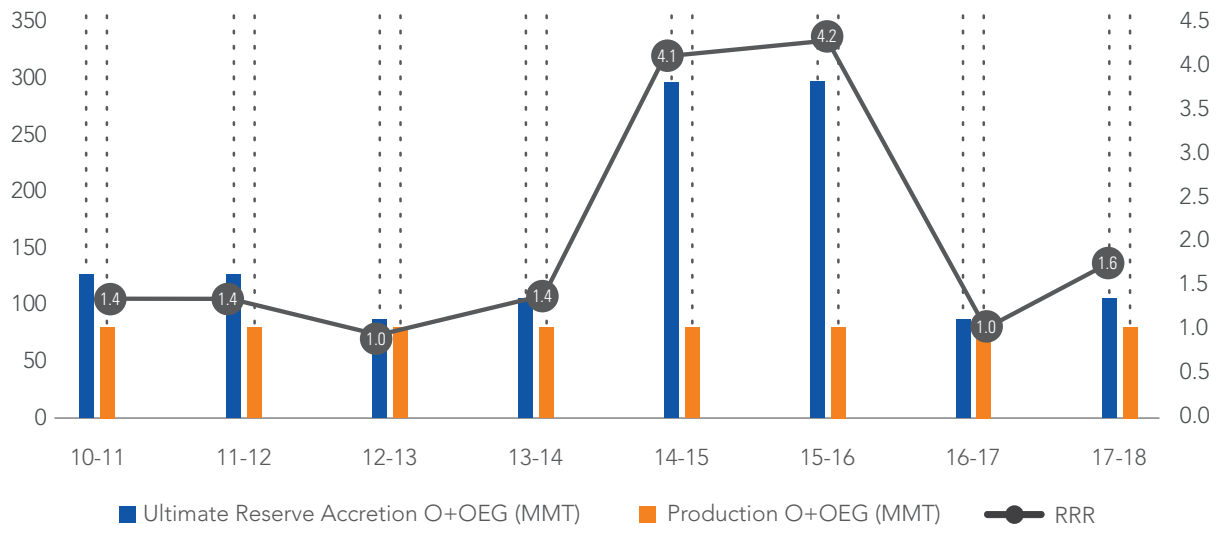
A reserve replacement ratio if greater than 1 indicates stable demand condition environments and suggest that reserves are added up along with simultaneous draining out of reserves through continued production.

The trend of Reserve Replacement Ratio (RRR) of overall country's producing fields under all the regimes during the period as on 01.04.2010 to 31.03.2018 is provided in table below:

Table 5.10: Trends in Reserve accretion, Production and RRR under all regimes

As on	Ultimate Reserve Accretion O+OEG (MMT)	Production O+OEG (MMT)	RRR
10-11	124.2	89.90	1.4
11-12	118.9	85.65	1.4
12-13	76.1	78.54	1.0
13-14	99.8	73.20	1.4
14-15	288.1	71.12	4.1
15-16	288.1	69.20	4.2
16-17	66.71	67.91	1.0
17-18	108.8	68.33	1.6

Fig 5.15: RRR O+OEG (MMT) of country 01.04.2011 to 31.03.2018



The trend of Reserve Replacement Ratio (RRR) of crude oil and natural gas under the PSC+CBM regime during the period as on 01.04.2008 to 31.03.2018 is provided in Table below:

Table 5.11: Trends in Reserve accretion, Production and RRR under PSC + CBM regime

As on	Reserve accretion			Production			RRR		
	OILCOND MMT	GAS BCM	O+OEG (MMT)	OILCOND MMT	GAS BCM	O+OEG (MMT)	Oil	Gas	O+OEG
Apr - 08	0.85	39.73	40.58	5.09	7.73	12.81	0.17	5.14	3.17
Apr - 09	5.76	-0.71	5.05	4.67	8.09	12.76	1.23	-0.09	0.40
Apr - 10	16.20	50.56	66.76	5.26	21.99	27.25	3.08	2.30	2.45
Apr - 11	0.57	39.83	40.40	9.68	26.77	36.46	0.06	1.49	1.11
Apr - 12	0.00	35.92	35.92	10.53	21.61	32.14	0.00	1.66	1.12
Apr - 13	1.71	3.24	4.96	11.64	14.49	26.13	0.15	0.22	0.19
Apr - 14	17.37	35.50	52.88	12.08	9.50	21.57	1.44	3.74	2.45
Apr - 15	0.80	51.71	52.51	11.82	8.92	20.74	0.07	5.80	2.53
Apr - 16	9.82	18.67	28.49	11.36	8.23	19.59	0.86	2.27	1.45
Apr - 17	2.70	49.62	52.32	10.53	6.87	17.40	0.26	7.22	3.01
Apr - 18	6.41	28.01	34.42	10.06	6.34	16.40	0.64	4.42	2.10

Fig 5.16: Reserve replacement ratio (RRR) of Oil, Gas and O+OEG 01-04-2008 to 01-04-2018 under PSC+CBM regime

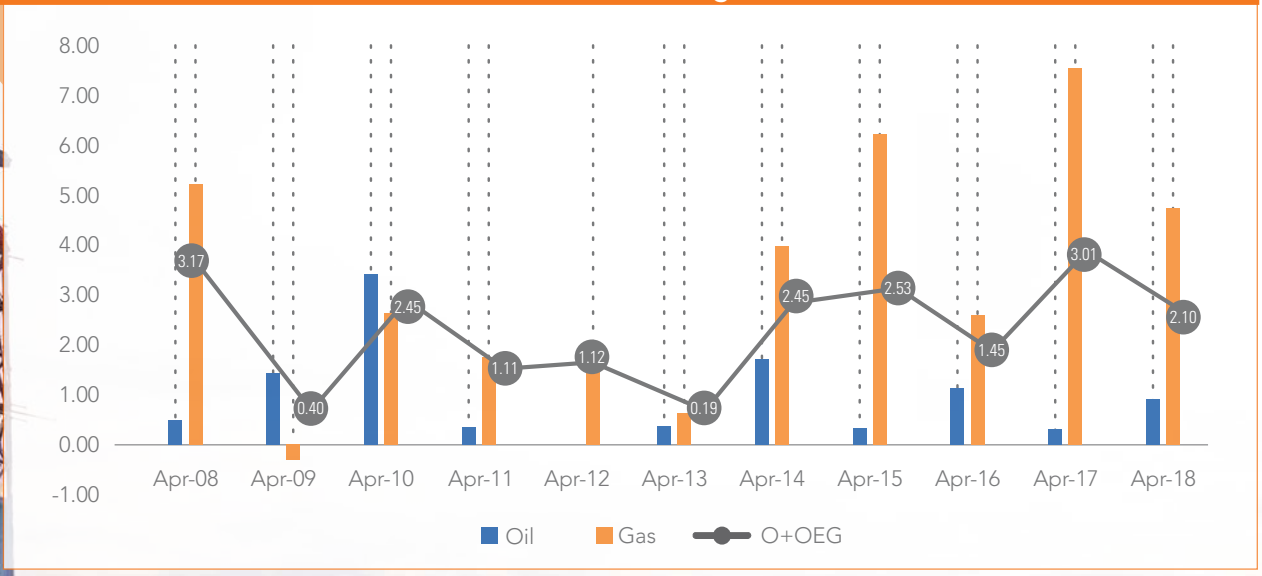


Fig 5.17: Reserve replacement ratio (RRR) of Oil 01-04-2008 to 01-04-2018 under PSC regime

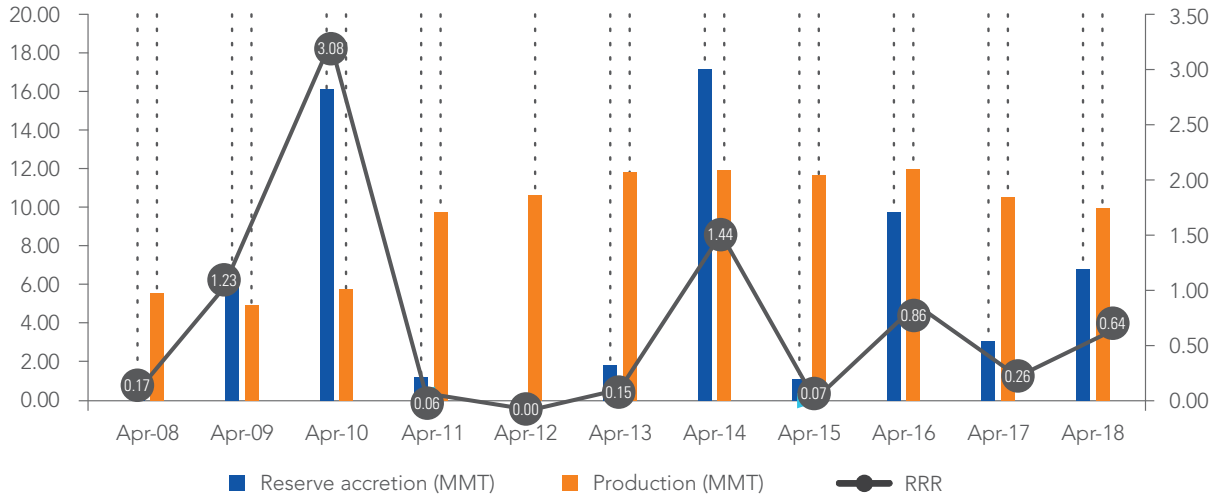
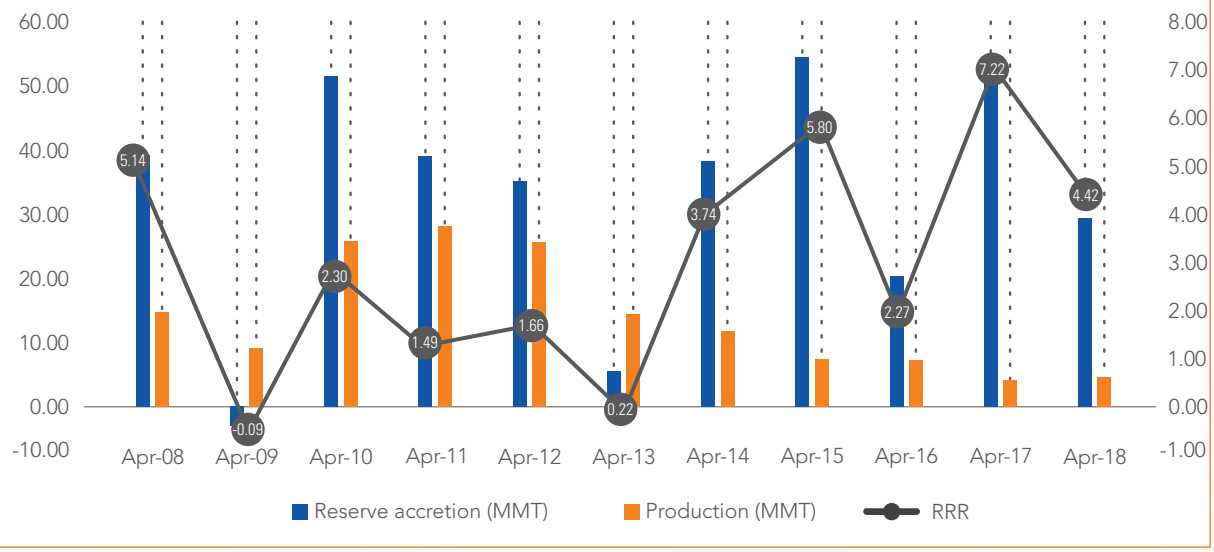
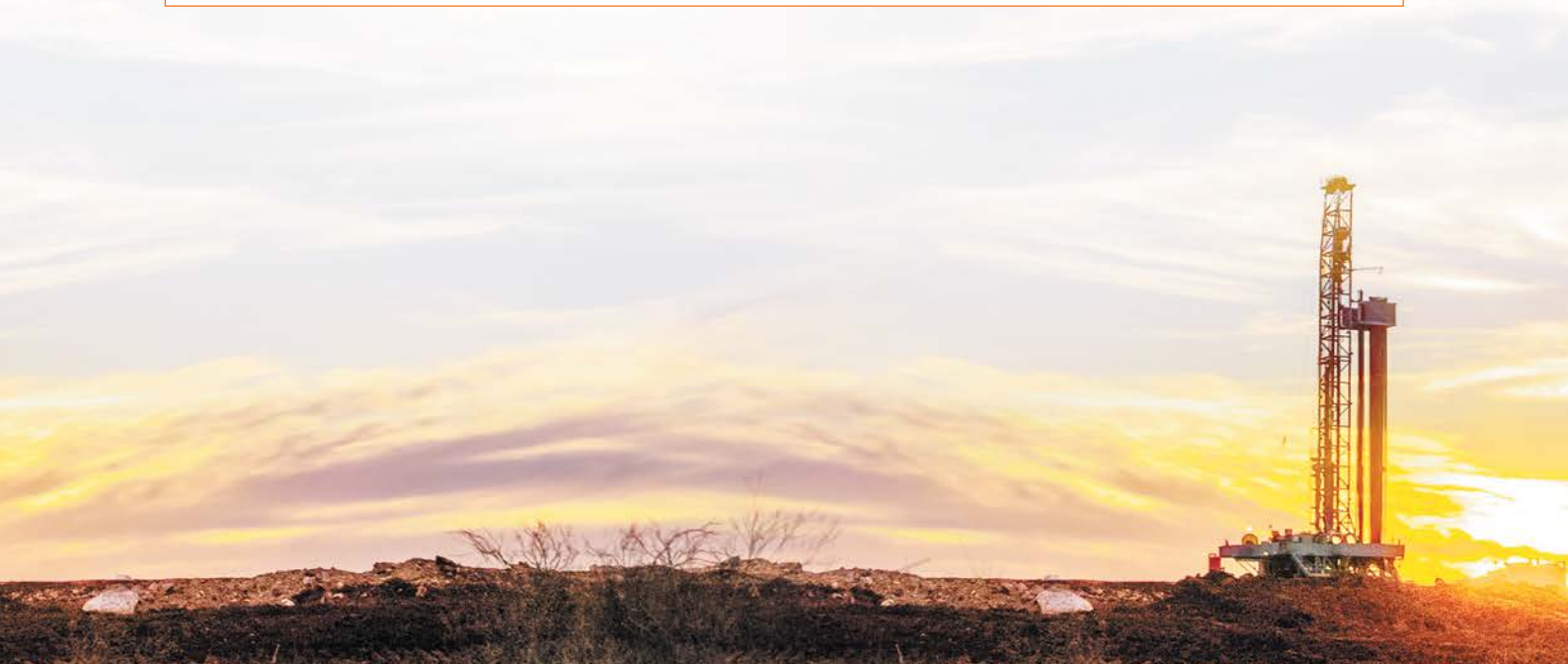


Fig 5.18: Reserve replacement ratio (RRR) of Gas 01-04-2008 to 01-04-2018 under PSC+CBM regime





25 YEARS OF DGH

CHAPTER 6

UNCONVENTIONAL HYDROCARBONS

Coal Bed Methane

Shale Gas/Oil

Gas Hydrates

CHAPTER 6

Unconventional Hydrocarbons

In order to increase hydrocarbon production & to exploit the full potential of unconventional hydrocarbon resources in India, policy framework for exploration and exploitation of unconventional hydrocarbons is prepared and is under final approval stage. The policy will ensure exploration and exploitation of Shale oil/gas, Coal Bed Methane (CBM) etc. under the existing Production Sharing Contracts (PSCs), CBM contracts and Nomination fields to encourage the contractors in the licensed/ leased area to unlock the potential of unconventional hydrocarbons in their existing acreages.

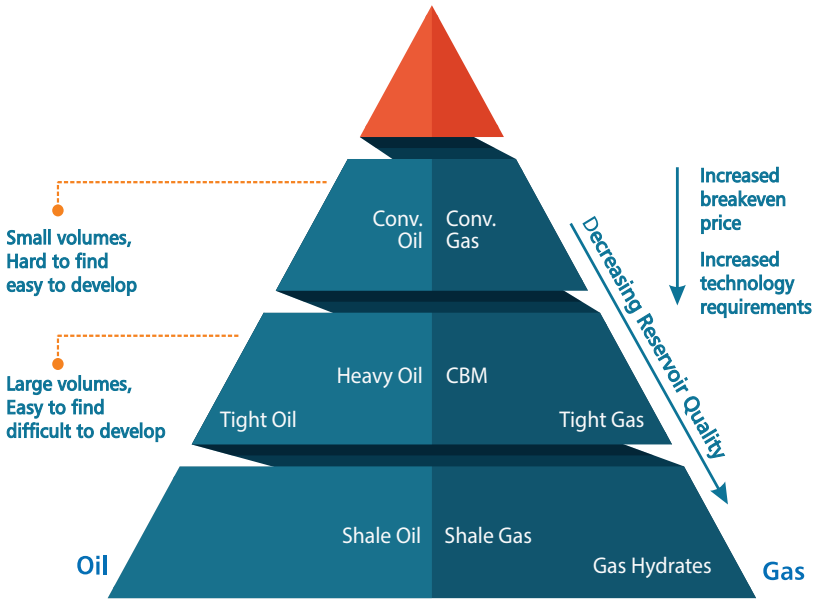
6.1 Coal Bed Methane (CBM)

Coal Bed Methane is an unconventional source of natural gas (Methane) generated during formation of coal and adsorbed in coal. India having fifth largest proven coal reserve, presents a significant opportunity of increasing the gas production keeping in line with the vision of reducing hydrocarbon import & making India gas economic. Despite having challenge of extracting natural gas from CBM reservoir due to low permeability, with the help of technology advancement, new CBM blocks are expected to commence commercial production in 2018-19. In order to exploit full potential of CBM in India, selected CBM blocks will be awarded in upcoming OALP bid rounds.

6.1.1 Coal Bed Methane (CBM) Production

Commercial production of CBM in India commenced from July 2007 from CBM Block Raniganj (South) operated by Great Easter Energy Corp. Ltd. (GEECL). Currently commercial production has commenced from 3 CBM blocks i.e. Raniganj (South) operated by Great Eastern Corporation Ltd (GEECL), Raniganj (East) operated by EOGEPL (Essar Oil & Gas Exploration & Production Limited) and Sohagpur (West) operated by RIL. In addition to this, incidental CBM gas being produced during testing of CBM wells in Jharia CBM block operated by ONGC and Sohagpur (East) operated by RIL.

Incidental CBM in Jharia is being sold to avoid wastage of gas



through flaring. Incidental CBM production from Sohagpur (East) is used for internal consumption only.

By the end of 2018-19 it is envisaged that 2 more blocks i.e. Jharia & North Karanpura will commence commercial CBM production.

As on March 2018, average daily CBM production is around 2.01 MMSCMD from 5 CBM blocks which includes test gas production from 2 CBM blocks and commercial production from 3 CBM block.

6.1.2 Coal Bed Methane Blocks

In order to harness CBM potential in the country, the Government of India formulated CBM Policy in 1997, wherein CBM being Natural Gas is explored and exploited under the provisions of Oil Fields (Regulation and Development) Act 1948 (ORD Act 1948) and Petroleum & Natural Gas Rules 1959 (P&NG Rules 1959) administered by Ministry of Petroleum & Natural Gas (MoP&NG). The CBM development in India gained momentum with the announcement of Coal Bed Methane (CBM) policy in 1997 which laid the foundation of commercial exploitation of CBM in India. As per the policy, Ministry of Petroleum & Natural Gas (MoP&NG) became the administrative Ministry and Directorate General of Hydrocarbons (DGH) was made the nodal agency for development of CBM in the country. To facilitate implementation of CBM policy, a MoU has been signed between Ministry of Petroleum and Natural Gas (MoP&NG) and Ministry of Coal (MOC).

The prognosticated CBM resources in the country are about 92 TCF (2600 BCM) in 12 states of India. CBM blocks were carved out by DGH in close interaction with Ministry of Coal (MoC) & Central Mine Planning and Design Institute (CMPDI), Ranchi.

In order to harness CBM (Coal Bed Methane) potential in the country, CBM blocks were offered through international competitive bidding for exploration and production of CBM in the country for the first time in May 2001.

Under the CBM policy, till date, four bidding rounds of CBM have been implemented by MOP&NG, resulting in award of 33 CBM blocks [including 2 blocks on Nomination and 1 block through Foreign Investment Promotion Board (FIPB) route] which covers 16,613 sq. km out of the total available coal bearing areas for CBM exploration of 26,000 sq. km. These CBM blocks are in the states of Andhra Pradesh, Assam, Chhattisgarh, Gujarat, Jharkhand, Madhya Pradesh, Maharashtra, Odisha, Rajasthan, Tamil Nadu and West Bengal. Currently 13 CBM blocks covering an area of 5269.5 sq. km are active.

While identifying the blocks for CBM development, such areas where coal mining was not envisaged for the next 15-20 years have been considered. To date, most CBM exploration and production activities in India is pursued by domestic Indian companies. The Gondwana sediments of eastern India host the bulk of India's coal reserves and all the current CBM producing blocks. The vast majority of the best prospective areas for CBM development are in eastern India, situated in Damodar Koel valley and Son valley. CBM projects exist in Raniganj South, Raniganj East and Raniganj North areas in the Raniganj coalfield, the Parbatpur block in Jharia coalfield and the East and west Bokaro coalfields. Son valley includes the Sonhat North and Sohagpur East and West blocks. Currently, commercial production has commenced from Raniganj South, Raniganj East and Sohagpur West CBM blocks operated by M/s. GEECL, Essar & RIL respectively.

CBM initial reserve & ultimate reserve has increased drastically since last 10 years. Taking 2008 as base year the initial reserve has increase by approximately 97% and ultimate reserve has increased by approximately 170%.

Fig 6.1: CBM

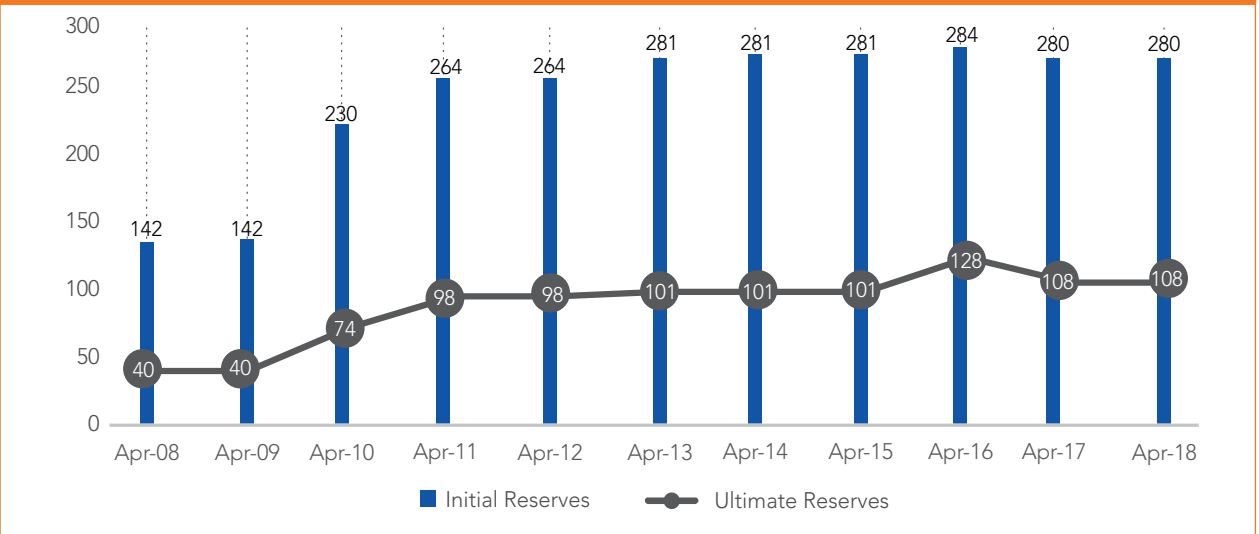


Table 6.1: State-wise distribution of CBM resources in India

Sl. No.	STATE	Prognosticated CBM Resource (in BCM)	Prognosticated CBM Resource (in TCF)	Established CBM Reserves (in TCF)
1	Jharkhand	722.08	25.5	1.916
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	3.65
7	West Bengal	218.04	7.7	4.33
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**	**9.9**

Table 6.2: In-Place CBM Reserve

Sl. No.	Block name	Consortium (PI)	Approx area (SQ.KM.)	GIIP (in TCF)	Recoverable Reserves (in TCF)
1	RG(E)-CBM-2001/1	**EOL** (100)	500	2.15	0.99
2	SP(W)-CBM-2001/1	**RIL** (100)	500	1.96	0.67
3	Raniganj South	**GEECL** (100)	210	1.92	1.34
4	SP(E)-CBM-2001/1	**RIL** (100)	495	1.68	0.59
5	BK-CBM-2001/1	**ONGC** (80) - IOC (20)	95	1.06	0.13
6	Jharia	**ONGC** (90) - CIL (10)	85	0.52	0.11
7	NK-CBM-2001/1	**ONGC** (55) - IOC (20) - **PEPL** (25)	340	0.34	0.05
8	Raniganj North	**ONGC** (74) - CIL (26)	350	0.26	0.07
Total			**2575**	**9.89**	**3.95**

*Operator marked in bold.

Table 6.4: Snapshot of CBM in India

CBM policy formulated in:	1997
MoU signed between MoP&NG & MoC	09.09.1997
Total CBM rounds conducted	4
No. of CBM Blocks awarded in 4 rounds	33
Coal bearing Area identified for CBM	26,000 Sq. Km.
Area covered under 33 blocks	16,613 Sq. Km. (64%)
CBM Resources in the 26,000 sq km area	2600 BCM (91.8TCF)
CBM Resources (from 33 Blocks)	1767.06 BCM (62.4 TCF)
Established CBM Reserves (GIP)	280.8 BCM (9.9 TCF)
Commercial Production commenced	July 2007
Total No. of Wells drilled	835
Investment made	Around US$ 1.9 Billion
Present Gas Production (March 2018)	2.46 MMSCMD from 4 CBM blocks
No. of CBM Blocks in Development/Production Phase	8
No. of CBM Blocks in Exploration phase	3
No. of CBM Blocks under relinquishment	17
No. of CBM Blocks Relinquished	4
No. of CBM Blocks Under Arbitration	1
Annual CBM Production in FY 2017-18	734.777 MMSCM

Table 6.5: Status of CBM Blocks

Sl. No.	Block	Coalfield	State	Contractor (PI%)	Date of signing contract	Present area (sq. km.)	Present Status
CBM BLOCKS OFFERED ON NOMINATION/FIPB ROUTE							
1	Raniganj (South)	Raniganj	West Bengal	**GEECL (100)**	31.05.2001	210	Production Phase
2	Raniganj (North)	Raniganj	West Bengal	**ONGC (74)**-CIL (26)	06.02.2003	311.8	Development
3	Jharia	Jharia	Jharkhand	**ONGC (90)**-CIL (10)	06.02.2003	65.1	Development
CBM ROUND-I							
4	RG(East)-CBM-2001/I	Raniganj	West Bengal	**EOL (100)**	26.07.2002	500	Production
5	SP(East)-CBM-2001/I	Sohagpur	Madhya Pradesh	**RIL (100)**	26.07.2002	495	Development
6	SP(West)-CBM-2001/I	Sohagpur	Madhya Pradesh	**RIL (100)**	26.07.2002	500	Production
7	BK-CBM-2001/I	Bokaro	Jharkhand	**ONGC (80)**-IOC (20)	26.07.2002	74.1	Development
8	NK-CBM-2001/I	North Karanpura	Jharkhand	**ONGC (55)**-IOC (20)-**PEPL** (25)	26.07.2002	271.5	Development
CBM ROUND-II							
9	SH(N)-CBM-2003/II	Sonhat	Chhattisgarh	**RIL** (100)	06.02.2004	825	Under Relinquishment
10	BS(1)-CBM-2003/II	Barmer Sanchor	Rajasthan	**RIL** (100)	06.02.2004	1,045	Under Relinquishment
11	BS(2)-CBM-2003/II	Barmer Sanchor	Rajasthan	**RIL** (100)	06.02.2004	1,020	Under Relinquishment

Sl. No.	Block	Coalfield	State	Contractor (PI%)	Date of signing contract	Present area (sq. km.)	Present Status
12	SK-CBM-2003/II	South Karanpura	Jharkhand	**ONGC** (100)	06.02.2004	70	Under Relinquishment
13	NK(W)-CBM-2003/II	North Karanpura	Jharkhand	**ONGC** (100)	06.02.2004	267	Under Relinquishment
14	ST-CBM-2003/II*	Satpura	Madhya Pradesh	**ONGC** (100)	06.02.2004	714	Relinquished
15	WD-CBM-2003/II*	Wardha	Maharash-tra	**ONGC** (100)	06.02.2004	503	Relinquished
16	BS(3)-CBM-2003/II*	Barmer Sanchor	Rajasthan	**ONGC** (70)-GSPC (30)	06.02.2004	790	Relinquished
				CBM ROUND-III			
17	SP(N)-CBM-2005/III	Sohagpur	Madhya Pradesh	**R-Infra** (55)-RNRL (45)	07.11.2006	609	Exploration
18	SR-CBM-2005/III	Singrauli	Madhya Pradesh	**DIL** (90)-Coal Gas Mart (10)	07.11.2006	330	Under Relinquishment
19	RM-CBM-2005/III	Rajmahal	Jharkhand	**Dart Energy** (35)-GAIL (35)-EIG (15)-TATA Power (15)	07.11.2006	469	Under Relinquishment
20	GV(N)-CBM-2005/III	Godavari	Telangana	Coal Gas (10)-**DIL** (40)-Adinath (50)	07.11.2006	386	Under Relinquishment
21	BB-CBM-2005/III	Birbhum	West Ben-gal	**British Petroleum** (100)	16.11.2006	248	Under Relinquishment
22	MR-CBM-2005/III	Mand Raigarh	Chhattis-garh	**Dart Energy** (35)-GAIL (35)-EIG (15)-TATA Power (15)	07.11.2006	634	Under Relinquishment
23	TR-CBM-2005/III	Tatapani Ramkola	Chhattis-garh	**Dart Energy** (35)-GAIL (35)-EIG (15)-TATA Power (15)	07.11.2006	458	Under Relinquishment
24	BS(4)-CBM-2005/III	Barmer Sanchor	Rajasthan	REL (45)-RNRL (45)-**Geopetrol** (10)	07.11.2006	1168	Under Relinquishment
25	BS(5)-CBM-2005/III	Barmer Sanchor	Rajasthan	REL (45)-RNRL (45)-**Geopetrol** (10)	07.11.2006	739	Under Relinquishment
26	KG(E)-CBM-2005/III	Ko-thagudem	Andhra Pradesh	REL (45) – RNRL(45) - **Geopetrol** (10)	07.11.2006	750	Under Relinquishment
				CBM ROUND-IV			
27	AS-CBM-2008/IV	Assam	Assam	**Dart Energy** (10)-OIL (90)	29.07.2010	113	Under Relinquishment
28	MG-CBM-2008/IV	Mannar-gudi	Tamil Nadu	**GEECL** (100)	29.07.2010	667	Under Arbitration
29	RM(E)-CBM-2008/IV	Rajmahal	Jharkhand	**EOL** (100)	29.07.2010	1128	Exploration
30	TL-CBM-2008/IV	Talcher	Odisha	**EOL** (100)	29.07.2010	557	Under Relinquishment
31	IB-CBM-2008/IV	Ib Valley	Odisha	**EOL** (100)	29.07.2010	209	Under Relinquishment
32	SP(NE)-CBM-2008/IV	Sohagpur	Madhya Pradesh & Chhattis-garh	**EOL** (100)	29.07.2010	339	Exploration
33	ST-CBM-2008/IV	Satpura	Madhya Pradesh	**Dart Energy** (80)-Tata Power (20)	29.07.2010	714	Relinquished

Operator has been marked Bold

*Exit option exercised by Contractor & approved by GoI

6.2 Shale Gas & Oil

Shale gas and Oil exploration policy was announced on 14th October, 2013 by the Govt. of India for National oil companies to explore and exploit shale oil and gas resources in nomination areas. As per policy guidelines ONGC and OIL were supposed to carry out exploration in their PML and ML area in three phases.

As per policy guidelines, ONGC and OIL India Ltd have to carry out Shale Gas and Oil exploration in 50 and 06 blocks respectively for assessment under Phase-I. Phase-I of Shale gas assessment studies commenced in October, 2013 and ended in April, 2017. Additional six months time was given to NOCs on account of delay in identifying shale gas blocks. ONGC identified 50 blocks in 4 basins viz. Assam, KG, Cauvery & Cambay basin in Phase-I. OIL identified 6 blocks in 2 basins viz. Jaisalmer and Assam basins In Phase-I.

At the end of phase-I in April, 2017, ONGC has drilled 22 wells in 18 blocks in four basins against the target of 57 wells. Out of which 5 are exclusive shale gas wells. OIL drilled 1 well in 1 block against the target of 8 wells.

After the end of Phase-I ONGC drilled one well in KG basin and OIL has drilled 2 wells in Assam Basin. OIL has drilled one more well in Assam basin in the Dibrugarh Extn. PML adjacent to the Dibrugarh PML block for which OIL doesn't have prior permission.

6.2.1 OIL's Activities

Oil India Limited (OIL) was granted permission for Shale Gas/Oil exploration in six (06) nominated blocks viz. Dibrugarh PML, Chabua PML, Dum duma PML of Assam, Jaisalmer PML of Rajasthan, and Jairampur Extn, PEL of Arunachal Pradesh with an effective time period of 3 years and validity up-to 08.04.2017 for five (05) blocks and Deomali PEL of Arunachal Pradesh validity up-to 05.10.2018 under Phase-I.

Activities carried out in each block during the year 2017-18 are as follows:

1. **Jaisalmer PML, Rajasthan:**

   Evaluation of the conventional core recovered from well DND-28 within Baisakhi-Bedesir Shale Formation completed. Evaluation results indicates poor shale prospectivity within Baisakhi-Bedeshir Formation. Core evaluation report of the well has been submitted to DGH.

2. **Dibrugarh PML block, Assam:**

   One pilot hole/well i.e.Sologuri-02 (Loc. DIBK) with TD of 4037 m MD in Dibrugarh Extn. PML adjacent to the Dibrugarh PML block boundary has been completed. About 111.5 m of conventional core was acquired from Kopili Formation (93.3 m) and Lakadong +Therria (18.2 m) target shale section. Core preservation, log based Cluster analysis, Canister desorption, Crushed gas analysis, SGR, CT scan, Grain density, TOC, Rock Eval, Adsorption isotherm, Geomechanical study has been completed. Evaluation of shale prospectivity based on the study results are in progress.

3. **Dumduma PML block, Assam:**

   One pilot holei.e. South Tinali-05 (Loc. DHS)with TD of 3665 m MD has been completed. About 81.84 m of conventional core was acquired within Barail Coal Shale sequence.

4. **Chabua PML block, Assam:**

   One pilot holei. eMatimekhana-05 (Loc. CAC) with TD of 3660 m MD has been completed within Kopili target shale section. About 110.12 m of conventional core was acquired from Kopili target shale section.

5. **Jairampur Extn. PEL and Deomali PEL, Arunachal Pradesh:**

   OIL has identified two locations i.eLoc. JRB in Jairampur Extn. PEL and DML-2 in Deomali PEL for acquiring extensive amount of conventional core against the target shale of Upper Tikak Partbat and Disang shales respectively for Shale Gas/Oil analysis. However, these two locations are still awaiting for Environmental Clearance.

Highlights of Activities of COD-Shale Exploration, ONGC during 2017-18

Environmental Clearance (EC) for shale exploratory drilling:

EC for KG and Cambay basin was received from MOEF&CC in June 2017 and March 2018 respectively.

Drilling:

KG Basin: Exclusive Shale well WGSGA in West Godavari Block, to test Bottom Transgressive Unit (BTU, lower part of HG-HR shales) spudded on 27.01.2018 and drilled down to 2925m. Two cores of 9m each have been taken in Raghavapuram shale.

Hydraulic fracturing:

Gandhar-708 (GNSGA): Hydraulic Fracturing in one of the identified zones (Obj.II: 3725-3781m, Perf. Int. 3744-3756m) was carried out on 24th July by M/S Schlumberger. During HF, 64 MT of proppant was successfully placed by pumping 250 m3 of frac fluid (cross linked gel).

GN-712 (GNSGB): Hydraulic Fracturing in one of the identified zones (Obj.I: 3740-3776m, Perf. Int. 3753-3763m) was carried out on 17th November 2017 by M/S Schlumberger. During HF, 100.5 MT of proppant was successfully placed by pumping 376 m3 of frac fluid (cross linked gel).

6.3 Gas Hydrate activities in India

Gas Hydrates can be an unconventional future energy source world over. World over the production of gas from gas hydrates are at R&D stage. USA, Japan, Russia, China, Germany and Korea are deeply involved in developing a technology to exploit these proved Gas hydrates reserves.

In India, Gas hydrate research and exploratory activities are being steered by the Ministry of Petroleum & Natural Gas under National Gas Hydrate Program (NGHP). The presence of Gas Hydrate is established in Krishna Godavari, Mahanadi, Gulf of Mannar and Andaman Basin.

NGHP-Expedition-01 exploration program carried out in 2006 for mapping gas hydrates zones in Krishna-Godavari, Kerala Konkan, Mahanadi and Andaman offshore. Total 39 holes at 21 sites were drilled and established the physical Presence of gas hydrate in Krishna Godavari, Mahanadi and Andaman Basin in clay dominated complex geologic settings.

NGHP-Expedition-02 was approved in 15th Steering Committee meeting and ONGC was mandated to execute NGHP-02 by hiring suitable vessel and integrated services. NGHP-02 commenced on 3rd March 2015 and has been completed on 28th July 2015. Total 42 wells drilled at 25 sites in Krishna Godavari and Mahanadi area in sand reservoirs for gas hydrates. LWD was completed in 25 wells in 4 areas A, B C & E. Coring, wire line logging was carried out in 17 wells in areas 'B' 'C' & 'E'.

NGHP-02 has discovered gas-hydrate-bearing sand reservoir system in the Krishna Godavari B, C and E area. Area A, which is in the Mahanadi deep water basin, has several sand zones devoid of gas hydrates.

An Advisory Committee of International experts in the field of Gas Hydrates exploration and development from USA and Japan was constituted by Director General, DGH to assess and firm up an appropriate way forward strategy for next NGHP-Expedition. Two meeting of Advisory Committee of international experts with Indian NGHP scientists have been convened.

Advisory committee opined that India may migrate from exploration to production testing phase. Technology for production of gas from gas hydrate is not yet matured and is at R & D stage world over. It was emphasized to build a strong technical capacity for sustained project support by way of providing staffing requirements and continued development of domestic R&D capabilities through domestic and international partnerships for India. Various studies are being planned to be taken up by national & international organizations for next NGHP-Expedition.

The pressure cores collected during NGHP-Exp.-02 were analysed at AIST, Japan. AIST study reveals that the Hydrocarbons released from the hydrate-bearing sediment samples recovered from the NGHP-02 drilling sites contain methane with high concentration (>99.9%). The parameters calculated by AIST study were used for the reservoir characterization and production simulation studies by USDOE/USGS. A production modelling study (by USDOE/USGS) for the areas 'A' and 'B' in eastern coast of India completed and has envisaged a production potential from the Gas Hydrate discovered in KG basin of India.

6.3.1 Research Projects Under NGHP:

Two NGHP R & D projects under direct funding by OIDB were approved in 15th steering committee and Ist installment of funds to the executing organizations has been released.

The first NGHP R & D project of KDMIPE, ONGC with IIT-Kanpur entitled "Modeling and Simulation of Methane Extraction from Gas Hydrates via Simultaneous Depressurization and CO2 injection", was taken up with aim to design of a simulator with all dynamic variables and estimate methane release per unit time.

The second project of NGRI entitled, "Carbon dioxide & Methane Hydrate phase stability in sandy and clay environment: Laboratory studies" approved under NGHP funding was formulated to carry out the CO2 phase stability experiments using synthetic sand & clay particles and to find out the rate of methane yield due to depressurization

6.3.2 NGHP-Expedition-03

The Expedition-03 aims at carrying out pilot production testing will be carried out after a thorough study of the data collected, planning and designing a suitable production testing method, understanding of environmental impacts of attempting a pilot production testing. Japan and China has taken a lead in this direction and recently carried out pilot production testing. Though the methane gas production rate from Gas Hydrates were low in both countries results but has proved the exploitation process.

Various activities for next NGHP expedition may be summarized as:

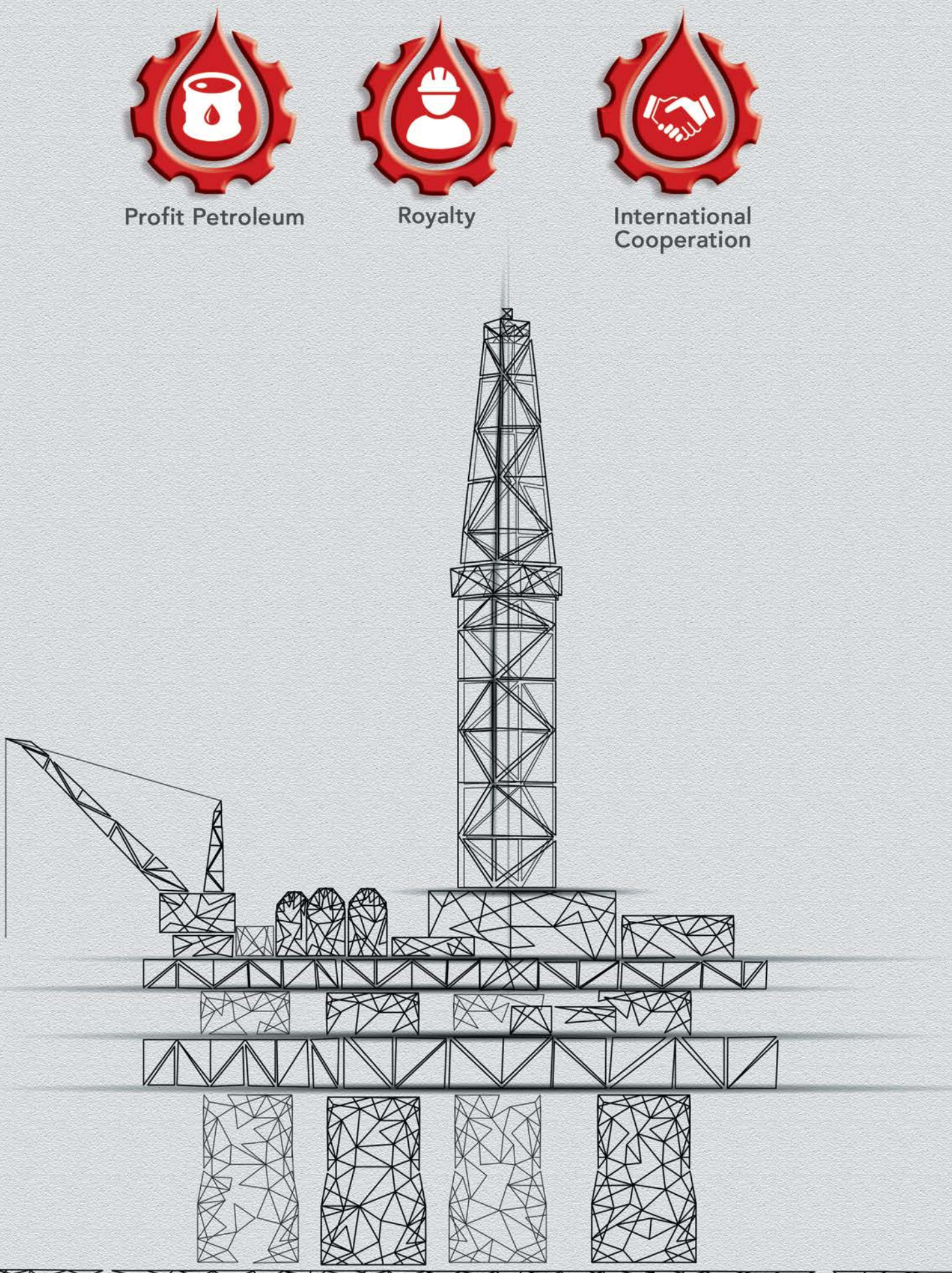
Active efforts required to get involved Indian scientists in international expeditions of Gas Hydrate with US/Japan scientific organizations.

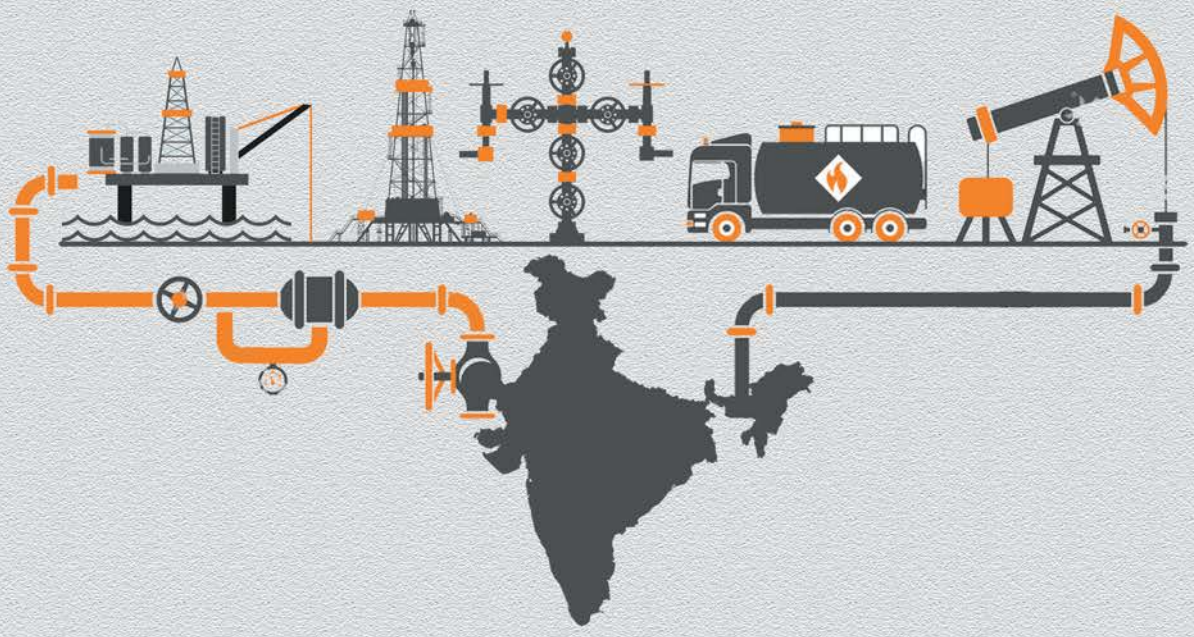
Identify the organization/agency involved in production testing of Gas Hydrates for technology transfer.

Focus on NGHP activities as collaborative projects with national and international organizations.

The NGHP expeditions will promote research of gas hydrates in India for capacity building and gain experience from collaborative associations to mitigate anticipated challenges.

Chikyu Drillship used in NGHP II Expedition


Profit Petroleum
Royalty
International Cooperation



CHAPTER 7

SUPPLEMENTARY INFORMATION

CHAPTER 7

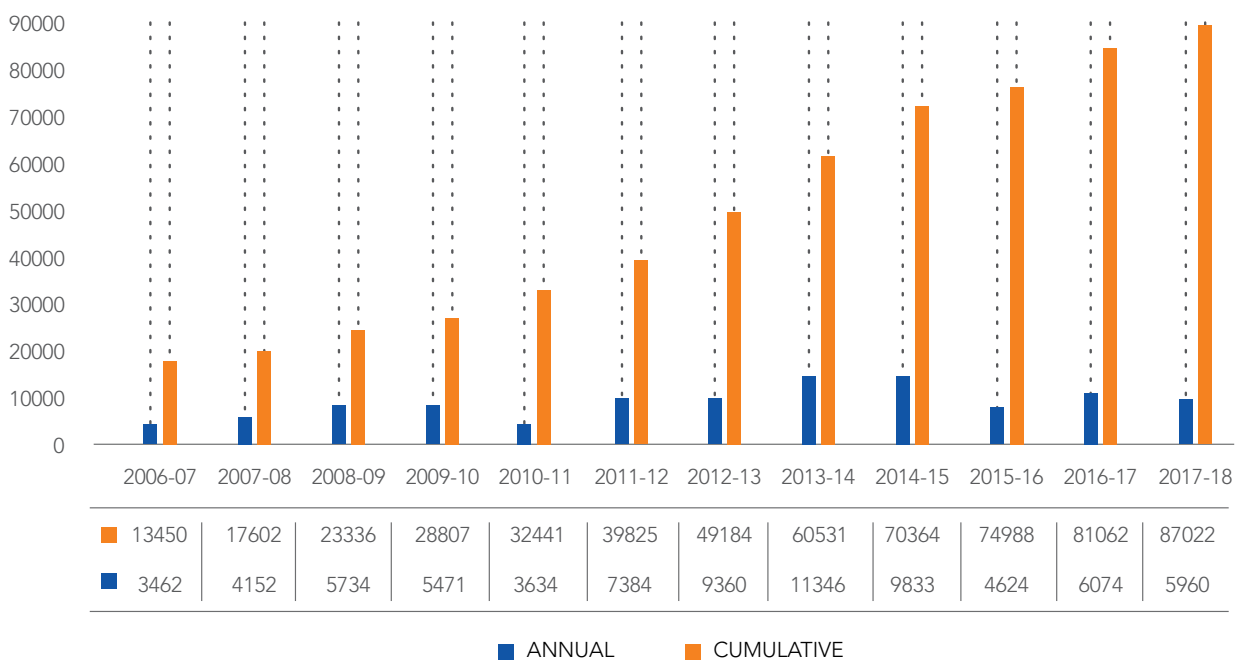
Supplementary Information

7.1 Contribution to Government Exchequer

7.1.1 Profit Petroleum

During the Financial Year 2017-18, Profit Petroleum of Rs. 5,960 Crores was contributed to Government Exchequer from the E&P operations under PSC regime. The cumulative profit petroleum earned up to 31st March 2018 was of the order of Rs. 87,022 Crores.

Fig 7.1: Year-wise earned Profit Petroleum

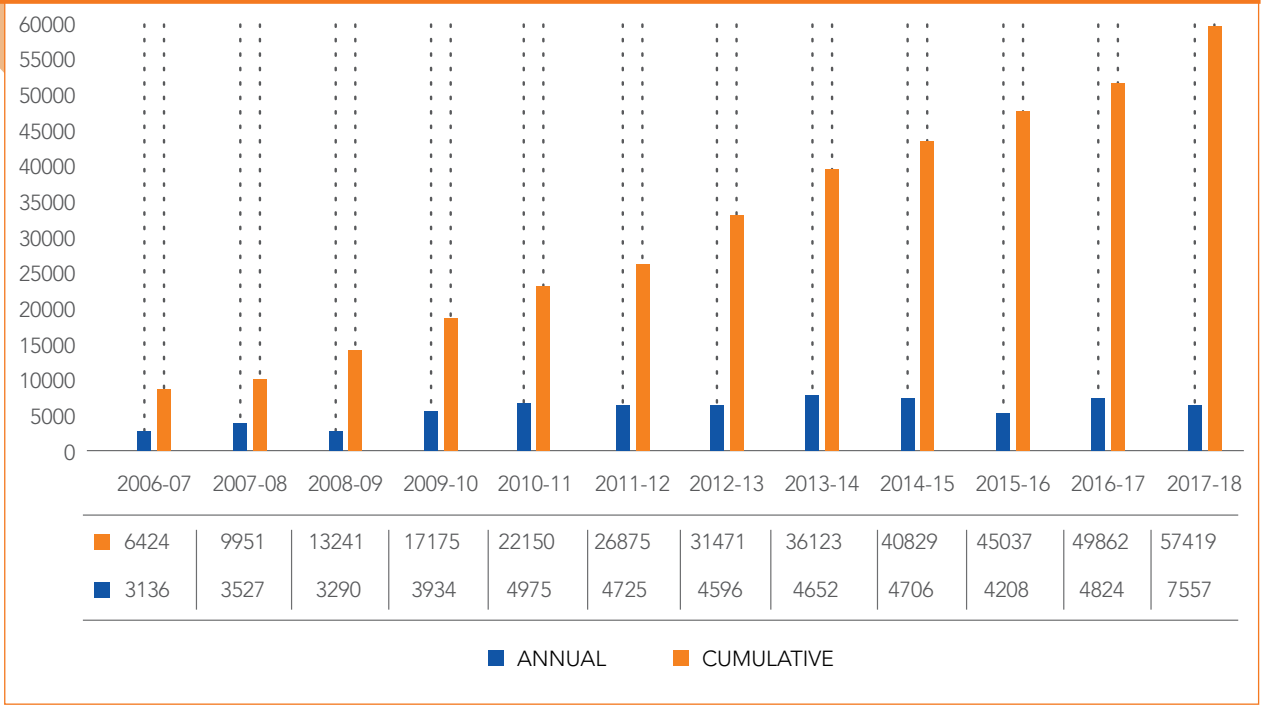


Back to Content Page

7.1.2 Royalty

During the Financial Year 2017-18, The Total Royalty received by central Exchequer was of the order of Rs. 7,557 Crores which was significantly higher than (over 50% increase) previous year. The cumulative Royalty contributing to central exchequer till 31st March 2018 amounted to be Rs. 57,419 Crores.

Fig 7.2: Year-wise Royalty Data



7.2 Memorandum of Understanding

Status of active MoUs signed between MOP&NG/DGH & National and International Organisations in the area of upstream E&P sector is provided below.

Table 7.1 "Status of active MOUs signed between MOPNG/DGH & National and International Organisations in the area of upstream E&P sector

No.	MoU signed between	Agency, Country	MoU signed on	Valid upto	Objectives
1	Japan Oil, Gas Metals National Corporation(JOGMEC) & DGH	JOGMEC, Japan	16th February 2007	15th February 2019	Exchanges of technical knowledge and information, workshops, meetings on Gas Hydrates Research and Development.
2	U.S. Geological Survey (USGS) of the Department of Interior of the United States of America & DGH	USGS, USA	16th December 2008	Open ended	Resource exploration hazards and environmental issues associated with Gas Hydrates, Field studies & research for Gas hydrate
3	Department of Energy of United States of America & MOPNG India	USDOE, USA	renewed on 6th June 2016	5th June 2021	Enhance & Accelerate Gas Hydrate exploration
4	Department of State (DOS), USA & MOPNG GOI	DOS, USA	6th November 2010	Open ended	Exchange of knowledge and expertise in the areas concerning Shale Gas resource characterization and assesment in India
5	Indian Space Research Organisation, India & MOPNG GOI	ISRO, India	1st June 2017	Open ended	To explore and identify potential opportunities of applications of space technologies and earth observation data sets inactivities related to exploration and production of conventional and unconventional petroleum and/or natural gas in India and in other regions. Mainly for ONGC projects

7.3 RTI Annual Return Information FY 2017-18

Table 7.2. RTI for FY 2017-18

Ministry/ Department/Organisation	Quarter	Opening balance of Requests (as on start of Quarter)	No. of Requests Received during Quarter	Total no. of Requests (Column 3+4)	No. of Requests Transferred to other PAs	Decisions where Applications for Information rejected	Number of cases where disciplinary action taken against any officer in respect of administration of RTI Act
Directorate General of Hydrocarbons	Ist Quarter (Apr17-June17)	2	61	63	11	7 (11.47%)	0
	2nd Quarter (July 17-Sept17)	82	26	108	6	5 (19.23%)	0
	3rd Quarter (Oct17-Dec17)	23	16	39	5	0 (0%)	0
	4th Quarter (Jan 18 - Mar 18)	10	6	16	2	0 (0%)	0

RAIVA B

EXIT
EXIT

CHAPTER 8

APPENDICES

Bidding rounds

Acreages

PEL/PML

CHAPTER 8

Appendices

8.1 Blocks and Fields Offered under PSC and RSC regime

Table 8.1: EXPLORATION BLOCKS AWARDED UNDER PRE-NELP

No.	BASIN	BLOCK NAME	CONSORTIUM (Participating Interest %)	DATE OF SIGNING CONTRACT	AWARDED AREA	RELINQ, AREA	PRESENT AREA
					(in sq.km)		
CURRENT ACTIVE BLOCKS (10 BLOCKS)							
ONLAND							
1	RJ	RJ-ON-90/1	CIL (35), CEHL (35) & ONGC (30)	15-05-1995	11,108	7,996.73	3,111.27
2		RJ-ON/6	FEL(10),ISIL(65)&NOCL(25)	30-06-1998	5,378	3,203	2,175
3	CB	CB-ON/7	HOEC(50)&GSPCL(50)	12-04-2000	492	484.36	7.64
4		CB-ON/2	GSPC(80), GGR(20)	12-04-2000	1,618	408	1,210
5		CB-ON/3	ESSAR OIL LTD.(100)	16-07-1998	574	560.27	13.73
6	GK	GK-ON/4	FEL(100)	30-06-1998	1,550	775	775
7	AA	AAP-ON-94/1	HOEC(26.882), OIL(44.086)&IOC(29.032)	30-06-1998	870	760	110
8		AA-ONJ/2	ONGC(100)	07-11-2003	1,595	318	1,277
SUB TOTAL					**23,185**	**14,505.36**	**86,79.64**
SHALLOW WATER							
9	CB	CB-OS/2	CIL (40), ONGC (50) & TPL (10)	-	3,315	3,110	205
10	CY	CY-OS-0/1(PY3)	HARDY(18), ONGC(40), TPL(21) &HOEC(21)	30-12-1994	81	0	81
SUB TOTAL					**3,315**	**3,110**	**286**
SUB TOTAL ACTIVE BLOCKS					**26,500**	**17,615.36**	**8,965.64**
RELINQUISHED BLOCKS/PROPOSED FOR RELINQUISHMENT (18 BLOCKS)							
11	AA	AA-ON/3	OKLAND(100)	-	3,000	3,000	0
12		AA-ON/7#	ACL(35)#	19-02-1999	1,934	1,615	319
13	CB	CB-OS/1	ONGC (55.26), HOEC(38.04) &TPL(6.7)	19-11-1996	3,290	3,230	60
14	CR	CR-ON-90/1	PONEI(29),EOL(16),IOC(35)&OIL(20)	30-06-1998	2,570	2,570	0
15	RJ	RJ-ON-90/5	EOL(75)&POGC(25)	-	16,030	16,030	0
16		RJ-ON-90/4	EOL(75)&POGC(25)	-	16,600	16,600	0
17	GK	GK-ON-90/2	OKLAND(100)	-	11,820	11,820	0
18		GK-OS/5*	RIL(40),TIOL(50) & OKLAND(10)	16-07-1998	5,000	5,000	0
19		GK-OSJ/1	RIL (50),TIOL (25) & ONGC (25)	-	1,275	1,275	0
20	KG	KG-ON/1	RIL(40)&TOIL(60)	-	4,180	4,180	0
21		KG-OS/6	CAIRN(50)&VPL(50)	30-06-1988	8,775	8,775	0
22		KG-OS-90/1	HARDY(30), HOEC (30), NIKO (30), NAGA FERTI (10)	-	3,720	3,720	0

No	BASIN	BLOCK NAME	CONSORTIUM (Participating Interest %)	DATE OF SIGNING CONTRACT	AWARDED AREA	RELINQ, AREA	PRESENT AREA
					(in sq.km)		
23	MB	BB-OS/5	ESSAR(79)&PETROM SA(21)	-	9,095	9,095	0
24	CY	CY-OS/2##	HARDY(75)&GAIL(25)	19-11-1996	5,010	5,010	0
25	GS	SR-OS-94/1	RIL(100)	12-04-2000	9,150	9,150	0
26	PG	GN-ON-90/3	HOEC(75)&MIL(25)	29-03-1993	29,200	29,200	0
27		CB-ON/1**	RIL(40),TOIL(50) & OOHL(10)	16-07-1998	6,133	6,133	0
28	GK	GK-OSJ/3*	RIL(60),ONGC(25)&OIL(15)	06-09-2001	5,725	5,725	0
SUB TOTAL RELINQUISHED/PFR BLOCKS					**1,42,507**	**14,2128**	**379**
TOTAL AREA					**1,69,007**	**1,59,743.36**	**9,344.64**

AA	Assam Arakan	GV	Ganga Valley	SR	South Rewa
AN	Andaman Nicobar	HF	Himalayan Foreland	WB	Bengal
PG	Pranhita Godavari	KG	Krishna Godavari	VN	Vindhyan
CB	Cambay	CY	Cauvery	DS	Deccan Syneclise
RJ	Rajasthan	MB	Mumbai	PR	Palar
GK	Gujarat Kutch	MN	Mahanadi - NEC	PA	Purnea
GS	Gujarat Saurashtra	KK	Kerala Konkan	MZ	Mizoram

NOTE:
#Execution of new PSC after resolution of Nagaland issue. CRL's operatorship has been terminated by GOI. ACL has requested to transfer the 65% PI of CRL to him.
##Arbitral award pronounced in favour of HEPI. Govt. challenged the arbitral award against the HEPI.
*PROPOSED FOR RELINQUISHMENT
**PSC TERMINATED BY MOP&NG

Table 8.2: FIELDS AWARDED UNDER PRE-NELP SMALL & MEDIUM DISCOVERED FIELD ROUNDS

No.	BASIN	BLOCK NAME	CONSORTIUM (Participating Interest %)	DATE OF SIGNING CONTRACT	AWARDED AREA	RELINQ, AREA	PRESENT AREA
					(in sq.km)		
CURRENT ACTIVE BLOCKS (25 BLOCKS)							
ONLAND							
1	AA	AMGURI	ACL (40%) (Op.), CRL. * (60%)	23-02-2001	52.75	0	52.75
2		KHARSANG	GEO-ENPRO(10%) (Op.), OIL (40%), JEKPL (25%), GPI (25%)	16-06-1995	10	0	10
3	CB	ALLORA	GNRL (30%) (Op.), GSPCL (70%)	23-02-2001	6.85	0	6.85
4		ASJOL	HOEC (50%) (Op.), GSPCL (50%)	03-02-1995	15	0	15
5		BAKROL	SELAN (100%) (Op.)	13-03-1995	36	0	36
6		BAOLA	SUN PETROCHEMICAL (100%) (Op.)	05-04-1995	4	0	4
7		BHANDUT	OILEX (40%) (Op.), GSPCL (60%)	23-09-1994	6	0	6
8		CAMBAY	OILEX (30%) (Op.), GSPCL (55%), OILEX-NL (15%)	23-09-1994	161	0	161
9		DHOLASAN	GNRL (30%) (Op.), GSPCL (70%)	23-02-2001	8.8	0	8.8
10		DHOLKA	JTI (100%) (Op.)	20-02-1995	48	0	48
11		HAZIRA	NIKO (33.33%) (Op.), GSPCL (66.67%)	23-09-1994	50	0	50
12		INDRORA	SELAN (100%) (Op.)	13-03-1995	130	0	130
13		KANAWARA	GNRL (30%) (Op.), GSPCL (70%)	23-02-2001	6.3	0	6.3
14		KARJISAN	SELAN (100%) (Op.)	16-02-2004	5	0	5
15		LOHAR	SELAN (100%) (Op.)	13-03-1995	5	0	5
16		MODHERA	SUN PETROCHEMICAL (100%) (Op.)	23-02-2001	12.7	0	12.7
17		N. KATHANA	GNRL (30%) (Op.), GSPCL (70%)	23-02-2001	12.2	0	12.2
18		N.BALOL	HOEC (25%) (Op.), GSPCL (45%), GNRL (30%)	23-02-2001	27.3	0	27.3
19		OGNAJ	SELAN (100%) (Op.)	16-02-2004	13.65	0	13.65
20		UNAWA	GSPCL (70%) (Op.), GNRL (30%)	23-02-2001	5.65	0	5.65
21		WAVEL	JTI (100%) (Op.)	20-02-1995	9	0	9
SUB TOTAL					**625.2**	**0**	**625.2**

No.	BASIN	BLOCK NAME	CONSORTIUM (Participating Interest %)	DATE OF SIGNING CONTRACT	AWARDED AREA	RELINQ, AREA	PRESENT AREA
					(in sq.km)		
SHALLOW WATER							
22	CY	PY-1	HOEC (100%) (Op.)	06-10-1995	75	0	75
23	KG	RAVVA	CEIL (22.5%) (Op.), ONGC (40%), RAVVA (12.5%), VIDEOCON (25%)	28-10-1994	331.26	0	331.26
24	MB	MID& SOUTH TAPTI	BGEPL (30%) (Op.), RIL (30%)(Op.), ONGC (40%)(Op.)	22-12-1994	1,471	0	1,471
25		PANNA-MUKTA	BGEPL (30%) (Op.), RIL (30%)(Op.), ONGC (40%)(Op.)	22-12-1994	1,207	0	1,207
SUB TOTAL					**3,084.26**	**0**	**3,084.26**
SUB TOTAL ACTIVE BLOCKS					**3,709.46**	**0**	**3,709.46**
RELINQUISHED BLOCKS/PROPOSED FOR RELINQUISHMENT (3 BLOCKS)							
26	CB	MATAR	NIKO (65%) (Op.), GSPCL (35%)	23-09-1994	6.2	6.2	0
27		SABARMATI	OILEX (40%) (Op.), GSPCL (60%)	23-09-1994	5.8	5.8	0
28		SANGANPUR	HRDC (50%) (Op.), PRIZE (50%)	23-02-2001	4.4	0	4.4
SUB TOTAL RELINQUISHED/PFR BLOCKS					**12**	**12**	**0**
TOTAL AREA					**3721.46**	**12**	**3709.46**

*PROPOSED FOR RELINQUISHMENT

Table 8.3: EXPLORATION BLOCKS AWARDED UNDER FIRST ROUND OF NELP (NELP-I)

No.	BASIN	BLOCK NAME	CONSORTIUM (Participating Interest %)	DATE OF SIGNING CONTRACT	AWARDED AREA	RELINQ, AREA	PRESENT AREA
					(in sq.km)		
CURRENT ACTIVE BLOCKS (3 BLOCKS)							
ONLAND							
1	KG	KG-DWN-98/2	ONGC (100)	12-04-2000	9,757	2,462	7,295
2		KG-DWN-98/3	RIL(60), BPEAL (30) & NIKO (10)	12-04-2000	7,645	6,198.88	1,446.12
SUB TOTAL					**17,402**	**8,660.88**	**8,741.12**
SHALLOW WATER							
3	MN	NEC-OSN-97/2	RIL (60), BPEAL (30) & NIKO (10)	12-04-2000	14,535	10,406.11	4,128.89
SUB TOTAL					**14,535**	**10,406.11**	**4,128.89**
SUB TOTAL ACTIVE BLOCKS					**31,937**	**19,066.99**	**12,870.01**
RELINQUISHED BLOCKS/PROPOSED FOR RELINQUISHMENT (21 BLOCKS)							
4	MN	NEC-OSN-97/1	GAZPROM (100)	03-10-2000	10,425	10,425	0
5		MN-OSN-97/3*	ONGC (85) & GAIL (15)	12-04-2000	5,420	5,420	0
6		MN-WN-98/3*	ONGC (100)	12-04-2000	10,005	10,005	0
7		MN-WN-98/2*	RIL (100)	12-04-2000	9,605	9,605	0
8	KG	KG-DWN-98/4	ONGC (85) & OIL (15)	12-04-2000	9,940	9,940	0
9		KG-OSN-97/4	RIL (100)	12-04-2000	4,020	4,020	0
10		KG-OSN-97/3	RIL (100)	12-04-2000	2,460	2,460	0
11		KG-OSN-97/2	RIL (100)	12-04-2000	4,790	4,790	0
12		KG-OSN-97/1	ONGC (100)	12-04-2000	4,485	4,485	0
13	CY	CY-OSN-97/1	Mosbacher (20) & HOEC (80)	08-01-2001	4,940	4,940	0
14		CY-OSN-97/2	OIL (100)	12-04-2000	5,215	5,215	0
15	KK	KK-OSN-97/2	RIL (100)	12-04-2000	19,450	19,450	0
16		KK-OSN-97/3	ONGC (100)	12-04-2000	15,910	15,910	0

* PROPOSED FOR RELINQUISHMENT

No.	BASIN	BLOCK NAME	CONSORTIUM (Participating Interest %)	DATE OF SIGNING CONTRACT	AWARDED AREA	RELINQ, AREA	PRESENT AREA
					(in sq.km)		
17	MB	MB-OSN-97/2	RIL(100)	12-04-2000	5,270	5,270	0
18		MB-OSN-97/3	RIL(100)	12-04-2000	5,740	5,740	0
19		MB-OSN-97/4	ONGC(70) &IOC(30)	12-04-2000	18,870	18,870	0
20	SR	SR-OSN-97/1	RIL(100)	12-04-2000	5,040	5,040	0
21	GK	GK-OSN-97/1	RIL(100)	12-04-2000	1,465	1,465	0
22	GV	GV-ONN-97/1	ONGC(40),IOC(30),CEIL(15)& CEEPC(15)	12-04-2000	36,750	36,750	0
23	KG	KG-DWN-98/1	RIL(70) & BPEAL(30)	12-04-2000	10,810	10,810	0
24		KG-DWN-98/5	ONGC(85) & OIL(15)	12-04-2000	8,980	8,980	0
SUB TOTAL RELINQUISHED/PFR BLOCKS					**1,99,590**	**1,99,590**	**0**
TOTAL AREA					**2,31,527**	**2,18,656.99**	**12,870.01**

Table 8.4: EXPLORATION BLOCKS AWARDED UNDER SECOND ROUND OF NELP (NELP-II)

No.	BASIN	BLOCK NAME	CONSORTIUM (Participating Interest %)	DATE OF SIGNING CONTRACT	AWARDED AREA	RELINQ, AREA	PRESENT AREA
					(in sq.km)		
CURRENT ACTIVE BLOCKS (3 BLOCKS)							
SHALLOW WATER							
1	GS	GS-OSN-2000/1	RIL (90), HEPI (10)	17-07-2001	**8,841**	**8,241**	**600**
SUB TOTAL					**8,841**	**8,241**	**600**
ONLAND							
2	CB	CB-ONN-2000/1	GSPC (50), GAIL (50)	17-07-2001	1,424	983.29	440.71
3		CB-ONN-2000/2	NIKO (100)	17-07-2001	419	394.75	24.25
SUB TOTAL					**1,843**	**1,378.04**	**464.96**
SUB TOTAL ACTIVE BLOCKS					**10,684**	**9,619.04**	**1,064.96**
RELINQUISHED BLOCKS/PROPOSED FOR RELINQUISHMENT (20 BLOCKS)							
4	KK	KK-DWN-2000/1	RIL (100)	17-07-2001	18,113	18,113	0
5		KK-DWN-2000/2	ONGC (85), GAIL (15)	17-07-2001	20,998	20,998	0
6		KK-DWN-2000/3	RIL (100)	17-07-2001	14,889	14,889	0
7		KK-DWN-2000/4	ONGC (100)	17-07-2001	26,149	26,149	0
8		KK-OSN-2000/1	ONGC (100)	17-07-2001	16,125	16,125	0
9	CY	CY-OSN-2000/1	ONGC (100)	17-07-2001	5,920	5,920	0
10		CY-OSN-2000/2	ONGC (100)	17-07-2001	3,530	3,530	0
11	GS	GS-DWN-2000/1	ONGC (100)	17-07-2001	13,937	13,937	0
12		GS-DWN-2000/2	ONGC (85), GAIL (15)	17-07-2001	14,825	14,825	0
13	MB	MB-DWN-2000/1	ONGC (85), IOC (15)	17-07-2001	11,239	11,239	0
14		MB-DWN-2000/2	ONGC (50), GAIL (15) IOC (15), OIL (10), GSPC (10)	17-07-2001	19,106	19,106	0
15		MB-OSN-2000/1	ONGC (75), IOC (15), GSPC (10)	17-07-2001	18,414	18,414	0
16	MN	MN-OSN-2000/1*	ONGC (100)	17-07-2001	6,730	6,730	0
17		MN-OSN-2000/2*	ONGC (40), GAIL (20), IOC (20), OIL (20)	17-07-2001	8,330	8,330	0
18		MN-ONN-2000/1	ONGC (20), GAIL (20), IOC (20), OIL(25), SUNTERA (15)	17-07-2001	7,900	7,900	0
19	WB	WB-OSN-2000/1	ONGC (85), IOC (15)	17-07-2001	6,700	6,700	0
20		WB-ONN-2000/1	ONGC (85), IOC (15)	17-07-2001	12,505	12,505	0
21	GV	GV-ONN-2000/1	ONGC (85), IOC (15)	17-07-2001	23,500	23,500	0
22	RJ	RJ-ONN-2000/1	OIL (60), SUNTERA (40)	17-07-2001	2,535	2,535	0
23	AA	AS-ONN-2000/1	RIL (90), HARDY (10)	17-07-2001	5,754	5,754	0
SUB TOTAL RELINQUISHED/PFR BLOCKS					**2,57,199**	**2,57,199**	**0**
TOTAL AREA:					**2,67,883**	**2,66,818.04**	**1,064.96**

* PROPOSED FOR RELINQUISHMENT

Table 8.5: EXPLORATION BLOCKS AWARDED UNDER THIRD ROUND OF NELP (NELP-III)

No.	BASIN	BLOCK NAME	CONSORTIUM (Participating Interest %)	DATE OF SIGNING CONTRACT	AWARDED AREA	RELINQ, AREA	PRESENT AREA
					(in sq.km)		
CURRENT ACTIVE BLOCKS (4 BLOCKS)							
SHALLOW WATER							
1	KG	KG-OSN-2001/3	GSPC (80), GGR(10), & JOGPL(10)	04-02-2003	1,870.5	1,340	530.5
SUB TOTAL					1,870.5	1,340	530.5
ONLAND							
2	AA	AA-ONN-2001/1	ONGC (100)	04-02-2003	3,010	2,050	960
3		AA-ONN-2001/2	ONGC (80) & IOC (20)	04-02-2003	5,340	2,680	2,660
4	CB	CB-ONN-2001/1	ONGC (100)	04-02-2003	215	189	26
SUB TOTAL					8,565	4,919	3,646
SUB TOTAL ACTIVE BLOCKS					10,435.5	6,259	4,176.5
RELINQUISHED BLOCKS/PROPOSED FOR RELINQUISHMENT (19 BLOCKS)							
5	KK	KK-DWN-2001/3	ONGC (100)	04-02-2003	21,775	21,775	0
6		KK-DWN-2001/2	RIL (70), BPEAL (30)	04-02-2003	31,515	31,515	0
7		KK-DWN-2001/1	RIL (70), BPEAL (30)	04-02-2003	27,315	27,315	0
8		KK-OSN-2001/2*	ONGC (100)	04-02-2003	14,120	14,120	0
9		KK-OSN-2001/3*	ONGC (100)	04-02-2003	8,595	8,595	0
10	CY	CY-DWN-2001/1	ONGC (80), OIL (20)	04-02-2003	12,425	12,425	0
11		CY-DWN-2001/2*	RIL (70), BPEAL (30)	04-02-2003	14,325	14,325	0
12		CY-PR-DWN-2001/3	RIL (70), BPEAL (30)	04-02-2003	8,600	8,600	0
13		CY-PR-DWN-2001/4	RIL (70), BPEAL (30)	04-02-2003	10,590	10,590	0
14	KG	KG-DWN-2001/1	RIL (60), BPEAL (30) & HEPI (10)	04-02-2003	11,605	11,605	0
15		KG-OSN-2001/1	RIL (100)	04-02-2003	1,100	1,100	0
16		KG-OSN-2001/2	RIL (100)	04-02-2003	210	210	0
17	GS	GS-OSN-2001/1	ONGC (100)	04-02-2003	9,468	9,468	0
18	RJ	RJ-ONN-2001/1	ONGC (30), OIL(40) & SUNTERA(30)	04-02-2003	3,425	3,425	0
19	PG	PG-ONN-2001/1	ONGC (100)	04-02-2003	6,920	6,920	0
20	HF	HF-ONN-2001/1	ONGC (100)	04-02-2003	3,175	3,175	0
21	PR	PR-DWN-2001/1	RIL (70), BPEAL (30)	04-02-2003	8,255	8,255	0
22	AA	AA-ONN-2001/3	ONGC (85) & OIL (15)	04-02-2003	110	110	0
23		AA-ONN-2001/4	ONGC (100)	04-02-2003	645	645	0
SUB TOTAL RELINQUISHED/PFR BLOCKS					1,94,173	1,94,173	0
TOTAL AREA:					2,04,608.5	2,00,432	4,176.5

* PROPOSED FOR RELINQUISHMENT

Table 8.6: EXPLORATION BLOCKS AWARDED UNDER FOURTH ROUND OF NELP (NELP-IV)

No.	BASIN	BLOCK NAME	CONSORTIUM (Participating Interest %)	DATE OF SIGNING CONTRACT	AWARDED AREA	RELINQ, AREA	PRESENT AREA
					(in sq.km)		
CURRENT ACTIVE BLOCKS (4 BLOCKS)							
ONLAND							
1	AA	AA-ONN-2002/1	JOGPL (20) & GAIL (80)	06-02-2004	1,680	420	1260
2	CB	CB-ONN-2002/1	ONGC (100)	06-02-2004	135	118	17
3		CB-ONN-2002/3	GSPC(55), JEPL (20), PPCL (15) & GGR(10)	06-02-2004	285	263.71	21.29
4	CY	CY-ONN-2002/2	ONGC (60) & BPRL (40)	06-02-2004	280	140	140
SUB TOTAL ACTIVE BLOCKS					2,380	941.71	1,438.29
RELINQUISHED BLOCKS/PROPOSED FOR RELINQUISHMENT (16 BLOCKS)							
5	GV	GV-ONN-2002/1	CIL(50) & CESL(50)	06-02-2004	15,550	15,550	0
6	GS	GS-DWN-2002/1	ONGC(100)	06-02-2004	21,450	21,450	0
7	RJ	RJ-ONN-2002/1	OIL(60) & ONGC(40)	06-02-2004	9,900	9,900	0
8	KK	KK-DWN-2002/2*	ONGC(80) & HPCL(20)	06-02-2004	22,810	22,810	0
9		KK-DWN-2002/3	ONGC(80) & HPCL(20)	06-02-2004	20,910	20,910	0

No.	BASIN	BLOCK NAME	CONSORTIUM (Participating Interest %)	DATE OF SIGNING CONTRACT	AWARDED AREA	RELINQ. AREA	PRESENT AREA
					(in sq.km)		
10	MN	MN-DWN-2002/1	ONGC(36), ENI(34), OIL(20) & BPCL(10)	06-02-2004	9,980	9,980	0
11		MN-DWN-2002/2	ONGC(100)	06-02-2004	11,390	11,390	0
12		NEC-DWN-2002/1	RIL(100)	06-02-2004	25,565	25,565	0
13		NEC-DWN-2002/2*	ONGC (100)	06-02-2004	15,465	15,465	0
14	AN	AN-DWN-2002/2*	ONGC(100)	06-02-2004	12,495	12,495	0
15	AN	AN-DWN-2002/1	ONGC(100)	06-02-2004	10,990	10,990	0
16	KG	KG-DWN-2002/1*	ONGC(70), OIL(20) & BPCL(10)	06-02-2004	10,600	10,600	0
17	CB	CB-ONN-2002/2	JOGPL(30), GSPC(60) & GGR(10)	06-02-2004	125	125	0
18	CY	CY-ONN-2002/1	JOGPL(30), GAIL(50) & GSPC(20)	06-02-2004	680	680	0
19	AA	AA-ONN-2002/4	ONGC (90) & OIL (10)	06-02-2004	1,060	1,060	0
20		AA-ONN-2002/3*	OIL(30) & ONGC (70)	06-02-2004	1,460	1,460	0
SUB TOTAL RELINQUISHED/PFR BLOCKS					**1,90,430**	**1,90,430**	**0**
TOTAL AREA:					**1,92,810**	**1,91,371.71**	**1,438.29**

* PROPOSED FOR RELINQUISHMENT

Table 8.7: EXPLORATION BLOCKS AWARDED UNDER FIFTH ROUND OF NELP (NELP-V)

No.	BASIN	BLOCK NAME	CONSORTIUM (Participating Interest %)	DATE OF SIGNING CONTRACT	AWARDED AREA	RELINQ. AREA	PRESENT AREA
					(in sq.km)		
CURRENT ACTIVE BLOCKS (5 BLOCKS)							
SHALLOW WATER							
1	CB	CB-OSN-2003/1	ONGC(100)	23-09-2005	2,394	1,892.0	502.0
SUB TOTAL					**2,394**	**1,892**	**502.0**
ONLAND							
2	RJ	RJ-ONN-2003/2	FEL(10), BIL(40) & XOIL(50)	23-09-2005	13,195	11,796.16	1,398.84
3	CB	CB-ONN-2003/1	RIL (70) & BPEAL (30)	23-09-2005	635	159.60	475.40
4		CB-ONN-2003/2	GSPC(50), GAIL(20), JSPL(20) & GGR(10)	23-09-2005	448	276	172
5	KG	KG-ONN-2003/1	CIL(49) & ONGC(51)	23-09-2005	1,697	1382	315
SUB TOTAL					**15,975**	**13,614**	**2,361**
SUB TOTAL ACTIVE BLOCKS					**18,369**	**15,506**	**2,863**
RELINQUISHED BLOCKS/PROPOSED FOR RELINQUISHMENT (15 BLOCKS)							
6	CY	CY-ONN-2003/1	NIKO(100)	23-09-2005	957	957	0
7	KK	KK-DWN-2003/1	RIL(100)	23-09-2005	18,245	18,245	0
8		KK-DWN-2003/2	RIL(100)	23-09-2005	12,285	12,285	0
9	GS	GS-OSN-2003/1	ONGC(51) & CE7L(49)	23-09-2005	5,970	5,970	0
10	AA	AA-ONN-2003/2	GPI(30), NTPC(40), CRL(15) & Brownstone (15)	23-09-2005	295	295	0
11		AA-ONN-2003/3	OIL(85) & HPCL(15)	23-09-2005	275	275	0
12		AA-ONN-2003/1	JOGPL(10), JSPL(35), GSPC(20) & GAIL(35)	16-12-2005	81	81	0
13	GV	GV-ONN-2003/1	CEIL(24), CE1L(25) & ONGC(51)	23-09-2005	7,210	7,210	0
14	RJ	RJ-ONN-2003/1	ENI(34),ONGC(36) & CIL(30)	23-09-2005	1,335	1,335	0
15	DS	DS-ONN-2003/1	GGR(100)	23-09-2005	3,155	3,155	0
16	MN	MN-DWN-2003/1*	RIL(55), NIKO(15) & BPEAL(30)	23-09-2005	17,050	17,050	0
17	AN	AN-DWN-2003/1*	ONGC(100)	23-09-2005	9,970	9,970	0
18		AN-DWN-2003/2	ENI (40), ONGC(45) & GAIL(15)	23-09-2005	13,110	13,110	0
19	VN	VN-ONN-2003/1	ONGC(100)	23-09-2005	3,585	3,585	0
20	KG	KG-DWN-2003/1	RIL(60), BPEAL(30) & HEPI(10)	23-09-2005	3,288	3,288	0
SUB TOTAL RELINQUISHED/PFR BLOCKS					**96,811**	**96,811**	**0**
TOTAL AREA:					**1,15,180**	**1,12,317**	**2,863.2**

* PROPOSED FOR RELINQUISHMENT

Table 8.8: EXPLORATION BLOCKS AWARDED UNDER SIXTH ROUND OF NELP (NELP-VI)

No.	BASIN	BLOCK NAME	CONSORTIUM (Participating Interest %)	DATE OF SIGNING CONTRACT	AWARDED AREA	RELINQ, AREA	PRESENT AREA
					(in sq.km)		
CURRENT ACTIVE BLOCKS (10 BLOCKS)							
SHALLOW WATER							
1	GS	GS-OSN-2004/1	ONGC (100)	02-03-2007	6,589	6,037	552
2	CB	CB-OSN-2004/1	FEL(10) & NEWBURY (90)	02-03-2007	2,616	0	2,616
3	KG	KG-OSN-2004/1	ONGC (100)	02-03-2007	1,131	0	1131
SUB TOTAL					**10,336**	**60,37**	**4,299**
ONLAND							
4	MZ	MZ-ONN-2004/1	OIL(85) & SHIV-VANI(15)	02-03-2007	3,213	0	3,213
5	RJ	RJ-ONN-2004/2	OIL (75) & GEOGLOBAL (25)	02-03-2007	2,196	2,185.76	10.24
6	CB	CB-ONN-2004/1	ONGC(50), GSPC(40) & HERAMEC (10)	02-03-2007	32	22.27	9.73
7		CB-ONN-2004/2	ONGC(55), GSPC(45)	02-03-2007	423	140.51	282.49
8		CB-ONN-2004/3	ONGC(65), GSPC(35)	02-03-2007	113	102.22	10.78
9	KG	KG-ONN-2004/1	OIL(90) & GEOGLOBAL(10)	02-03-2007	549	195.54	353.46
10	CY	CY-ONN-2004/2	ONGC (80) & BRPL(20)	02-03-2007	375	0	375
SUB TOTAL					**6,901**	**2,646**	**4,255**
SUB TOTAL ACTIVE BLOCKS					**17,237**	**8,683**	**8,554**
RELINQUISHED BLOCKS/PROPOSED FOR RELINQUISHMENT (42 BLOCKS)							
11	KK	KK-DWN-2004/1	ONGC(45), CIL(40) & TATA(15)	02-03-2007	12,324	12,324	0
12	KG	KG-DWN-2004/1	ONGC(70), GSPC(10), HPCL(10) & GAIL(10)	02-03-2007	11,951	11,951	0
13		KG-DWN-2004/2	ONGC(60), GSPC(10), HPCL(10), GAIL(10)& BPRL(10)	02-03-2007	11,851	11,851	0
14		KG-DWN-2004/3	ONGC(70), GSPC(10), HPCL(10) & GAIL(10)	02-03-2007	6,205	6,205	0
15		KG-DWN-2004/4	RIL(70) & BPEAL (30)	02-03-2007	11,904	11,904	0
16		KG-DWN-2004/5	ONGC(50), GSPC(10), HPCL(10), GAIL(10), OIL(10) & BPCL(10)	02-03-2007	11,922	11,922	0
17		KG-DWN-2004/6	ONGC(60), GSPC(10), HPCL(10), GAIL(10) & OIL (10)	02-03-2007	10,907	10,907	0
18		KG-ONN-2004/2*	GSPC (40), GAIL (40) & PETROGAS (20)	02-03-2007	1,140	1,140	0
19		KG-DWN-2004/7	RIL (70) & BPEAL (30)	02-03-2007	11,856	11,856	0
20	MN	MN-DWN-2004/1*	RIL (70) & BPEAL (30)	02-03-2007	9,885	9,885	0
21		MN-DWN-2004/2*	RIL (70) & BPEAL (30)	02-03-2007	11,813	11,813	0
22		MN-DWN-2004/3*	RIL (70) & BPEAL (30)	02-03-2007	11,316	11,316	0
23		MN-DWN-2004/4*	RIL (70) & BPEAL (30)	02-03-2007	8,822	8,822	0
24		NEC-DWN-2004/1*	SANTOS (100)	02-03-2007	7,790	7,790	0
25		NEC-DWN-2004/2*	SANTOS (100)	02-03-2007	8,706	8,706	0
26		MN-DWN-2004/5	RIL (70) & BPEAL (30)	02-03-2007	10,454	10,454	0
27	RJ	RJ-ONN-2004/3	OIL(60), GEOGLOBAL(25) & HPCL (15)	02-03-2007	1,330	13,30	0
28		RJ-ONN-2004/1*	GSPC(22.225), GAIL(22.225), HPCL(22.22), HALLWORTHY(PANAMA)(11.11), NITINFIRE (11.11), & BPCL (11.11)	02-03-2007	4,613	4,613	0
29	MZ	MZ-ONN-2004/2**	NAFTOGAZ(10), RNRL(10), GEOPETROL(10) & REL(70)	02-03-2007	3,619	3,619	0
30	AA	AA-ONN-2004/1**	OIL(85) & SHIV-VANI (15)	02-03-2007	144	144	0
31		AA-ONN-2004/4**	NAFTOGAZ(10), ADANI ENTERPRISES(35), APIPL(20) & JPIP(35)	02-03-2007	95	95	0
32		AA-ONN-2004/3	ESSAR OIL (10), EEHL (90)	02-03-2007	1,252	1,252	0
33		AA-ONN-2004/2	OIL (100)	02-03-2007	218	218	0
34		AA-ONN-2004/5*	ESSAR OIL (10), ESSAR ENERGY(90)	02-03-2007	46	46	0

No.	BASIN	BLOCK NAME	CONSORTIUM (Participating Interest %)	DATE OF SIGNING CONTRACT	AWARDED AREA	RELINQ. AREA	PRESENT AREA
					(in sq.km)		
35	CB	CB-ONN-2004/4	ONGC(50), GSPC(40) & HERAMEC(10)	02-03-2007	70	70	0
36		CB-ONN-2004/5**	NAFTOGAZ (10), ADANI ENTEREPRISES(35), ADANI PORT(20), WELSPUN (35)	02-03-2007	75	75	0
37	CY	CY-DWN-2004/1	ONGC(70), GSPC(10), HPCL(10) & GAIL(10)	02-03-2007	10,302	10,302	0
38		CY-DWN-2004/2	ONGC(70), GSPC(10), HPCL(10) & GAIL(10)	02-03-2007	12,059	12,059	0
39		CY-DWN-2004/4	ONGC(70), GSPC(10), HPCL(10) & GAIL(10)	02-03-2007	12,025	12,025	0
40		CY-PR-DWN-2004/2	ONGC(70), GSPC(10), HPCL(10) & GAIL(10)	02-03-2007	9,994	9,994	0
41		CY-DWN-2004/3*	ONGC(70), GSPC(10), HPCL(10) & GAIL(10)	02-03-2007	12,017	12,017	0
42		CY-PR-DWN-2004/1*	ONGC(70), GSPC(10), HPCL(10) & GAIL(10)	02-03-2007	13,451	13,451	0
43		CY-ONN-2004/1*	ONGC (80) & BPCL(20)	02-03-2007	214	214	0
44	MB	MB-OSN-2004/1	GSPC(20), IOC(20), GAIL(20), HPCL(20) & PETROGAS (20)	02-03-2007	1,520	1,520	0
45		MB-OSN-2004/2	PETROGAS(20), GAIL(20), IOC(20), GSPC(20)& HPCL(20)	02-03-2007	741	741	0
46	PA	PA-ONN-2004/1	ONGC (100)	02-03-2007	2,537	2,537	0
47	PR	PR-OSN-2004/1	CIL(35), ONGC(35) & TATA(30)	02-03-2007	9,417	0	9,417
48	GV	GV-ONN-2004/1	ONGC (100)	02-03-2007	8,354	8,354	0
49	SR	SR-ONN-2004/1*	PRIZE PETROLEUM (10) & JAIPRAKASH ASSOCIATES LTD. (90)	02-03-2007	13,277	13,277	0
50	DS	DS-ONN-2004/1*	GEOGLOBAL RESOURCES (BARBADOS) (100)	02-03-2007	2,649	0	2,649
51	VN	VN-ONN-2004/2*	ONGC (100)	02-03-2007	4,466	4,466	0
52		VN-ONN-2004/1*	ONGC (100)	02-03-2007	5,801	5,801	0
SUB TOTAL RELINQUISHED/PFR BLOCKS					**2,89,132**	**2,77,066**	**12,066**
TOTAL AREA:					**3,06,369**	**2,85,749.30**	**20,619.70**

* PROPOSED FOR RELINQUISHMENT
**PSC TERMINATED BY MOP&NG

Table 8.9: EXPLORATION BLOCKS AWARDED UNDER SEVENTH ROUND OF NELP (NELP-VII)

No.	BASIN	BLOCK NAME	CONSORTIUM (Participating Interest %)	DATE OF SIGNING CONTRACT	AWARDED AREA	RELINQ, AREA	PRESENT AREA
					(in sq.km)		
CURRENT ACTIVE BLOCKS (12 BLOCKS)							
SHALLOW WATER							
1	MB	MB-OSN-2005/1	ONGC (80) & GSPC (20)	22-12-2008	2811	1,561	1,250
2		MB-OSN-2005/2	ADANI WELSPUN EXPLORATION LTD. (100)	22-12-2008	1,191	0	1,191
3		MB-OSN-2005/3	ESSAR (30), ONGC (70)	22-12-2008	2,810	1,125	1,685
SUB TOTAL					**6,812**	**2,686**	**4,126**
ONLAND							
4	WB	WB-ONN-2005/2	ONGC (100)	22-12-2008	3,792	0	3,792
5		WB-ONN-2005/3	ONGC (100)	22-12-2008	4,001	0	4,001
6		WB-ONN-2005/4	ONGC (75) & OIL (25)	22-12-2008	3,940	0	3,940
7	SR	SR-ONN-2005/1	DEEP ENERGY(10),DEEP INDUS(70), KANVEL FINANCE (10) & SAVLA ELECTRONICS (10)	22-12-2008	789	0	789
8	RJ	RJ-ONN-2005/1	HOEC (33.34), BPRL (33.33) & IMC (33.33)	22-12-2008	1,424	273	1,151
9	CB	CB-ONN-2005/3	MERCATOR PETROLEUM (100)	22-12-2008	48	0	48
10		CB-ONN-2005/5	OMKAR NATUAL RESOUR. (100)	22-12-2008	83	0	83
11		CB-ONN-2005/9	MERCATOR PETROLEUM (100)	22-12-2008	170	38	132
12		CB-ONN-2005/10	ONGC (51) & GSPC (49)	22-12-2008	270	0	270
SUB TOTAL					**15,463**	**311**	**15,152**
SUB TOTAL ACTIVE BLOCKS					**22,275**	**2,997**	**19,278**
RELINQUISHED BLOCKS/PROPOSED FOR RELINQUISHMENT (29 BLOCKS)							
13	KK	KK-DWN-2005/1	BHP BILLITON (26) & GVK (74)	22-12-2008	14,675	14,675	0
14		KK-DWN-2005/2*	ONGC (90) & GSPC (10)	22-12-2008	19,234	19,234	0
15	KG	KG-DWN-2005/2	BP EXPLORATION (50) & RIL (50)	22-12-2008	1,949	1,949	0
16		KG-OSN-2005/1	ONGC (60), GSPC (20) & HMEL (20)	22-12-2008	2,810	2,810	0
17		KG-OSN-2005/2	ONGC (80) & HMEL (20)	22-12-2008	1,881	1,881	0
18		KG-DWN-2005/1	ONGC (70), IOCL (20) & GSPC (10)	22-12-2008	1,727	1727	0
19	AN	AN-DWN-2005/1	ONGC (90) & OIL (10)	22-12-2008	11,837	11,837	0
20	CB	CB-ONN-2005/8**	VASUNDHARA RESOUR (100)	22-12-2008	133	133	0
21		CB-ONN-2005/2	IOCL (100)	22-12-2008	81	81	0
22		CB-ONN-2005/4*	ONGC (51) & GSPC (49)	22-12-2008	31	31	0
23		CB-ONN-2005/6	OMKAR NATUAL RESOUR. (100)	22-12-2008	102	102	0
24		CB-ONN-2005/7*	IOCL (100)	22-12-2008	199	199	0
25		CB-ONN-2005/11	QUEST (20), QQVS (40), SREI (20), VIPL(10) & PRIM (10)	22-12-2008	257	257	0
26	CY	CY-ONN-2005/1	GAIL (40), GSPC (30) & BENGAL ENERGY INTERNATIONAL(30)	22-12-2008	946	946	0
27	GV	GV-ONN-2005/3	ONGC (80) & TATA PETRO (20)	22-12-2008	2,227	2,227	0
28	MB	MB-DWN-2005/2	BHP BILLITON (26) & GVK (74)	22-12-2008	3,660	3,660	0
29		MB-DWN-2005/3	BHP BILLITON (26) & GVK (74)	22-12-2008	3,097	3,097	0
30		MB-DWN-2005/4	BHP BILLITON (26) & GVK (74)	22-12-2008	3,408	3,408	0
31		MB-DWN-2005/5	BHP BILLITON (26) & GVK (74)	22-12-2008	3,169	3,169	0
32		MB-DWN-2005/7	BHP BILLITON (26) & GVK (74)	22-12-2008	3,324	3,324	0
33		MB-DWN-2005/9	BHP BILLITON (26) & GVK (74)	22-12-2008	3,138	3,138	0
34		MB-OSN-2005/5*	ONGC (70) & GSPC (30)	22-12-2008	2,402	2,402	0
35		MB-OSN-2005/6*	ONGC (80) & GSPC (20)	22-12-2008	2,820	2,820	0
36	AA	AA-ONN-2005/1	ONGC (60), OIL (30) & ACL (10)	22-12-2008	363	363	0

No.	BASIN	BLOCK NAME	CONSORTIUM (Participating Interest %)	DATE OF SIGNING CONTRACT	AWARDED AREA	RELINQ, AREA	PRESENT AREA
					(in sq.km)		
37	PA	PA-ONN-2005/1	ONGC (100)	22-12-2008	1,096	1,096	0
38		PA-ONN-2005/2	ONGC (100)	22-12-2008	2,552	2,552	0
39	RJ	RJ-ONN-2005/3*	GSPC (60) & ONGC (40)	22-12-2008	1,217	1,217	0
40		RJ-ONN-2005/2*	OIL(60), HOEC(20), HPCL & Mittal Energy Ltd.(20)	22-12-2008	1,517	1,517	0
41	PR	PR-ONN-2005/1*	ONGC (80) & TATA PETRO. (20)	22-12-2008	1,807	1,807	0
SUB TOTAL RELINQUISHED/PFR BLOCKS					**91,659**	**91,659**	**0**
TOTAL AREA:					**1,12,988**	**93,710**	**19,278**

NOTE
* PROPOSED FOR RELINQUISHMENT
**PSC TERMINATED BY MOP&NG

Table 8.10: EXPLORATION BLOCKS AWARDED UNDER EIGHTH ROUND OF NELP (NELP-VIII)

No.	BASIN	BLOCK NAME	CONSORTIUM (Participating Interest %)	DATE OF SIGNING CONTRACT	AWARDED AREA	RELINQ, AREA	PRESENT AREA
					(in sq.km)		
CURRENT ACTIVE BLOCKS (10 BLOCKS)							
SHALLOW WATER							
1	GK	GK-OSN-2009/1	ONGC (40), GSPC (20), AWEL (20) & IOC (20)	30-06-2010	1,264	747	517
2		GK-OSN-2009/2	ONGC (40), AWEL (30) & IOC (30)	30-06-2010	1,242	376	866
3	KG	KG-OSN-2009/2	ONGC (90) & APGIC (10)	30-06-2010	1,471	0	1,471
4		KG-OSN-2009/3	CIL (100)	30-06-2010	1,988	0	1,988
5		KG-OSN-2009/4	ONGC (50), OIL (30), NTPC (10) & APGIC (10)	30-06-2010	835	0	835
SUB TOTAL					**6,800**	**1,123**	**5,677**
ONLAND							
6	VN	VN-ONN-2009/3	ONGC (100)	30-06-2010	1250	788	462
7	CB	CB-ONN-2009/3##	HCIL (100)	30-06-2010	71	0	71
8		CB-ONN-2009/6##	HCIL (100)	30-06-2010	177	0	177
9		CB-ONN-2009/7	SINTEX OIL & GAS (100)	30-06-2010	144	0	144
10		CB-ONN-2009/8	JPIL (87) & JPPL (13)	30-06-2010	136	0	136
SUB TOTAL					**1,778**	**788**	**990**
SUB TOTAL ACTIVE BLOCKS					**8,578**	**1,911**	**6,667**
RELINQUISHED BLOCKS/PROPOSED FOR RELINQUISHMENT (22 BLOCKS)							
11	AA	AA-ONN-2009/1*	JOGPL (47), JEKPL (17) & JODPL (36)	30-06-2010	2,217	2,217	0
12		AA-ONN-2009/2*	JOGPL (47), JEKPL (17) & JODPL (36)	19-07-2010	1,740	1,740	0
13		AA-ONN-2009/3	ONGC (50) & OIL (50)	30-06-2010	84	84	0
14		AA-ONN-2009/4	OIL (50) & ONGC (50)	30-06-2010	84	0	84
15	KG	KG-DWN-2009/1	BGEPIL (30), OIL (15), ONGC (45) & APGIC (10)	30-06-2010	1,800	1,800	0
16		KG-OSN-2009/1	ONGC (80), APGIC (10) & NTPC (10)	30-06-2010	1,472	1,472	0
17	CY	CY-OSN-2009/1	Bengal Energy International Inc (100)	30-06-2010	1,362	1,362	0
18		CY-OSN-2009/2	OIL (50) & ONGC (50)	30-06-2010	1,621	0	1,621
19	CB	CB-ONN-2009/2*	SINTEX OIL & GAS (100)	30-06-2010	68	0	68
20		CB-ONN-2009/5*	NTPC (100)	30-06-2010	165	165	0
21		CB-ONN-2009/1*	SINTEX OIL & GAS (100)	30-06-2010	113	0	113
22		CB-ONN-2009/4	ONGC (50) & GSPC (50)	30-06-2010	58	0	58
23	AN	AN-DWN-2009/1	ONGC (70) & OIL (30)	30-06-2010	4,981	4,981	0
24		AN-DWN-2009/2	ONGC (60) & OIL (40)	30-06-2010	3,995	3,995	0
25		AN-DWN-2009/3	ONGC (60) & OIL (40)	30-06-2010	3,992	3,992	0
26		AN-DWN-2009/5	ONGC (90) & GSPC (10)	30-06-2010	4,002	4,002	0
27		AN-DWN-2009/13	ONGC (70), NTPC (10), GAIL (10) & GSPC (10)	30-06-2010	4,007	4,007	0
28		AN-DWN-2009/18	ONGC (60), OIL (30) & GAIL (10)	30-06-2010	4,040	4,040	0
29	MB	MB-OSN-2009/3	BHP (100)	30-06-2010	1,492	1,492	0
30		MB-OSN-2009/6	BHP (100)	30-06-2010	1,876	1,876	0
31		MB-OSN-2009/7	BHP (100)	30-06-2010	1,865	1,865	0
32		MB-DWN-2009/1	CIL (100)	30-06-2010	2,961	2,961	0
SUB TOTAL RELINQUISHED/PFR BLOCKS					**43,995**	**42,051**	**1,944**
TOTAL AREA:					**52,573**	**43,962**	**8,611**

NOTE: * PROPOSED FOR RELINQUISHMENT ## PEL NOT YET GRANTED

Table 8.11: EXPLORATION BLOCKS AWARDED UNDER NINTH ROUND OF NELP (NELP-IX)

No.	BASIN	BLOCK NAME	CONSORTIUM (Participating Interest %)	DATE OF SIGNING CONTRACT	AWARDED AREA	RELINQ, AREA	PRESENT AREA
					(in sq.km)		
CURRENT ACTIVE BLOCKS (15 BLOCKS)							
SHALLOW WATER							
1.	GK	GK-OSN-2010/1	ONGC (60), OIL (30) & GAIL (10)	28-03-2012	1361	0	1,361.00
SUB TOTAL					1361	0	1,361.00
ONLAND							
2.	A A	AA-ONN-2010/2	OIL(50), ONGC(30) & GAIL(20)	28-03-2012	396	0	396.00
3.		AA-ONN-2010/3	OIL(40), ONGC(40) & BPRL(20)	28-03-2012	171	0	171.00
4.	VN	VN-ONN-2010/1##	Deep Energy LLC(10) & KGN Industries(90)	28-03-2012	3,776	0	3,776.00
5.		VN-ONN-2010/2##	Deep Energy LLC (10), Deep Natural Resources Limited (15) & Safak WSB Energy Pvt. Ltd. (75)	28-03-2012	4,909	0	4,909.00
6.	RJ	RJ-ONN-2010/2##	FEL (10) & Birkbeck Investments Ltd. (90)	28-03-2012	535	0	535.00
7.	CB	CB-ONN-2010/1	ONGC (100)	28-03-2012	782	0	782.00
8.		CB-ONN-2010/3##	Deep Energy LLC (10) & KGN Oil & Gas Pvt. Ltd. (90)	28-03-2012	534	0	534.00
9.		CB-ONN-2010/4	Pratibha Oil & Natural Gas Pvt. Ltd. (100)	28-03-2012	61	0	61.00
10.		CB-ONN-2010/5	Pan India Consultants (20) & Frost International Ltd. (80)	28-03-2012	49	0	49.00
11.		CB-ONN-2010/6	ONGC (80) & IOCL (20)	28-03-2012	39	0	39.00
12.		CB-ONN-2010/8	BPRL(25), GAIL(25), EIL(20), BFIL(20) & MIEL(10)	30-08-2012	42	0	42.00
13.		CB-ONN-2010/9	ONGC (100)	30-08-2012	120	0	109.36
14.		CB-ONN-2010/10	Sankalp Oil & Natural Resources Ltd. (100)	27-06-2012	122	0	122.00
15.		CB-ONN-2010/11	BPRL (25), GAIL (25), EIL (20) BFIL (15) & MIEL (15)	28-03-2012	131	0	131.00
SUB TOTAL					11,667	0	11,656.36
SUB TOTAL ACTIVE BLOCKS					13,028	0.00	13,017.36
RELINQUISHED BLOCKS/PROPOSED FOR RELINQUISHMENT (4 BLOCKS)							
16.	MB	MB-DWN-2010/1	BGEPIL (50) & BHP (50)	10-09-2012	7,963	7,963	0.00
17.	MB	MB-OSN-2010/2*	OIL (50), HPCL (30) & BPRL (20)	30-08-2012	3,411	3,411	0.00
18.	A A	AA-ONN-2010/1	PPCL(20) & ABGEL (80)	30-08-2012	401	401	0.00
19.	GK	GK-OSN-2010/2*	ONGC (90) & GAIL (10)	28-03-2012	1,625	1,625	0.00
SUB TOTAL RELINQUISHED/PFR BLOCKS					13,400	13,400	0
TOTAL AREA:					26,428	13,400.00	13,017.36

NOTE : ## PEL NOT YET GRANTED, * PROPOSED FOR RELINQUISHMENT

Table 8.12: CONTRACT AREAS AWARDED UNDER DISCOVERED SMALL FIELD ROUND-2016

No.	BASIN	BLOCK NAME	CONSORTIUM (Participating Interest %)	DATE OF SIGNING CONTRACT	AWARDED AREA	RELINQ, AREA	PRESENT AREA
					(in sq.km)		
CURRENT ACTIVE BLOCKS (30 BLOCKS)							
SHALLOW WATER							
1	MB	MB/OSDSF/B37/2016	SUN PETROCHEMICAL (100%) (Op.)	27-03-2017	124	0	124
2	MB	MB/OSDSF/B9/2016	ADANI WELSPUN EXPLORATION LTD. (100)	27-03-2017	183	0	183
3	MB	MB/OSDSF/B15/2016	BPRL (100)	27-03-2017	41	0	41
4	MB	MB/OSDSF/B127E/2016	BPRL (100)	27-03-2017	39.3	0	39.3
5	MB	MB/OSDSF/B80/2016	HOEC(50), AEPL (50)	27-03-2017	56.02	0	56.02
6	GK	GK/OSDSF/KD/2016	IOCL (100)	27-03-2017	46	0	46
7	KG	KG/OSDSF/GSKV1/2016	KEI-RSOS Petroleum & Energy Pvt Ltd (100)	27-03-2017	24.2	0	24.2
SUB TOTAL					514	0	514
ONLAND							
8	AA	AA/ONDSF/HILARA/2016	PPCL (100)	27-03-2017	9.6	0	9.6
9	AA	AA/ONDSF/LAXMIJAN/2016	MEIL (100)	27-03-2017	8.9	0	8.9
10	AA	AA/ONDSF/PATHARIA/2016	VBIPL (100)	27-03-2017	19.15	0	19.15
11	AA	AA/ONDSF/BARSILLA/2016	RIPL (29), BDNEPL (29), DFPL (23), MIPL (19)	27-03-2017	6.22	0	6.22
12	AA	AA/ONDSF/ CHARAIDEO/2016	OILMAX (100)	27-03-2017	11.5	0	11.5
13	AA	AA/ONDSF/DIPLING/2016	RIPL (29), BDNEPL (29), DFPL (23), MIPL (19)	27-03-2017	28.17	0	28.17
14	AA	AA/ONDSF/ DUARMARA/2016	OILMAX (100)	27-03-2017	8.91	0	8.91
15	AA	AA/ONDSF/ JERAIPATHAR/2016	IOCL (100)	27-03-2017	10.1	0	10.1
16	AA	AA/ONDSF/KHEREM/2016	HOEC (40), OIL (40), PPCL (20)	27-03-2017	16.45	0	16.45
17	CB	CB/ONDSF/ELAO/2016	PFHOGPL (100)	27-03-2017	9.98	0	9.98
18	CB	CB/ONDSF/SOUTH PATAN/2016	SACFZE (100)	27-03-2017	9.88	0	9.88
19	CB	CB/ONDSF/KHAMBEL/2016	MEIL (100)	27-03-2017	9.78	0	9.78
20	CB	CB/ONDSF/KAMBOI/2016	NIPPON POWER LTD (100)	27-03-2017	2.35	0	2.35
21	CB	CB/ONDSF/WEST BECHRAJI/2016	NIPPON POWER LTD (100)	27-03-2017	9.15	0	9.15
22	CY	CY/ONDSF/ NEDUVASAL/2016	GEMLPL (100)	27-03-2017	10.01	0	10.01
23	CY	CY/ONDSF/KARAIKAL/2016	BPRL (100)	27-03-2017	10.4	0	10.4
24	KG	KG/ONDSF/ACHANTA/2016	PFHOGPL (100)	27-03-2017	9.63	0	9.63
25	KG	KG/ONDSF/ BHIMANAPALLI/2016	PFHOGPL (100)	27-03-2017	15.1	0	15.1
26	KG	KG/ONDSF/KORAVAKA/2016	KEI-RSOS Petroleum & Energy Pvt Ltd (100)	27-03-2017	9.9	0	9.9
27	KG	KG/ONDSF/ SANARUDRAVARAM/2016	PPCL (100)	27-03-2017	9.35	0	9.35
28	RJ	RJ/ONDSF/BAKHRI TIBBA/2016	BPRL (100)	27-03-2017	13.4	0	13.4
29	RJ	RJ/ONDSF/SADEWALA/2016	BPRL (100)	27-03-2017	10.3	0	10.3
30	VN	VN/ONDSF/NOHTA/2016	IOCL (100)	27-03-2017	15	0	15
SUB TOTAL					263	0	263
TOTAL AREA:					777	0	777

Table 8.13: BASIN-WISE DISTRIBUTION OF PEL AREAS UNDER OPERATION (PRE-NELP (EXPLORATION BLOCK) & NELP BLOCKS) (AS ON 31.03.2018)

Location Type	BASIN	Pre-NELP	NELP I	NELP II	NELP III	NELP IV	NELP V	NELP VI	NELP VII	NELP VIII	NELP IX	Total
Deep Water	Krishna Godavari (2)	-	2691	-	-	-	-	-	-	-	-	2691
Deep Water Total (2)		**-**	**2691**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2,691**
Shallow Water	Cambay (3)	-	-	-	-	-	259	2616	-	-	-	2,875
	Cauvery (1)	-	-	-	-	-	-	-	-	-	-	0
	Krishna Godavari (5)	-	-	-	493	-	-	1131	-	3776		5,400
	Kutch (3)	-	-	-	-	-	-	-	-	1,383	1361	2,744
	Mahanadi (1)	-	832	-	-	-	-	-	-	-	-	832
	Mumbai (3)	-	-	-	-	-	-	-	4,126	-	-	4,126
	Saurashtra (2)	-	-	600	-	-	-	552	-	-	-	1,152
Shallow Water Total (18)		**-**	**832**	**600**	**493**	**-**	**259**	**4,299**	**4,126**	**5,159**	**1,361**	**17,129**
Onland	Assam-Arakan Fold Belt (1)	-	-	-	-	-	-	3213	-	-	-	3,213
	Assam-Arakan Shelf (7)	1,311	-	-	3,620	1,260	-	-	-	-	567	6,758
	Bengal (3)	-	-	-	-	-	-	-	11,733	-	-	11,733
	Cambay (27)	1,202	-	425	-	-	216	-	533	280	1314	3,971
	Cauvery (2)	-	-	-	-	140	-	127	-	-	-	267
	Krishna Godavari (2)	-	-	-	-	-	261	353	-	-	-	614
	Kutch (1)	775	-	-	-	-	-	-	-	-	-	775
	Rajasthan (5)	1,999	-	-	-	-	1399	10	1151	-	-	4,559
	Satpura-South Rewa-Damodar (1)	-	-	-	-	-	-	-	789	-	-	789
	Vindhyan (1)	-	-	-	-	-	-	-	-	462	-	462
Onland Total (50)		**5,288**		**425**	**3,620**	**1,400**	**1,875**	**3,704**	**14,206**	**742**	**1,881**	**33,141**
Total (70)		**5,288**	**3,523**	**1,025**	**4,113**	**1,400**	**2,134**	**8,003**	**18,332**	**5,901**	**3,242**	**52,961**

Table 8.14: COMPANY-WISE DISTRIBUTION OF PEL AREAS UNDER OPERATION (PRE-NELP & NELP BLOCKS) (AS ON 31.03.2018)

Operator	No. of Blocks	Pre-NELP	NELP I	NELP II	NELP III	NELP IV	NELP V	NELP VI	NELP VII	NELP VIII	NELP IX	TOTAL
Oil and Natural Gas Corporation Ltd.	30	1,277	2,393	-	4,113	140	520	1,810	13,253	3,633	2,291	29,430
Oil India Ltd.	5	-	-	-	-	-	-	3577	-	-	567	4,144
Focus Energy Ltd.	4	2,774	-	-	-	-	1,399	2616	-	-	-	6,789
Gujarat State Petroleum Corporation Ltd.	4	1,202	-	425	-	-	159	-	-	-	-	1,787
Reliance Industries Ltd.	4	-	1,130	600	-	-	57	-	-	-	-	1,787
Cairn Energy India Pty Ltd.	3	-	-	-	-	-	-	-	-	1,988	-	1,988
Hindustan Oil Exploration Company Limited.	3	34	-	-	-	-	-	-	1,151	-	-	1,185
Bharat Petro Resources Ltd	2	-	-	-	-	-	-	-	-	-	173	173
Essar Oil Ltd.	2	-	-	-	-	-	-	-	1,685	-	-	1,685
Mercator Petroleum Private Limited.	2	-	-	-	-	-	-	-	180	-	-	180
Adani Welspun Exploration Ltd.	1	-	-	-	-	-	-	-	1,191	-	-	1,191
Deep Energy Llc	1	-	-	-	-	-	-	-	789	-	-	789
Hardy Exploration & Production (India) Inc.	1	-	-	-	-	-	-	-	-	-	-	-
Jay Polychem (India) Ltd.	1	-	-	-	-	-	-	-	-	136	-	136
Jubilant Oil & Gas Private Limited.	1	-	-	-	-	1,260	-	-	-	-	-	1,260
Niko Resources Limited.	1	-	-	-	-	-	-	-	-	-	-	-
Omkar Naturals Resources Pvt. Ltd.	1	-	-	-	-	-	-	-	83	-	-	83
Pan India Consultants	1	-	-	-	-	-	-	-	-	-	49	49
Pratibha Oil and Natural Gas Pvt. Ltd.	1	-	-	-	-	-	-	-	-	-	61	61
Sankalp Oil and Natural Resources Ltd.	1	-	-	-	-	-	-	-	-	-	101	101
Sintex Oil & Gas Pvt. Ltd.	1	-	-	-	-	-	-	-	-	144	-	144
Total	**70**	**5,287**	**3,523**	**1,025**	**4,113**	**1,400**	**2,134**	**8,003**	**18,332**	**5,901**	**3,242**	**52,961**

Table 8.15: PELs OPERATED BY OIL (As on 31.03.2018)

No.	BASIN	BLOCK NAME	EFFECTIVE DATE OF PEL	AREA (Sq. Km.)	TOTAL AREA (Sq. Km.)
NOMINATION BLOCKS					
1	Assam-Arakan	Namchik	01.05.05	195	-
2		Jairampur Extn.	01.04.06	23.25	-
3		Deomali	18.02.05	113.5	331.75
NOMINATION TOTAL					**331.75**
PRE-NELP / NELP BLOCKS					
4	Rajasthan	RJ-ONN-2004/2	21.01.08	10.24	10.24
5	Assam-Arakan	AA-ONN-2010/2	29.12.14	396	-
6		AA-ONN-2010/3	12.12.13	171	567
7	Mizoram	MZ-ONN-2004/1	22.05.07	3,213	3,213
8	Krishna -Godavari	KG-ONN-2004/1	16.02.08	353	353
PRE-NELP / NELP TOTAL					**4,143.7**
TOTAL PELS OPERATED BY OIL					**4,475.45**

Table 8.16: PELs operated by ONGC (As on 31.03.2018)

No.	BASIN	BLOCK NAME	EFFECTIVE DATE OF PEL	AREA (Sq. Km.)	TOTAL AREA (Sq. Km.)
NOMINATION BLOCKS					
ONLAND					
1	Assam - Arakan	Sibsagar District	01.04.02	87.05	
2		Bhagty Bhandari	28.04.06	620	
3		Singphan	28.04.06	320	
4		Dimapur	28.04.06	650	1,677.05
5	Himalayan Foreland	Kangra-Mandi	10.11.03	18,28	1,828
TOTAL ONLAND NOMINATION BLOCKS					**3,505.05**
OFFSHORE BLOCKS					
6	Gujarat-Kutch Offshore	GK-DW-1	01.10.04	16,557	16,557
7	Mumbai Offshore	BB-OS-DW-I	28.12.04	7,537	
8		BB-OS-DW-II	28.12.04	8,950	16,487
9	K-G Offshore	KG-OS-DW-III	15.05.03	1,190	1,190
TOTAL OFFSHORE NOMINATION BLOCKS					**34,234**
TOTAL NOMINATION BLOCKS					**37,739.05**
PRE-NELP / NELP BLOCKS					
10	Cambay	CB-OSN-2003/1	05.12.05	259	
11		CB-ONN-2005/10	20.11.09	270	
12		CB-ONN-2010/1	16.03.13	782	
13		CB-ONN-2010/6	16.02.13	39	
14		CB-ONN-2010/9	01.02.14	109.36	1459.36
15	Cauvery Onland	CY-ONN-2002/2	31.08.04	140	
16		CY-ONN-2004/2	30.05.08	126.8	266.8
17	Assam-Arakan	AA-ONJ/2	07.11.08	1,277	
18		AA-ONN-2001/1	01.05.03	960	
19		AA-ONN-2001/2	29.07.03	2,660	4,897
20	Vindhyan	VN-ONN-2009/3	30.06.10	462	462
21	Gujarat - Kutch	GS-OSN-2004/1	25.04.07	552	
22	Saurashtra Offshore	GK-OSN-2009/1	05.08.10	517	
23		GK-OSN-2009/2	05.08.10	866	
24		GK-OSN-2010/1	04.05.12	1,361	3296
25	Mumbai Offshore	MB-OSN-2005/1	27.01.09	1,250	1,250
26	K-G Offshore	KG-DWN-98/2	12.04.00	2,393	
27		KG-OSN-2001/3	04.02.03	493	
28		KG-ONN-2003/1	08.02.07	260.54	
29		KG-OSN-2004/1	25.05.07	1,131	
30		KG-OSN-2009/2	30.07.10	1471	
31		KG-OSN-2009/4	02.08.10	317	6,065.54
32	Bengal	WB-ONN-2005/2	23.12.09	3,792	
33		WB-ONN-2005/3	23.12.09	4,001	
34		WB-ONN-2005/4	23.12.09	3,940	11,733
TOTAL PELs IN PRE-NELP/NELP					**29,429.7**
TOTAL PELs OPERATED BY ONGC					**67,168.75**

Table 8.17: PELs UNDER PRE-NELP EXPLORATION AND NELP: BLOCKS WITH PVT./JV COMPANIES (AS ON 31.03.2018)

NO.	COMPANY / OPERATOR	BASIN	BLOCK NAME	EFFECTIVE DATE OF PEL	AREA (Sq.Km.)	TOTAL AREA (Sq.Km.)
1	RIL	K-G Offshore	KG-DWN-98/3	07.06.00	298	
2		Mahanadi-NEC Offs.	NEC-OSN-97/2	07.06.00	832	
3		Gujarat-Saurashtra	GS-OSN-2000/1	16.08.01	600	
4		Cambay	CB-ONN-2003/1 (A&B)	05.06.06	57	1,786.77
5	CAIRN	Krishna Godavari	KG-OSN-2009/3	05.08.09	1988	1,988
6	ESSAR	Mumbai offshore	MB-OSN-2005/3	04.02.2009	1685	1,685
7	HOEC	Assam - Arakan	AAP-ON-94/1	28.11.00	34.06	
8		Rajasthan	RJ-ONN-2005/1	13.07.09	1151	1,185.06
9	FOCUS	Rajasthan	RJ-ON/6	21.08.99	1999	
10			RJ-ONN-2003/2	28.01.06	1398.84	
11		Gujarat-Kutch	GK-ON/4	19.04.03	775	
12		Cambay	CB-OSN-2004/1	28.05.07	2616	6,788.84
13	Deep Energy	Satpura-South Rewa-Damodar	SR-ONN-2005/1	24.10.2016	789	789
14	GSPC	Cambay	CB-ON/2	23.11.00	1202.43	
15			CB-ONN-2000/1	17.07.01	425	
16			CB-ONN-2003/2	01.04.06	159.31	1,786.74
17	JOGPL	Assam-Arakan	AA-ONN-2002/1	07.04.04	1260	1,260
18	Adani Welspun	Mumbai offshore	MB-OSN-2005/2	04.02.09	1191	1191
19	Mercator Petr.	Cambay	CB-ONN-2005/3	03.06.10	48	
20			CB-ONN-2005/9	03.06.10	132	180
21	Omkar Natural	Cambay	CB-ONN-2005/5	07.10.09	83	83
22	SINTEX Oil & GAS	Cambay	CB-ONN-2009/7	04.01.11	144	144
23	JPIL	Cambay	CB-ONN-2009/8	22.10.10	136	136
24	PAN India / Frost Int. Ltd.	Cambay	CB-ONN-2010/5	-	49	49
25	Pratibha Oil & gas	Cambay	CB-ONN-2010/4		61	61
26	BPRL/ GAIL	Cambay	CB-ONN-2010/8	01.03.08	42	
27			CB-ONN-2010/11	15.03.13	131	173
28	Sankalp Oil and Natural Resources Ltd.	Cambay	CB-ONN-2010/10		100.75	100.75
TOTAL PELs BY PVT./JV COS.						**19,387.16**

*CRL's operatorship has been terminated by Government ACL has requested to transfer the PI

Table 8.18: COMPANY WISE PEL AREAS

Company/Operator	PEL Area	
	Sq. km.	(%)
Oil and Natural Gas Corporation Ltd.	67,169	73.79%
Oil India Ltd.	4,475	4.92%
Focus Energy Ltd.	6,789	7.46%
Cairn Energy India Pty Ltd.	1,988	2.18%
Reliance Industries Ltd.	1,787	1.96%
Gujarat State Petroleum Corporation Ltd.	1,787	1.96%
Essar Oil Ltd.	1,685	1.85%
Jubilant Oil & Gas Private Limited.	1,260	1.38%
Adani Welspun Exploration Ltd.	1,191	1.31%
Hindustan Oil Exploration Company Limited.	1,185	1.30%
Deep Energy Llc	789	0.87%
Mercator Petroleum Private Limited.	180	0.20%
Bharat Petro Resources Ltd	173	0.19%
Sintex Oil & Gas Pvt. Ltd.	144	0.16%
Jay Polychem (India) Ltd.	136	0.15%
Sankalp Oil and Natural Resources Ltd.	101	0.11%
Omkar Naturals Resources Pvt. Ltd.	83	0.09%
Pratibha Oil and Natural Gas Pvt. Ltd.	61	0.07%
Pan India Consultants	49	0.05%
Total	**91,031**	**100.00%**

Table 8.19: State-wise PEL distribution

Onland/Offshore	Location Area	PEL Area	
		Sq. km.	(%)
Offshore	Eastern Offshore	10,113	11.11%
	Western Offshore	43,941	48.27%
Offshore Total		**54,054**	**59.38%**
Onland	Andhra Pradesh	614	0.67%
	Arunanchal Pradesh	332	0.36%
	Assam	1,965	2.16%
	Chattisgarh	789	0.87%
	Gujarat	4,746	5.21%
	Himachal Pradesh	1,828	2.01%
	Madhya Pradesh	462	0.51%
	Mizoram	5,873	6.45%
	Nagaland	1,590	1.75%
	Rajasthan	4,559	5.01%
	Tamil Nadu	267	0.29%
	Tripura	2,220	2.44%
	West Bengal	11,733	12.89%
Onland Total		**36,977**	**40.62%**
TOTAL		91,031	100.00%

Table 8.20: Nomination PML areas operated by ONGC and OIL in India

COMPANY / OPERATOR	BASIN	BLOCK NAME	EFFECTIVE DATE OF PML	VALIDITY DATE OF PML	PML AREA (Sq. Km.)	TOTAL PML AREA (Sq. Km.)
ONGC	Assam-Arakan	Adamtila	24-11-2014	23-11-2031	4	
		Adamtila Extn.	03-03-2012	02-03-2032	63	
		Agartala Dome (AD-1)	01-05-2009	30-04-2029	15.75	
		Agartala Dome (AD-4)	01-01-1998	31-12-2017	32.58	
		Agartala Dome Extn.-II	01-02-2006	31-01-2026	160.86	
		Agartala Dome Extn.-III	30-03-2011	29-03-2031	60	
		Badarpur	01-08-2009	31-07-2019	2.3	
		Banamali	17-12-2002	16-12-2022	50	
		Banaskandi	21-07-1997	20-07-2017	15	
		Baramura Extn.-IV	01-02-2006	31-01-2026	150.25	
		Baramura Field	01-10-2013	30-09-2033	10.75	
		Bhubandar	22-12-2002	21-12-2022	6	
		Borholla	17-06-1998	16-06-2018	32.12	
		Cachar District	04-01-2013	03-01-2020	732	
		Changmaigaon	07-02-2004	06-02-2024	10	
		Changmaigaon East	30-01-2006	29-01-2026	15	
		Changpang ML	14-03-2007	13-03-2027	12	
		Charaideo-Nahorhabi	30-01-2006	29-01-2026	14	
		Charaideo-Nahorhabi Extn.	26-09-2011	25-09-2031	41	
		Charali	20-03-1999	19-03-2019	51.64	
		Charali Ext.-I	20-05-1998	19-05-2018	45	
		East Changmaigaon Extn.	01-12-2011	30-11-2031	35	
		East Lakhibari	23-07-2003	22-07-2023	8.5	
		East Lakhibari Extn.	10-10-2013	09-10-2020	49	
		Geleki	16-08-1990	15-08-2030	27.94	
		Geleki Ext.- II	14-12-2001	13-12-2021	2.65	
		Geleki Ext.-I	23-11-2009	22-11-2029	5.01	
		Gojalia block	07-02-2006	06-02-2026	271.17	
		Golaghat Extn. II-A	09-12-2009	08-12-2024	24	
		Golaghat Extn. II-A (Add.)	21-11-2012	20-11-2019	61	
		Kalyanpur	13-04-2007	12-04-2027	40	
		Kasomarigaon	09-12-2009	08-12-2025	20	
		Kasomarigaon (Add.)	21-11-2012	20-11-2019	56	
		Khoraghat	26-07-2009	25-07-2024	3	
		Khoraghat Ext. - I	17-07-2000	16-07-2020	83	
		Konaban Field	04-03-2014	03-03-2034	33.0046	
		Kunjaban	14-07-2008	13-07-2028	288	
		Laiplingaon Extn.	26-09-2011	25-09-2023	30.45	
		Laipling-Gaon	13-10-2003	13-10-2023	26	
		Lakwa	29-09-2008	28-09-2028	172.49	
		Manikya Nagar (RO-15)	01-01-1998	31-12-2017	0.8	
		Manikyanagar-Sonamura Extn-I	01-02-2006	31-01-2026	138.55	
		Mekeypore-Santak-Nazira	30-01-2006	29-01-2026	77	
		Mekeypore-Santak-Nazira-Bihubar Extn.	26-09-2011	25-09-2031	50	

COMPANY / OPERATOR	BASIN	BLOCK NAME	EFFECTIVE DATE OF PML	VALIDITY DATE OF PML	PML AREA (Sq. Km.)	TOTAL PML AREA (Sq. Km.)
ONGC	**Assam-Arakan**	Mekrang	19-09-1997	18-09-2017	16	
		Namber	05-09-1999	04-09-2019	26	
		Namber Extn.	27-01-2006	26-01-2026	20	
		Namti	09-11-2007	08-11-2027	35.55	
		North Patharia	30-03-2012	29-03-2029	60	
		North Rudrasagar	30-01-2006	29-01-2026	149	
		Panidihing	19-05-2004	18-05-2024	34	
		Rokhia (RO-19)	26-02-2012	25-02-2020	0.58	
		Rokhia (RO-2)	14-11-2008	13-11-2028	5.04	
		Rudrasagar	30-05-2009	29-05-2029	70.5	
		SE Geleki	30-01-2006	29-01-2026	20.5	
		SE Geleki Extn.	26-09-2011	25-09-2031	28	
		Sector - VC	30-11-2014	29-11-2034	497	
		Sonari	01-08-2009	31-07-2026	30	
		Sundalbari-Agartala Dome	13-12-2010	12-12-2026	301	
		Tichna block	07-02-2006	06-02-2026	195.41	
		Titabar	24-12-2008	23-12-2023	10	
		Tulamura	20-11-2009	19-11-2031	45	
		Tulamura (Add.)	21-11-2012	20-11-2019	39	
		West Charali	23-03-2012	22-03-2032	12	
		West Tripura	**04-01-2013**	**03-01-2020**	**1327.58**	**5947.96**
	Cambay	Ahmedabad Ext.-I	22-02-2001	21-02-2021	17.29	
		Ahmedabad Ext.-II	29-07-2008	28-07-2028	5.98	
		Ahmedabad Ext.-III	11-11-2011	10-11-2031	34.75	
		Ahmedabad Ext.-IV	08-10-1998	07-10-2018	10.21	
		Ahmedabad Ext-V	08-05-2000	07-05-2020	17.75	
		Ahmedabad-Bakrol	05-08-2009	04-08-2029	30.16	
		Akholjuni	27-07-2000	26-07-2020	81.25	
		Anklav Ext.-I	15-02-2002	14-02-2022	61	
		Ankleshwar (Main)	15-08-2001	14-08-2021	38.98	
		Ankleshwar Ext.-I	26-05-2005	25-05-2025	17.43	
		Asmali ML	15-06-1998	14-06-2017	43.26	
		Balasar	08-06-2013	07-06-2030	12	
		Balol	25-05-1990	24-05-2030	24	
		Balol Extn.-I	26-12-2013	25-12-2018	5.83	
		Bechraji	31-08-2011	30-08-2028	37.11	
		Bechraji Ext.-I	29-03-2004	28-03-2024	3.06	
		Cambay	14-12-2004	13-12-2024	2.6	
		Chaklasi-Rasnol	06-12-2007	05-12-2027	42	
		Chaklasi-Rasnol Extn.-I	16-11-2010	15-11-2027	168	
		Chanasma	28-09-1996	27-09-2016	2.81	
		Chandrora	16-02-2004	15-02-2024	1.39	
		Charada	06-10-2014	05-10-2019	10.6	
		Charada Mansa	23-10-2012	22-10-2027	187.5	
		Charada Mansa Extn.-I	20-09-2008	19-09-2028	12.5	
		Dabka	01-05-1993	30-04-2013	21.67	

COMPANY / OPERATOR	BASIN	BLOCK NAME	EFFECTIVE DATE OF PML	VALIDITY DATE OF PML	PML AREA (Sq. Km.)	TOTAL PML AREA (Sq. Km.)
ONGC	Cambay	Dabka Ext.-I	23-08-2008	22-08-2028	12.85	
		Dabka Ext.-II	30-06-2009	29-06-2024	0.56	
		Dabka Ext.-IV (D#6)	20-02-1997	19-02-2017	1	
		Dabka Ext.-V (D#38)	29-06-1999	28-06-2019	2	
		Dahej	06-02-2005	05-02-2025	18.52	
		Dahej Ext.-I	17-04-2014	16-04-2034	90.9	
		Dedana (ML)	04-11-1996	03-11-2016	5.44	
		Degam	25-03-2008	24-03-2025	15.47	
		East Sobhasan	28-06-2002	27-06-2022	22.42	
		Elav	30-03-1990	29-03-2010	10.37	
		Gamij	26-06-2015	25-06-2035	39.16	
		Gamij Ext. - II	04-04-2001	03-04-2021	116.22	
		Gamij Ext.-I	25-03-1997	24-03-2017	81.22	
		Gamij Ext.-III ML	08-02-2002	07-02-2022	15.41	
		Gandhar	07-01-2005	06-01-2025	11.78	
		Gandhar Ext. - IX	20-08-2002	19-08-2022	40.91	
		Gandhar Ext.-I	08-10-2006	07-10-2026	32.75	
		Gandhar Ext.-II (Denwa)	08-07-2006	07-07-2026	54.3	
		Gandhar Ext.-III	24-02-2007	23-02-2027	235.38	
		Gandhar Ext.-IV	30-08-2014	29-08-2034	36.75	
		Gandhar Ext.-V	22-03-1996	21-03-2016	29.43	
		Gandhar Ext.-VI (G#388)	22-01-1997	21-01-2017	44.47	
		Gandhar Ext.-VII(G#155)	24-04-1999	23-04-2019	25.82	
		Gandhar Ext.-VIII	16-08-2000	15-08-2020	7.23	
		Gandhar Extn.-X	19-06-2009	18-06-2017	9	
		Gandhar Extn.-XI	19-06-2009	18-06-2019	7.2	
		Gandhar Extn.-XII	19-06-2009	18-06-2025	29	
		Geratpur	20-08-2000	19-08-2020	18.31	
		Halisa	30-01-1998	29-01-2018	143.44	
		Hirapur	24-10-1997	23-10-2017	87.92	
		Jakasna(ML)	02-06-2001	01-06-2021	9.8	
		Jambusar-Dabka	25-03-2008	24-03-2028	48	
		Jambusar-Dabka (Add.)	21-11-2012	20-11-2019	53.5	
		Jotana	26-07-2000	25-07-2020	39.5	
		Jotana Ext.-I	28-11-2006	27-11-2026	57.7	
		Jotana Ext.-II	16-06-1997	15-06-2017	0.87	
		Jotana-South	10-03-2008	09-03-2024	23	
		Jotana-Warosan	24-06-2005	23-06-2025	38.05	
		Kadi	18-08-2008	17-08-2028	64.49	
		Kadi Asjol	28-08-2003	27-08-2023	0.72	
		Kadi Ext-III	02-02-1999	01-02-2019	16.07	
		Kadi Extn.-IV	13-11-2003	12-11-2023	5.28	
		Kadi Extn.-V	22-11-2010	21-11-2027	13	
		Kalol (Main)	13-05-2004	12-05-2024	35.84	
		Kalol Ext.-I	04-08-2006	03-08-2026	159.92	
		Kalol Ext.-II	11-04-2009	10-04-2029	15.5	
		Kalol North-East	15-03-2010	14-03-2030	9.44	

COMPANY / OPERATOR	BASIN	BLOCK NAME	EFFECTIVE DATE OF PML	VALIDITY DATE OF PML	PML AREA (Sq. Km.)	TOTAL PML AREA (Sq. Km.)
ONGC	Cambay	Kalol West Ext.-II	20-09-2007	19-09-2022	20	
		Kalol West Extn.-I	03-02-2006	02-02-2022	27	
		Kalol West Extn.-I (Add.)	21-11-2012	20-11-2019	27.25	
		Kalol West ML	21-11-2003	01-11-2023	14.53	
		Kamboi	25-12-2007	24-12-2018	2.35	
		Kasiyabet	12-09-2009	11-09-2029	5.06	
		Kathana	20-11-2008	19-11-2028	16.95	
		Kathana Ext.-I	15-03-2004	14-03-2024	16.99	
		Kharach	23-03-2015	22-03-2035	0.77	
		Kim Ext. - I	04-01-2002	03-01-2022	56.11	
		Kim(ML)	10-03-1997	09-03-2017	18.33	
		Kosamba	03-01-2008	02-01-2028	19.17	
		Kosamba Extn.-I	01-03-2003	28-02-2023	39	
		Kudara	28-06-2002	07-06-2022	2.6	
		Kural (ML)	03-04-2001	02-04-2021	83.49	
		Langhnaj ML	23-07-2002	22-07-2022	17.92	
		Langhnaj-Wadasma	05-02-2001	04-02-2021	13.84	
		Lanwa	09-12-2002	08-12-2022	30	
		Lanwa Ext.-I	16-12-1996	15-12-2016	2.15	
		Limbodra	21-12-2005	01-12-2025	15.75	
		Limbodra Ext.-I	25-03-1998	24-03-2018	14.96	
		Linch	16-10-2013	15-10-2033	43.73	
		Linch Ext.- I	18-03-2007	17-03-2017	34.25	
		Linch Ext.-II	24-03-2007	23-03-2017	13.35	
		Lohar	16-11-2004	15-11-2024	8.29	
		Malpur (ML)	04-06-2007	03-06-2027	1	
		Mansa	26-07-1995	25-07-2015	58.72	
		Matar	01-10-2009	30-09-2029	36	
		Matar (Add.)	21-11-2012	20-11-2019	30.5	
		Mehsana City	08-08-1996	07-08-2016	8.85	
		Mehsana City Ext.-II	18-07-2015	17-07-2035	7.58	
		Motera	14-08-1996	13-08-2016	12.7	
		Motera Ext.-I	25-03-1997	24-03-2017	23.65	
		Motera Ext.-II	25-03-1998	24-03-2018	26.02	
		Motwan	04-07-1999	03-07-2019	42.2	
		N. Kadi Ext.-I (New)	03-05-2013	02-05-2029	61.43	
		N. Sobhasan Pt. A+B	25-01-1999	24-01-2019	12.05	
		Nada	19-02-2009	18-02-2029	9.85	
		Nada Ext.-I	03-09-1998	02-09-2018	6.12	
		Nandasan - Langnaj	27-04-2006	26-04-2026	61.9	
		Nandasan Ext.-I	18-07-2015	17-07-2035	26.39	
		Nandej	25-03-1997	24-03-2017	90.18	
		Nandej East	26-06-2015	25-06-2035	20.92	
		Nandej Ext.-I	08-02-2002	07-02-2022	56.18	
		Nawagam Ext. - III	31-08-2000	30-08-2020	56	
		Nawagam Ext.-I	21-03-2003	20-03-2023	2.77	
		Nawagam Ext.-II	26-11-1999	25-11-2019	14.66	

COMPANY / OPERATOR	BASIN	BLOCK NAME	EFFECTIVE DATE OF PML	VALIDITY DATE OF PML	PML AREA (Sq. Km.)	TOTAL PML AREA (Sq. Km.)
ONGC	**Cambay**	Nawagam Main	28-03-2007	27-03-2027	72.23	
		Nawagam South Ext.-I	21-11-2003	20-11-2023	30.88	
		Nawagam South Ext.-II	21-11-2003	20-11-2023	43.94	
		Nawagam South Ext.-III	13-12-2005	12-12-2025	53.71	
		North Sobhasan Ext.-I	12-03-2001	11-03-2021	56.85	
		North Sobhasan Ext.-II	17-11-2001	16-11-2021	23	
		Olpad - Dandi Ext. - I	01-01-2004	31-12-2023	94.4	
		Olpad (A)	24-11-2002	23-11-2022	2.75	
		Padra Field	03-09-2013	02-09-2033	172.24	
		Pakhajan Ext.-I	10-01-2015	09-01-2020	18	
		Pakhajan Extn. - II	16-09-2002	15-09-2022	38.5	
		Pakhajan(ML)	21-08-2007	20-08-2027	6.25	
		Paliyad-Kalol-Limbodra	26-06-2015	25-06-2035	161.48	
		Patan-Tharad	04-09-2013	03-09-2033	13.619	
		Rajpur	26-06-2015	25-06-2035	6.76	
		Rajpur Ext.-I	02-02-1999	01-02-2019	8.7	
		Rupal	29-10-2004	28-10-2024	14.06	
		Sanand	10-05-2009	09-05-2029	81.36	
		Sanand Ext.-I	30-04-2013	29-04-2033	18.51	
		Sanand Ext.-II	23-03-1999	22-03-2019	10.37	
		Sanand Ext.-III	11-11-2011	11-11-2031	19.3	
		Sanaokhurd	30-12-1996	29-12-2016	23.29	
		Sanganpur ML	05-06-2002	04-06-2022	6.97	
		Santhal	09-06-2014	08-06-2034	19.46	
		Siswa	12-02-2000	11-02-2020	37.78	
		Sobhasan	20-08-2013	19-08-2033	35.89	
		South Dahej	12-11-2008	11-11-2025	27	
		South Patan	16-06-1997	15-06-2017	6.99	
		South Wamaj ML	28-06-2002	27-06-2022	18.29	
		Umra	10-08-2007	09-08-2027	8.44	
		Umra Ext.-I	19-10-2014	18-10-2034	9.93	
		Umra Extn.-II	13-03-2003	12-03-2017	34.43	
		Valod	07-11-2007	06-11-2017	8.58	
		Valod Extn.-I	22-11-2010	21-11-2027	110	
		Valod Extn.-II	10-09-2013	09-09-2033	30.27	
		Varsoda-Halisa	29-08-2008	28-08-2025	155	
		Varsoda-Halisa Extn.-I	22-11-2010	21-11-2028	169	
		Vasad-Kathol Ext.-III	08-07-2011	07-07-2029	103.175	
		Viraj	26-07-2000	25-07-2020	17.49	
		Wadu	26-05-2010	25-05-2030	15.41	
		Wadu Ext.-I	19-05-1997	18-05-2017	55.17	
		Wamaj	25-03-1997	24-03-2017	19.44	
		West Mewad(ML)	11-10-2000	10-10-2020	13.2	
		West Sobhasan	23-04-2003	22-04-2023	9.6	**5,816.26**
	Cauvery Offshore	PBS-1-1 Extn.	01-04-2009	31-03-2025	11	
		PBS-1-1 Extn. (Add.)	21-11-2012	20-11-2019	85.83	**96.83**

COMPANY / OPERATOR	BASIN	BLOCK NAME	EFFECTIVE DATE OF PML	VALIDITY DATE OF PML	PML AREA (Sq. Km.)	TOTAL PML AREA (Sq. Km.)
ONGC	**Cauvery Onshore**	Greater Kovilkalapal	15-05-2007	14-05-2027	33.61	
		Adichapuram	13-04-2007	12-04-2027	2.3	
		Adiyakka Mangalam	27-05-1999	26-05-2019	17.8	
		Greater Bhuvanagiri	15-12-2007	14-12-2027	14	
		Greater Kali	21-07-2010	20-07-2030	36	
		Greater Kamalapuram	26-12-2004	24-12-2024	22	
		Greater Narimanam	27-01-2006	26-01-2026	54	
		Kali	01-06-2001	31-05-2021	19	
		Kali-6	01-01-2004	31-12-2023	1.6	
		Kamalapuram-I	27-05-1999	26-05-2019	23.5	
		Kamalapuram-II	04-05-1994	03-05-2014	3.5	
		Kanjirangudi	13-10-2003	12-10-2023	68	
		Karaikal	10-09-2008	09-09-2028	2	
		Kizhavalur	27-05-1999	26-05-2019	3.6	
		Kuthalam	01-06-2001	31-05-2021	91	
		Kuthalam-13	12-02-2004	11-02-2024	12	
		Kuthanallur	26-02-2004	25-02-2024	6.25	
		L-I	31-12-2012	30-12-2019	948.16	
		L-II	31-12-2012	30-12-2019	1,542.02	
		Mattur	04-05-1994	03-05-2014	3	
		Nannilam-I	26-04-2013	25-04-2033	4.7	
		Nannilam-II	27-05-1999	26-05-2019	1	
		Neyveli	15-03-2008	14-03-2028	3.84	
		PBS-1-1	01-10-2003	30-09-2023	9	
		Perungulam-periyapattinam	15-07-1997	14-07-2017	75	
		Pundi	27-05-1999	26-05-2019	1	
		Ramanathapuram	21-11-2012	20-11-2019	493.21	
		Tiruvarur-19	12-02-2004	11-02-2024	2	
		Tulsapatnam	27-05-1999	26-05-2019	3.7	
		Vadatheru	31-12-2007	30-12-2027	15.18	
		Vijayapuram #13	03-11-2002	02-11-2022	2	**3,513.97**
	K-G Offshore	G-1 Field	05-09-2003	04-09-2023	105	
		Godavari	24-01-2008	23-01-2028	111.5	
		GS-15 & 23	04-09-1998	03-09-2018	80	
		GS-29	30-10-2009	29-10-2029	35	
		GS-29 Extn.	07-12-2011	06-12-2027	137.62	
		GS-49	22-10-2009	21-10-2029	32	
		GS-49 (Add.)	21-11-2012	20-11-2019	20.5	
		GS-49 Extn.	06-09-2013	05-09-2033	77.68	
		Vainateyam	20-09-2008	19-09-2023	221	
		Vainateyam Extn.	11-01-2011	10-01-2029	78	
		Vasistha	15-02-2008	14-02-2028	119	
		Yanam	19-11-2009	18-11-2029	94	
		Yanam (Add.)	21-11-2012	20-11-2019	174.5	**1,285.8**
ONGC	**KG-Onshore**	Achanta	28-11-2008	27-11-2028	14.1	
		Addvipalem-Ponnamanda	30-07-1996	29-07-2016	95	
		Bantumilli Extn.	05-01-2009	04-01-2019	38	

COMPANY / OPERATOR	BASIN	BLOCK NAME	EFFECTIVE DATE OF PML	VALIDITY DATE OF PML	PML AREA (Sq. Km.)	TOTAL PML AREA (Sq. Km.)
		Bantumilli Extn. (Add.)	21-11-2012	20-11-2019	117.67	
		Chintalapalli Extn.	12-11-2009	11-11-2019	18.56	
		Elamanchali	21-02-2011	20-02-2031	6	
		Endamuru-4	30-04-2003	29-04-2023	6	
		Endamuru-7&9	19-05-2003	18-05-2023	7.3	
		Endamuru-I	03-04-2012	02-04-2019	3	
		Enugupalli	06-07-2000	05-07-2020	7	
		Godavari On-land	01-01-2013	31-12-2019	2176	
		Kaikalur-3	10-09-2006	09-09-2026	9	
		Kavitam	12-10-2007	11-10-2027	36	
		Kavitam (Add.)	21-11-2012	20-11-2019	120.35	
		Kesanapalli-1	18-07-2012	17-07-2032	3.7	
		Kesavadasupalem	30-07-2002	29-07-2022	26.5	
		Lakshmaneswaram	30-07-2002	29-07-2022	23.5	
		Lingala	21-12-2009	20-12-2024	7.6	
		Lingala Ext. & Kaikalur-12	30-07-2002	29-07-2022	30	
		Mahadevapatnam	28-11-2008	27-11-2028	138.89	
		Malleswaram	22-11-2011	21-11-2017	241.18	
		Mandapeta	22-08-2015	21-08-2035	40	
		Mandapeta West	01-06-2004	31-05-2024	20	
		Mandapeta-19	01-05-1998	30-04-2018	6	
		Manepalli Extn.	12-11-2009	11-11-2024	10	
		Medapadu-1	08-07-2012	07-07-2032	16.6	
		Mori-1	07-04-2011	06-04-2031	6.5	
		Mori-5	05-06-2014	04-06-2020	1.56	
		Nandigama	31-01-2000	30-01-2020	55	
		Pasarlapudi-8	27-06-2012	26-06-2027	5.5	
		Pasarlapudi-9	23-07-2012	22-07-2032	6.6	
		Penumadam-1	03-04-2012	02-04-2022	9.6	
		Penumadam-2	01-07-2004	31-05-2024	3.2	
		Razole-1 & 2	23-01-2008	22-01-2026	18.85	
		Srikatpalli	30-07-2002	29-07-2022	163	
		Suryaraopeta	30-07-2002	29-07-2022	56	
		Tatipaka-Pasarlapudi	14-02-2014	13-02-2034	62	
		Turputallu	21-11-2012	20-11-2019	37.58	
		Turputallu (Add.)	28-11-2013	27-11-2033	2	
		Vadali	20-04-2010	19-04-2020	4	
		West Godavari	01-01-2013	31-12-2019	1,278.32	**4,927.66**
	Kutch Offshore	GK-28	10-10-2011	09-10-2027	840	
		GK-28 (Add.)	21-11-2012	20-11-2019	402.5	
		KD-Field	01-04-2011	31-03-2026	46	
		KD-Field (Add.)	21-11-2012	20-11-2019	384	**1,672.5**
ONGC	**Mumbai Offshore**	Around D-1 Field	14-09-2009	13-09-2025	384	
		Around D-1 Field (Add.)	21-11-2012	20-11-2019	783	
		B-119 / B-121	15-05-1997	14-05-2017	113.4	
		B-173A	01-06-1998	31-05-2018	51.95	
		B-55	30-06-1999	29-06-2019	135.85	

COMPANY / OPERATOR	BASIN	BLOCK NAME	EFFECTIVE DATE OF PML	VALIDITY DATE OF PML	PML AREA (Sq. Km.)	TOTAL PML AREA (Sq. Km.)
		Bassein Field Extn. (SB-II)	15-06-2005	14-06-2031	22.55	
		BOFF	03-01-2013	02-01-2020	11,595	
		C-37 (BOFF I, II & III)	12-09-2007	11-09-2027	292	
		C-37 (BOFF I, II & III) (Add.)	21-11-2012	20-11-2019	177	
		C-Series Fields	01-04-2006	31-03-2026	3620	
		D-1 Field	31-07-2005	30-07-2025	25.6	
		D-18	01-01-2005	31-12-2024	194	
		D-33 (BOFF I, III, SWBH)	05-09-2006	04-09-2026	134	
		D-33 (BOFF I, III, SWBH) (Add.)	21-11-2012	20-11-2019	469	
		Extn. of NW-Mumbai High	17-11-2008	16-11-2028	531	
		Extn. of NW-Mumbai High (Add.)	21-11-2012	20-11-2019	1,949	
		Heera	20-11-2004	19-11-2024	448.05	
		Mumbai High-South	09-01-2006	08-01-2026	331	
		Mumbai High-South (Add.)	21-11-2012	20-11-2019	471	
		Mumbai High-SW	01-04-2006	31-03-2026	1,064.71	
		Mumbi High-NW	01-04-2006	31-03-2026	1,567.67	
		Neelam	14-11-2009	13-11-2029	213	
		North Heera	04-12-2007	03-12-2022	82	
		North Heera (Add.)	21-11-2012	20-11-2019	39	
		North Tapti Field	09-01-2006	08-01-2026	68.14	
		Ratna (R-12) field	11-02-2001	10-02-2021	67.93	
		S&E of Bassein	01-04-2006	31-03-2026	1,447.31	
		Single PML MH Field	24-10-2010	23-10-2030	1,953.83	
		South Bassein	01-10-1987	30-09-2027	743	
		SW BH Extension	03-01-2013	02-01-2020	482	
		Vasai East	01-04-2006	31-03-2026	103.69	
		West of Bassein	01-04-2006	31-03-2026	835	30,394.68
	Rajasthan	Bakriwala	10-01-2001	09-01-2021	1	
		Chinnewala Tibba	15-10-2003	14-10-2023	114.86	
		Ghotaru Ext. - I	10-01-2001	09-01-2021	564.6	
		Manherra Tibba	01-05-2014	30-04-2034	24	
		South-Kharatar	25-03-2011	24-03-2031	180.39	884.85
	Vindhyan	Nohta-Damoh-Jabera	10-02-2015	09-02-2022	1150	1150
ONGC Total						**55,690. 5286**
OIL	**Assam-Arakan**	Baghjan	14-05-2003	13-05-2023	75	
		Borhapjan	07-08-2001	06-08-2020	87	
		Borhat	13-08-2013	12-08-2033	81	
		Chabua	12-06-2002	11-06-2022	189	
		Dholiya	02-08-2001	17-10-2022	131	
		Dibrugarh	06-08-2001	21-01-2018	186	
		Digboi	14-10-2001	13-10-2021	49.33	
		Dum-Duma BK-D	26-11-2009	25-11-2029	10.36	
		Dum-Duma BK-C	26-11-2009	25-11-2029	85.47	
		Dum-Duma BK-B	26-11-2009	25-11-2029	311.96	

COMPANY / OPERATOR	BASIN	BLOCK NAME	EFFECTIVE DATE OF PML	VALIDITY DATE OF PML	PML AREA (Sq. Km.)	TOTAL PML AREA (Sq. Km.)
		Dum-Duma BK-A	26-11-2009	25-11-2029	98.42	
		Hugrijan	10-01-2001	09-01-2021	725.2	
		Mechaki	19-05-2003	18-05-2023	195	
		Mechaki Extnension	06-07-2010	05-07-2030	9	
		Moran	01-11-2006	09-01-2021	429.42	
		Moran Extn.	01-11-2006	31-10-2026	560	
		Nahorkatiya	04-02-2004	03-02-2024	1.42	
		Nahorkatiya Extn.	10-01-2011	09-01-2031	165.76	
		Ningru	27-11-2003	26-11-2023	540.67	
		Ningru Extension	04-06-2003	03-06-2023	75	
		Sapkaint + Dumduma Extn (NF)	24-12-2007	23-12-2027	105	
		Tinsukia	02-08-2001	06-12-2021	250	
		Tinsukia Extension	17-05-2003	16-05-2023	185	**4,546.01**
	Rajasthan	Baghewala	30-05-2003	29-05-2023	210	
		Dandewala (Jaisalmer)	01-01-2016	31-12-2035	250	**460**
OIL TOTAL PML AREA						**5,006.01**
ONGC TOTAL PML AREA						
NOMINATION (OIL+ONGC) TOTAL PML AREA						**60,696.54**
Pvt. / JV TOTAL PML AREA						**9,404.44**
TOTAL OF PMLs AWARDED IN THE COUNTRY (NOC'S & PVT. / JV COMPANIES)						**70,100.98**

Table 8.21: PML AREAS UNDER OPERATION IN PSC REGIME (AS ON 31.03.2018)

No.	Operator	Basin	Block Name	Field Name	Pre-NELP/ Field/NELP	PML Effective Date	PML Area (Sq. Km.)	Total Area (Sq.km.)
1	CAIRN	K-G Offshore	Ravva	Ravva- offshore	Field	28-10-1994	331.26	**3,756.94**
2		K-G Onland		Ravva- onland	Field	04-07-1997		
3		Gulf of Cambay	CB-OS/2	Lakshmi	Pre-NELP	01-01-2002	121.06	
4				Gauri		01-04-2004	52.7	
5				Ambe		01-04-2004	107.47	
6				CBX		-	33.28	
7		Rajasthan	RJ-ON-90/1	DA1	Pre-NELP	20-06-2005	1859	
8				DA2		15-11-2006	430.17	
9				DA3		06-11-2007	822	
10	ONGC	Cambay	CB-ONN-2002/1	West Patan	NELP	30-03-2015	17	**643.46**
11			CB-ONN-2001/1	Nadiad – 1	NELP	07-05-2015	26	
12			CB-ONN-2004/1	Karan nagar - 1	NELP	20-03-2015	9.73	
13			CB-ONN-2004/2	Vadatal-1	NELP	20-03-2015	14.37	
14				Vadatal- 3 & 5	NELP	14-06-2017	268.12	
15			CB-OSN-2003/1	Aliabet	NELP	04-07-2017	243	
16			CB-ONN-2004/3	Uber-2	NELP	11.11.2017	10.78	
17			KG-ONN-2003/1	Nagayalanka	NELP	25-09-2017	54.46	
18	BG-RIL-ONGC	Mumbai Off.	Mid & South Tapti	Mid & South Tapti	Field	22-12-1994	1471	**2678**
19			Panna	Panna	Field	22-12-1994	430	
20			Mukta	Mukta	Field	22-12-1994	777	
21	GEOENPRO	Assam-Arakan	Kharsang	Kharsang	Field	21-10-1997	10	**10**

No.	Operator	Basin	Block Name	Field Name	Pre-NELP/ Field/NELP	PML Effective Date	PML Area (Sq. Km.)	Total Area (Sq.km.)
22	ACIL	Assam-Arakan	Amguri	Amguri	Field	01-11-2003	52.75	**52.75**
23	HOEC	Cambay	Asjol	Asjol	Field	09-04-1996	15	**200.88**
24			N. Balol	N. Balol	Field	21-03-2002	27.3	
25			CB-ON/7	Pramoda & Palej	Pre-NELP	21-09-2005	7.64	
26		Cauvery Off.	PY-1	PY-1	Field	06-10-1995	75	
27		Assam-Arakan	AAP-ON-94/1	Dirok	Pre-NELP	25-08-2017	75.94	
28	Sun Petro-chemical private Ltd.	Cambay	Baola	Baola	Field	12-12-1996	4	**16.7**
29			Modhera	Modhera	Field	19-05-2007	12.7	
30	JTI	Cambay	Wavel	Wavel	Field	20-02-1995	9	**57**
31			Dholka	Dholka	Field	20-02-1995	48	
32	NIKO	Cambay	Hazira	Hazira	Field	23-09-1994	50	**74.25**
33			CB-ONN-2000/2	NS-A	NELP	28-12-2004	20.22	
34				Bheema		28-12-2004	4.03	
35	SELAN	Cambay	Lohar	Lohar	Field	13-03-1995	5	**189.65**
36			Indrora	Indrora	Field	13-03-1995	130	
37			Bakrol	Bakrol	Field	13-03-1995	36	
38			Karjisan	Karjisan	Field	23-11-2005	5	
39			Ognaj	Ognaj	Field	05-08-2008	13.65	
40	GNRL	Cambay	Kanawara	Kanawara	Field	04-02-2003	6.3	**34.15**
41			Dholasan	Dholasan	Field	27-02-2006	8.8	
42			Allora	Allora	Field	16-05-2003	6.85	
43			N. Kathana	N. Kathana	Field	11-06-2003	12.2	
44	HYDROCAR-BON- RES. DEV.-PPC	Cambay	Sanganpur	Sanganpur	Field	27-02-2002	4.4	**4.4**
45	OILEX	Cambay	Cambay	Cambay	Field	23-09-1994	161	**167**
46			Bhandut	Bhandut	Field	23-09-1994	6	
47	GSPCL	Cambay	Unawa	Unawa	Field	19-05-2003	5.65	**100.41**
48			CB-ONN-2000/1	Ingoli/SE-01 Field	NELP	05-09-2005	15.71	
49			CB-ONN-2003/2	Ank-21	NELP	25-02-2014	1.6	
50				Ank-40s	NELP	15-09-2015	11.09	
51			CB-ONN-2002/3	Mirroli	NELP	25-02-2014	3.29	
52			CB-ONN-2002/3	Sanand	NELP	20-03-2015	18	
53			CB-ON/2	Tarapur#1	Pre-NELP	12-02-2009		
54				Tarapur#G	Pre-NELP	03-03-2014	7.57	
55				Tarapur#6	Pre-NELP	09-06-2015		
56		KG Off.	KG-OSN-2001/3	DDW	NELP	11-08-2010	37.5	
57	FOCUS	Rajasthan	RJ-ON/6	SGL	Pre-NELP	23-06-2010	176	**176**
58	HARDY	Cauvery Off.	CY-OS-90/1	PY-3	Pre-NELP	20-07-1998	81	**81**
59	RIL	KG Off.	KG-DWN-98/3	D-1&3	NELP	02-03-2005	339.4	**1,148.12**
60				D-26		17-04-2008	49.72	
61				D-2, 6,19 & 22		21-06-2012	229	
62				D-34		30-09-2013	530	
63	ESSAR	Cambay	CB-ON/3	ESU	Pre-NELP	23-04-2007	7.81	**13.73**
64				EEU		21-10-2016	1.41	
65				ENS		09-11-2016	2.93	
66				ENP		13-12-2016	1.58	
Total of PMLs awarded in PSC regime								**9,404.44**

Table 8.22: Fiscal Terms of Upstream Oil and Gas Bid Rounds

Item	Nomination	Pre-NELP Exploration Blocks	Small fields,1992	Medium fields,1992
Bonus	NA	No signature or production bonus	Signature/ production bonuses payable by companies to ONGC and OIL	Signature/production bonuses payable by coventures
Royalty	For Crude Oil: 20% for onshore 10% for offshore 10% for deep water Natural Gas: 10% for all onshore and offshore	No royalty payment OR No royalty payment No custom duty	All statutory levies including royalty, cess, customs duties, etc. payable by Contractor	All statutory levies, including royalty, cess, customs duties, sales tax, etc. payable by Coventure
Government of India (GoI) interest	Government owned	"Government of India or its nominee will have carried interest of 30% from the date of signing of contract, with the option to convert it into a working interest after the decision to proceed with the development and production of discovered hydrocarbons has been taken GoI or its nominee may also acquire 10% working interest in any block it chooses at the time of signing of contract, thereby sharing 10% of exploration cost OR ONGC or OIL will have a participating interest of between 25% to 40% in the JV from the date of signing of contract, thereby sharing the exploration cost in proportion to their participating interest"	ONGC/OIL would have no participating or carried interest in the Contract. NOCs not allowed to bid	ONGC/OIL will have upto 40% Participating Interest
Pricing of crude oil and natural gas	As per prevailing rate and subsidy arrangement	International market price for oil produced The pricing formula for associated gas would be on a cost plus basis, while for non-associated gas it would be related to the international price of fuel oil, the exact relationship being negotiable. The price payable for both associated and non-associated gas would not exceed the price paid to the producing National Oil Companies (exclusive of cess, taxes and royalty) OR The pricing formula for gas would be on internationally accepted principles Arrangement for marketing of the gas produced would be negotiable between GoI and the Company OR The JV will have freedom to make arrangements for marketing the gas	First right of refusal to Government of India in respect of purchase of crude oil produced. International market price for oil produced.	First right of refusal to Government of India in respect of purchase of crude oil & natural gas produced International market price for oil produced and in case of natural gas, related to international price of fuel oil for Non-associated gas and determined on a cost plus basis for associated gas

	Discovered fields,1993	NELP (1999 till 2016)	Discovered Small Field Bid Round 2016	Open Accreage Licensing Programme Bid Round I under HELP	Discovered Small Field Bid Round II
	Signature/production bonuses payable by coventures	No signature, discovery or production bonus	No signature, discovery or production bonus	No signature, discovery or production bonus	No signature, discovery or production bonus
	All statutory levies, including royalty, cess , customs duties, etc. payable	Royalty : Oil- 12.5% for on- shore,10% for offshore, 5% for deep water; Gas- 10% onshore, 10% offshore, 5% for deep water ad valorem applicable to all companies No custom duty on imports for Petroleum Operation Income Tax holiday of 7 years for Mineral Oil	Royalty : For Crude Oil- 12.5% for onshore 10% for Shallow water 5% for Deep water* For Natural Gas- 10% for onshore 10% for Shallow water 5% for deep water* *for first 7 year of commencement of production in a Contract Area and 10% thereafter No custom duty on imports for Petroleum Operations	Royalty : For Crude Oil- 12.5% for onshore 7.5% for Shallow water 5% for Deep water 2% for Ultra Deep water For Natural Gas- 10% for onshore 7.5% for Shallow water 5% for deep water 2% for Ultra Deep water No royalty for first 7 year in Deep and Ultra Deep Water. No custom duty on imports for Petroleum Operations	Onland - 12.5% of well head price on ex-royalty basis Shallow Water - 7.5 % of well head price on ex-royalty basis Deep water first 7 years - Zero Royalty Deep water after 7 years - Royalty of 5% of well head price No custom duty on imports for Petroleum Operations
	ONGC/OIL will have up to 40 % Participating Interest in medium size fields ONGC/OIL would have no participating or carried interest in the Contracts of small fields. NOCs not allowed to bid for small size fields	No State participation or any carried interest NOCs to compete for acreage with Private	No State Participation or any carried interest, NOCs to compete for acreage with Private	No State Participation or any carried interest, NOCs to compete for acreage with Private	No State Participation or any carried interest, NOCs to compete for acreage with Private
	Domestic market would have the first call on natural gas produced, arrangements for marketing of gas produced would be negotiable between GoI and Company. The pricing would be based on internationally accepted principles	International Crude Oil price at arm's length Gas pricing requires approval of GoI	Full Marketing and pricing freedom subject to floor price as per Article 19 of Model Revenue Sharing Contract (MRSC)	Full Marketing and pricing freedom subject to floor price as per Article 19 of Model Revenue Sharing Contract (MRSC)	Full Marketing and pricing freedom subject to floor price as per Article 19 of Model Revenue Sharing Contract (MRSC)

Item	Nomination	Pre-NELP Exploration Blocks	Small fields,1992	Medium fields,1992
Sharing of profit	In the pattern of shareholding	Profit oil shall be bid based on sliding scale tied to post tax rates of return or multiples of investment recovered	"Sharing of the profit oil shall be bid, based on a sliding scale tied to post tax rates of return or multiples of investment recovered and shall be specified in each Contract"	NA
Minimum expenditure	NA	No minimum expenditure commitment No ring fencing of blocks for corporate tax purposes	Percentage of annual production of crude oil expected to be allocated for recovery of costs should be indicated in the offer	Preferential treatment to companies taking up exploration blocks under round the year bidding scheme of the Government of India
Operatorship	NOC (ONGC/ OIL)	Company will be operator for exploration and appraisal period Time of transfer of operatorship to GoI or its nominee during development and production phase is negotiable OR Operatorship is negotiable Time of transfer of operatorship to ONGC/OIL during development and production phase is also negotiable OR NA	As per Article 7 of PSC	
Exploration for Conventional & Unconventional	Organlly exploration for conventional was allowed but as per GOI Guidelines 2018 exploration for both conventional and unconventional is allowed	Organlly exploration for conventional was allowed but as per GOI Guidelines 2018 exploration for both conventional and unconventional is allowed	Organlly exploration for conventional was allowed but as per GOI Guidelines 2018 exploration for both conventional and unconventional is allowed	Organlly exploration for conventional was allowed but as per GOI Guidelines 2018 exploration for both conventional and unconventional is allowed

	Discovered fields,1993	NELP (1999 till 2016)	Discovered Small Field Bid Round 2016	Open Accreage Licensing Programme Bid Round I under HELP	Discovered Small Field Bid Round II
	Sharing of the profit oil/gas would have to be indicated in the offer, based on a sliding scale tied to post tax rates of return or multiples of investment recovered as in the Rounds of bidding for exploration blocks	Sharing of Profit Petroleum with Govt. on biddable pre-tax investment multiple NELP I to VI: Step ladder based system of Investment multiple for GoI Share NELP VII to IX: Linear based system of Investment multiple for GoI Share	Profit Sharing has been replaced by Revenue Sharing Linear based system of Investment multiple for GoI Share	Profit Sharing has been replaced by Revenue Sharing Linear based system of Investment multiple for GoI Share	Profit Sharing has been replaced by Revenue Sharing Linear based system of Investment multiple for GoI Share
	Flexibility of negotiations: The terms and conditions are indicative and companies can state in their bids the specific assumptions made in respect of these terms. While the Govt. of India has a flexible approach to these terms, it reserves to itself the right to accept or reject any bid in its sole discretion	No ring fencing of expenditures Tax Incentives for Site Restoration Fund Scheme (SRFS)	No minimum. Companies to bid for work programme LDs (Liquidity Damage) value specified	No minimum. Companies to bid for work programme LDs (Liquidity Damage) value specified	No minimum. Companies to bid for work programme LDs (Liquidity Damage) value specified
		As per Article 7 of PSC	As per Article 7 of RSC Operator required no qualification / experience	As per Article 7 of RSC Any Company Single or consortium with minimum qualification / experience	As per Article 7 of RSC Operator required no qualification /experience
	Organlly exploration for conventional was allowed but as per GOI Guidelines 2018 exploration for both conventional and unconventional is allowed	Organlly exploration for conventional was allowed but as per GOI Guidelines 2018 exploration for both conventional and unconventional is allowed	Exploration for both conventional and unconventional is allowed	Exploration for both conventional and unconventional is allowed	Exploration for both conventional and unconventional is allowed

Table 8.23: Details of Fiscal Terms under which blocks were offered under various Pre-NELP Exploration Rounds in India

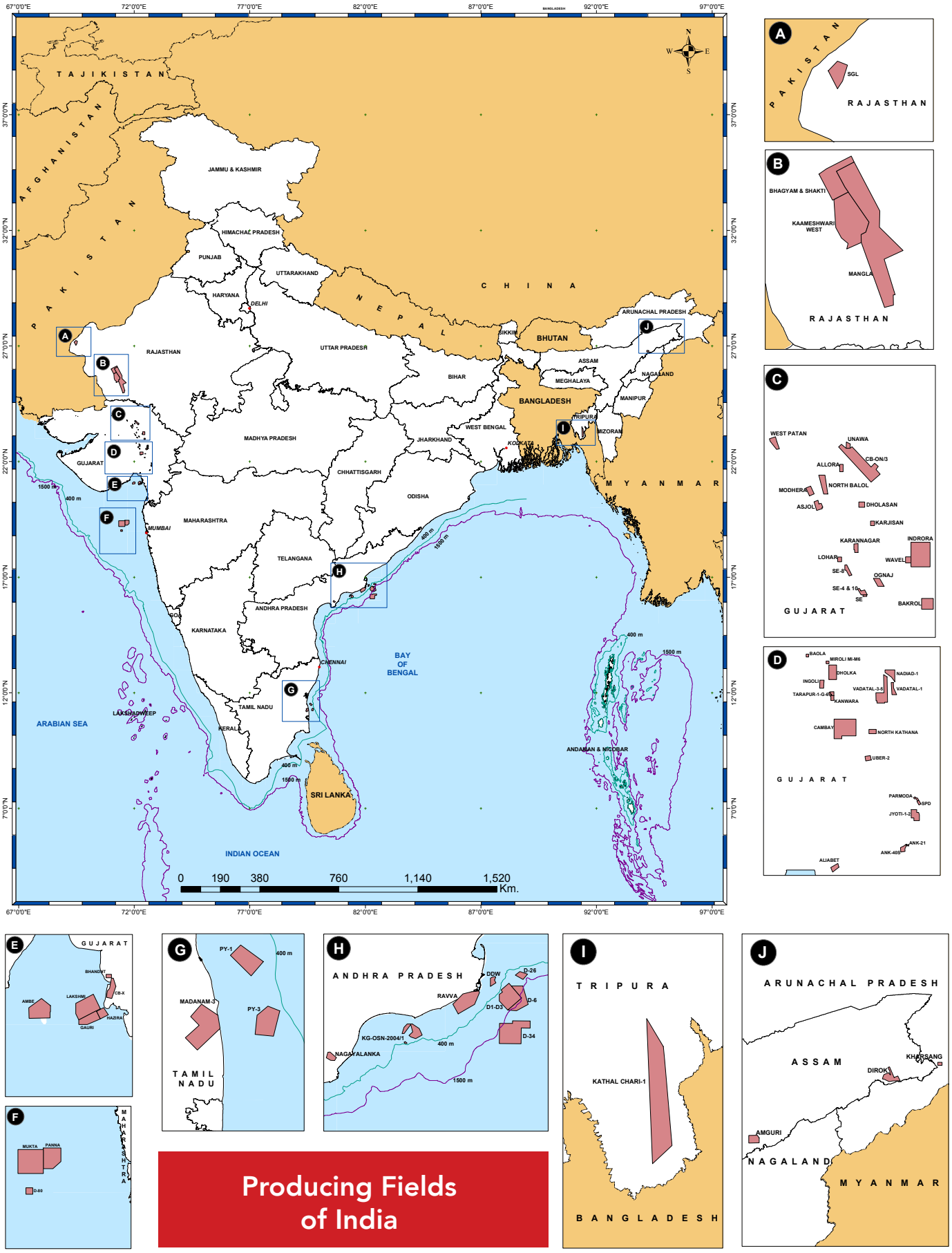
Item	Round,1991	Round,1993	Round,1993
Bonus	No signature or production bonus	No signature or production bonus	No signature or production bonus
Royalty	No royalty payment	No royalty payment No custom duty	No royalty payment
Government of India (GoI) interest	GoI or its nominee will have carried interest of 30% from the date of signing of contract, with the option to convert it into a working interest after the decision to proceed with the development and production of discovered hydrocarbons has been taken. GoI or its nominee may also acquire 10% working interest in any block it chooses at the time of signing of contract, thereby sharing 10% of exploration cost	GoI or its nominee will have carried interest of 30% from the date of signing of contract, with the option to convert it into a working interest after the decision to proceed with the development and production of discovered hydrocarbons has been taken. GoI or its nominee may also acquire 10% working interest in any block it chooses at the time of signing of contract, thereby sharing 10% of exploration cost.	GoI or its nominee will have carried interest of 30% from the date of signing of contract, with the option to convert it into a working interest after the decision to proceed with the development and production of discovered hydrocarbons has been taken. GoI or its nominee may also acquire 10% working interest in any block it chooses at the time of signing of contract, thereby sharing 10% of exploration cost.
Pricing of crude oil and natural gas	International market price for oil produced. The pricing formula for associated gas would be on a cost plus basis, while for non-associated gas it would be related to the international price of fuel oil, the exact relationship being negotiable. The price payable for both associated and non-associated gas would not exceed the price paid to the producer National Oil Companies (exclusive of cess, taxes and royalty).	International market price for oil produced. The pricing formula for associated gas would be on a cost plus basis, while for non-associated gas it would be related to the international price of fuel oil, the exact relationship being negotiable. The price payable for both associated and non-associated gas would not exceed the price paid to the producer National Oil Companies (exclusive of cess, taxes and royalty)	International market price for oil produced. The pricing formula for gas would be on internationally accepted principles. Arrangement for marketing of the gas produced would be negotiable between the GoI and the Company.
Sharing of profit	Profit oil shall be bid based on sliding scale tied to post tax rates of return or multiples of investment recovered	Profit oil shall be bid based on sliding scale tied to post tax rates of return or multiples of investment recovered.	Profit oil and profit gas share based on sliding scale tied to post tax rates of return or multiples of investment recovered.
Minimum expenditure	No minimum expenditure commitment No ring fencing of blocks for corporate tax purposes		No minimum expenditure commitment during the exploration period No ring fencing of blocks for corporate tax purposes.
Operatorship	NA	Company will be operator for exploration and appraisal period. Time of transfer of operatorship to GoI or its nominee during development and production phase is negotiable	Company will be operator for exploration and appraisal period. Time of transfer of operatorship to GoI or its nominee during development and production phase is negotiable

	Round,1994	Round,1994	JV Exploration Program,1995
	No signature or production bonus	No signature or production bonus	No signature or production bonus
	No royalty payment	No royalty payment	No royalty payment/cess payment
	GoI or its nominee will have carried interest of 30% from the date of signing of contract, with the option to convert it into a working interest after the decision to proceed with the development and production of discovered hydrocarbons has been taken. GoI or its nominee may also acquire 10% working interest in any block it chooses at the time of signing of contract, thereby sharing 10% of exploration cost.	GoI or its nominee will have carried interest of 30% from the date of signing of contract, with the option to convert it into a working interest after the decision to proceed with the development and production of discovered hydrocarbons has been taken. GoI or its nominee may also acquire 10% working interest in any block it chooses at the time of signing of contract, thereby sharing 10% of exploration cost.	ONGC or OIL will have a participating interest of between 25% to 40% in the JV from the date of signing of contract, thereby sharing the exploration cost in proportion to their participating interest
	International market price for oil produced. The pricing formula for gas would be on internationally accepted principles Arrangement for marketing of the gas produced would be negotiable between the GoI and the Company.	International market price for oil produced. The pricing formula for gas would be on internationally accepted principles Arrangement for marketing of the gas produced would be negotiable between the GoI and the Company.	International market price for oil produced. The JV will have freedom to make arrangements for marketing the gas.
	Profit oil and profit gas share based on sliding scale tied to post tax rates of return or multiples of investment recovered.	Profit oil and profit gas share based on sliding scale tied to post tax rates of return or multiples of investment recovered.	Sharing of Profit petroleum based on sliding scale tied to post tax rates of return or multiples of investment recovered.
	No minimum expenditure commitment during the exploration period No ring fencing of blocks for corporate tax purposes		
	Company will be operator for exploration and appraisal period. Time of transfer of operatorship to GoI or its nominee during development and production phase is negotiable	Company will be operator for exploration and appraisal period. Time of transfer of operatorship to GoI or its nominee during development and production phase is negotiable	Operatorship is negotiable Time of transfer of operatorship to ONGC/ OIL during development and production phase is also negotiable

Table 8.24: PROGRESSIVE MODIFICATIONS OF TERMS & CONDITIONS IN DIFFERENT NELP ROUNDS

Item	NELP-I to V	NELP-VI	NELP-VII	NELP-VIII & IX
Categorization of blocks	Blocks categorized as Deepwater blocks, shallow offshore blocks and onland blocks. No sub-categorization of blocks.	Each category is sub-categorized as Type A and Type B.	Sub-categories Type A and Type B continued New category Type S with small onland blocks of size less than 200 sq. km. introduced For Type S blocks, Technical capability is not considered for pre- qualification or evaluation.	Type A & B classification among onland, shallow water and deep water blocks removed. Category Type S continued.
Exploration phases	Three exploration phases	Two exploration phases	Two exploration phases	Two exploration phases
Work Program	No mandatory work program	Mandatory work specified in the NIO for some of the blocks.	Mandatory work specified in the NIO for some of the blocks.	Mandatory work specified in the NIO for some of the blocks.
Bid Evaluation Criteria	1. Technical Capability 2. Financial Capability 3. Work Program 4. Fiscal Package	1. Technical Capability 2. Work Program 3. Fiscal Package	1. Technical Capability 2. Work Program 3. Fiscal Package	1. Technical Capability 2. Work Program 3. Fiscal Package
Investment Multiple and GoI share	Stair-step based system of Investment multiple for GoI Share	Stair-step based system of Investment multiple for GoI Share	Linear based system of Investment multiple for GoI Share	Linear based system of Investment multiple for GoI Share
Part Relinquishment	Part area relinquishment, after phase –I and after phase-II	Part area relinquishment, after phase–I	Part area relinquishment, after phase–I	No part area relinquishment after phase-I
Liquidated Damages	No Liquidated Damages (LD) specified. Penalties for unfinished work program computed case-to-case basis.	No Liquidated Damages (LD) specified. Penalties for unfinished work program computed case-to-case basis.	No Liquidated Damages (LD) specified. Penalties for unfinished work program computed case-to-case basis.	Liquidated Damages (LD) specified upfront for unfinished work program
Bank Guarantee	Bank Guarantee @ 35% of Annual work program.	Bank Guarantee @ 35% of Annual work program.	Bank Guarantee @ 35% of Annual work program.	One time BG introduced @ 7.5% of total committed work program.
Bid Bond	No Bid bond to be furnished at the time of submission of bids.	No Bid bond to be furnished at the time of submission of bids.	No Bid bond to be furnished at the time of submission of bids.	Bid bond to be submitted at the time of submission of bids.

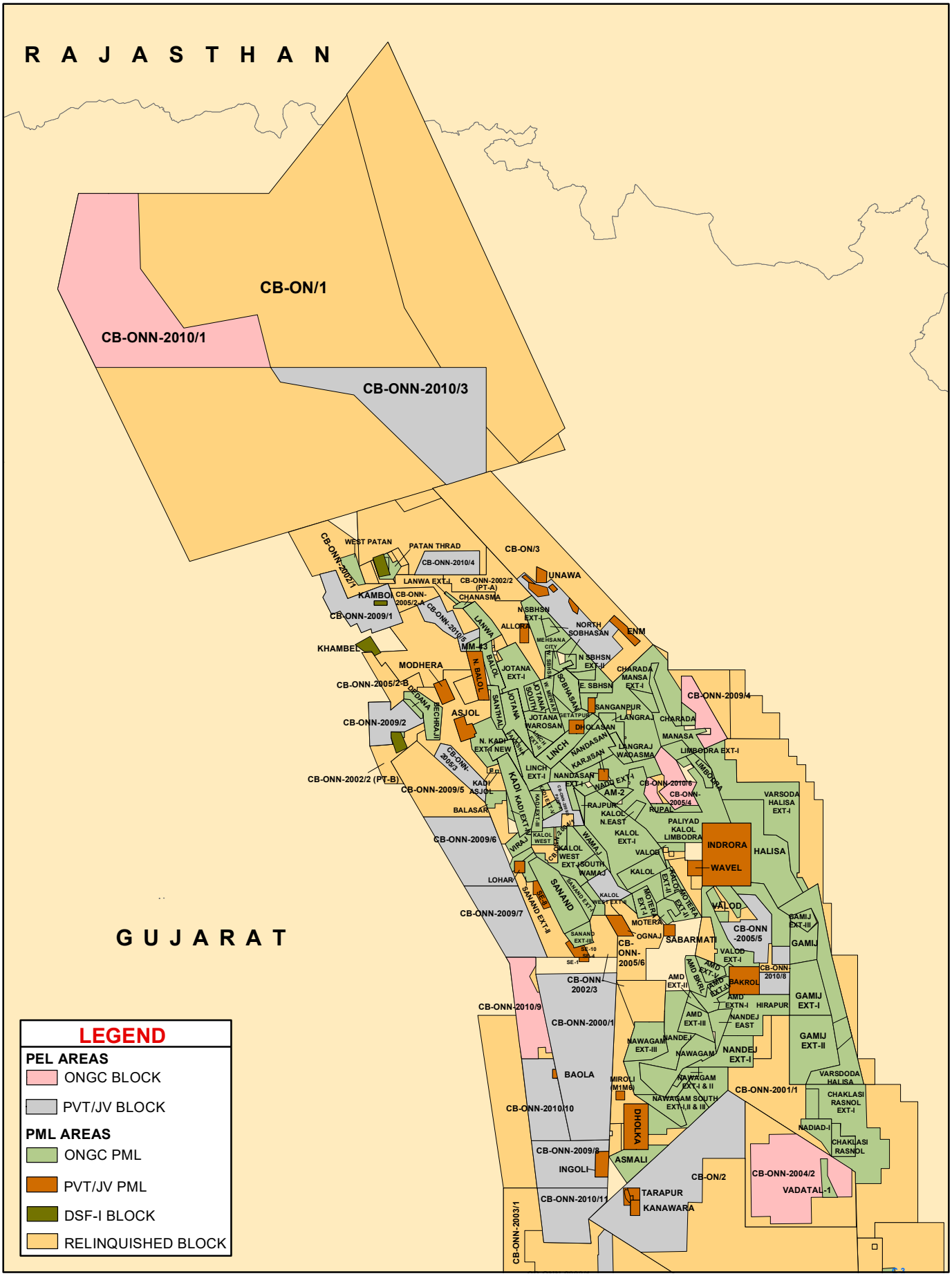
8.2 Maps of Awarded Acreages



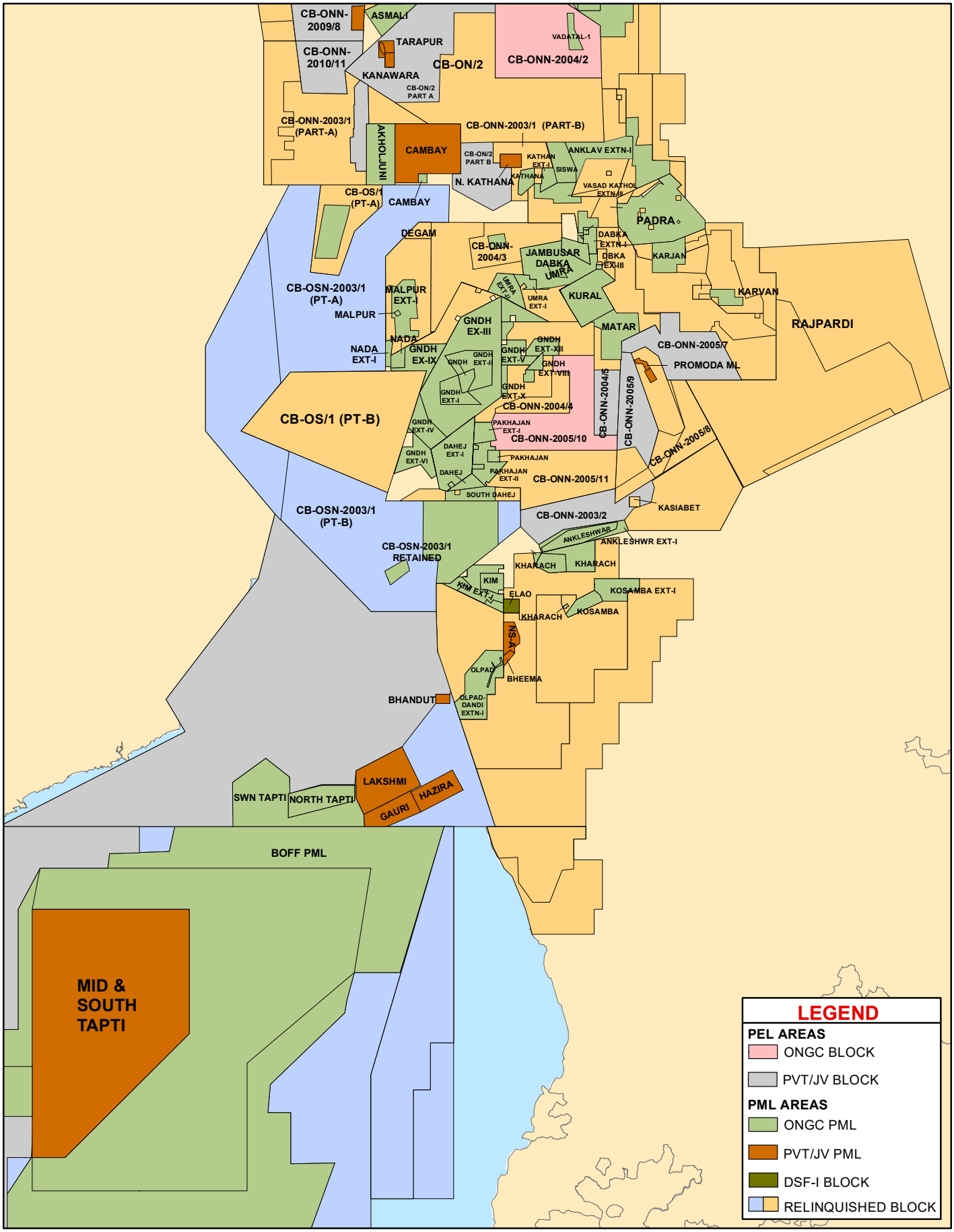
Producing Fields of India

1. RAJASTHAN BASIN

2. NORTH CAMBAY BASIN

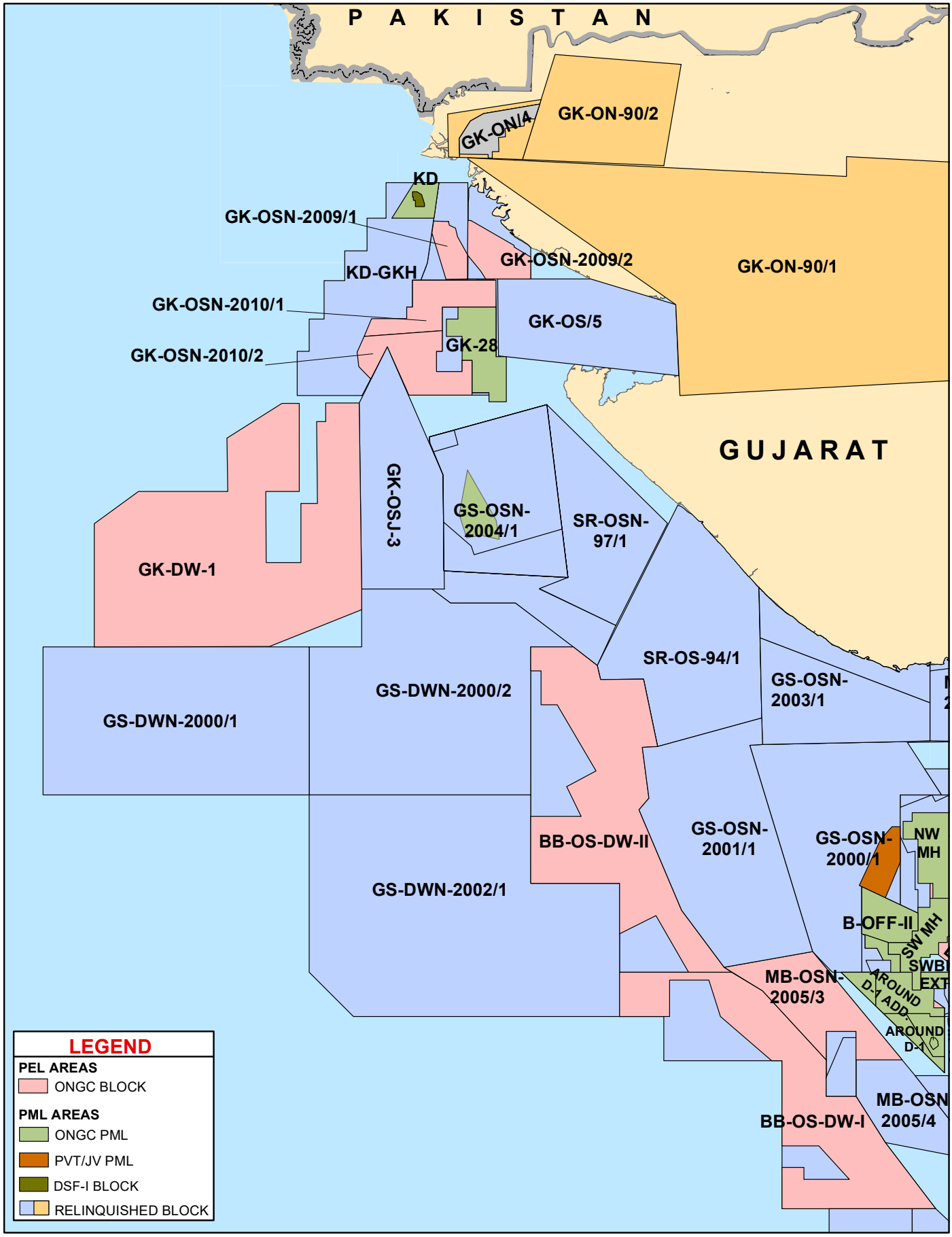


3. SOUTH CAMBAY BASIN

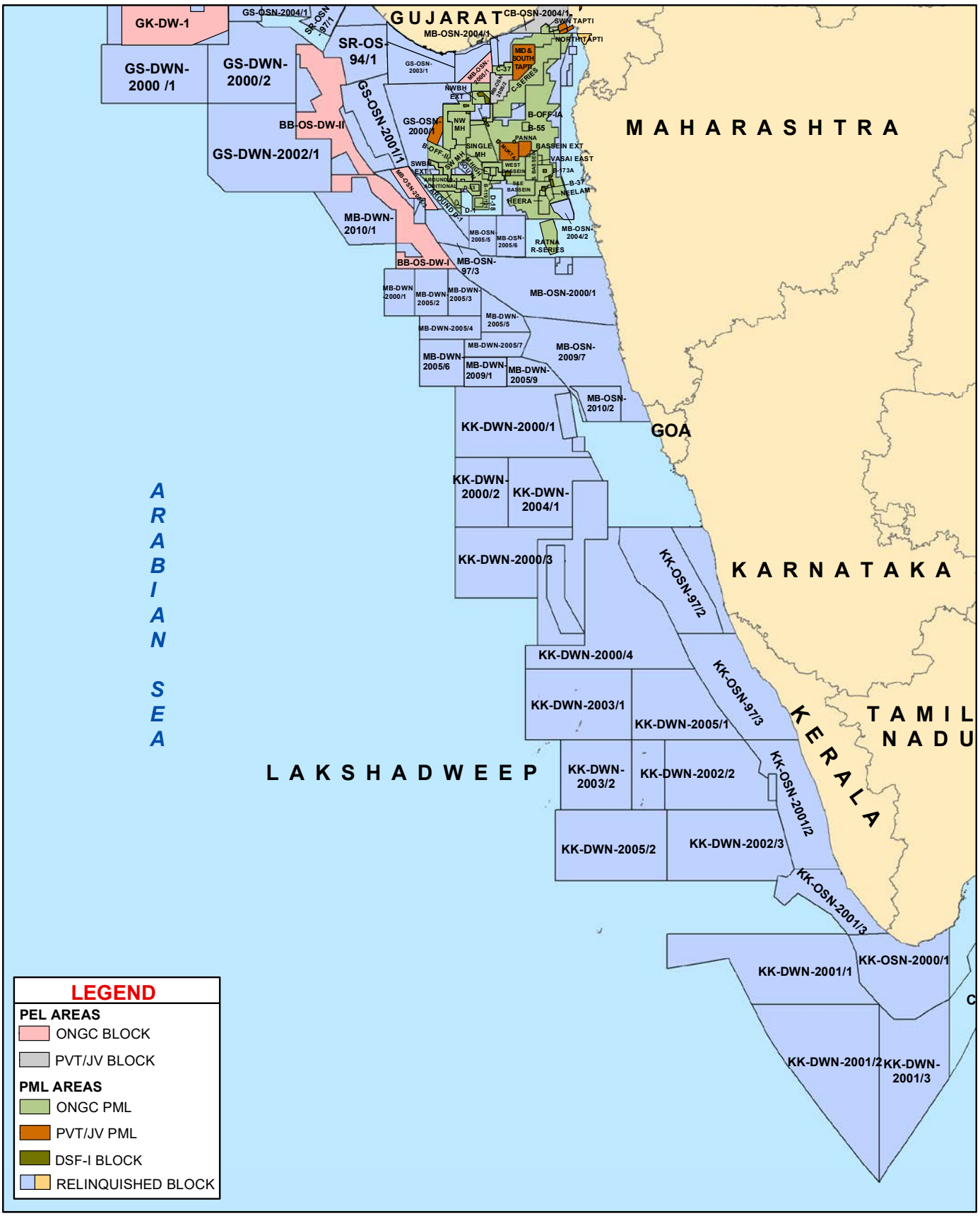


Back to Content Page

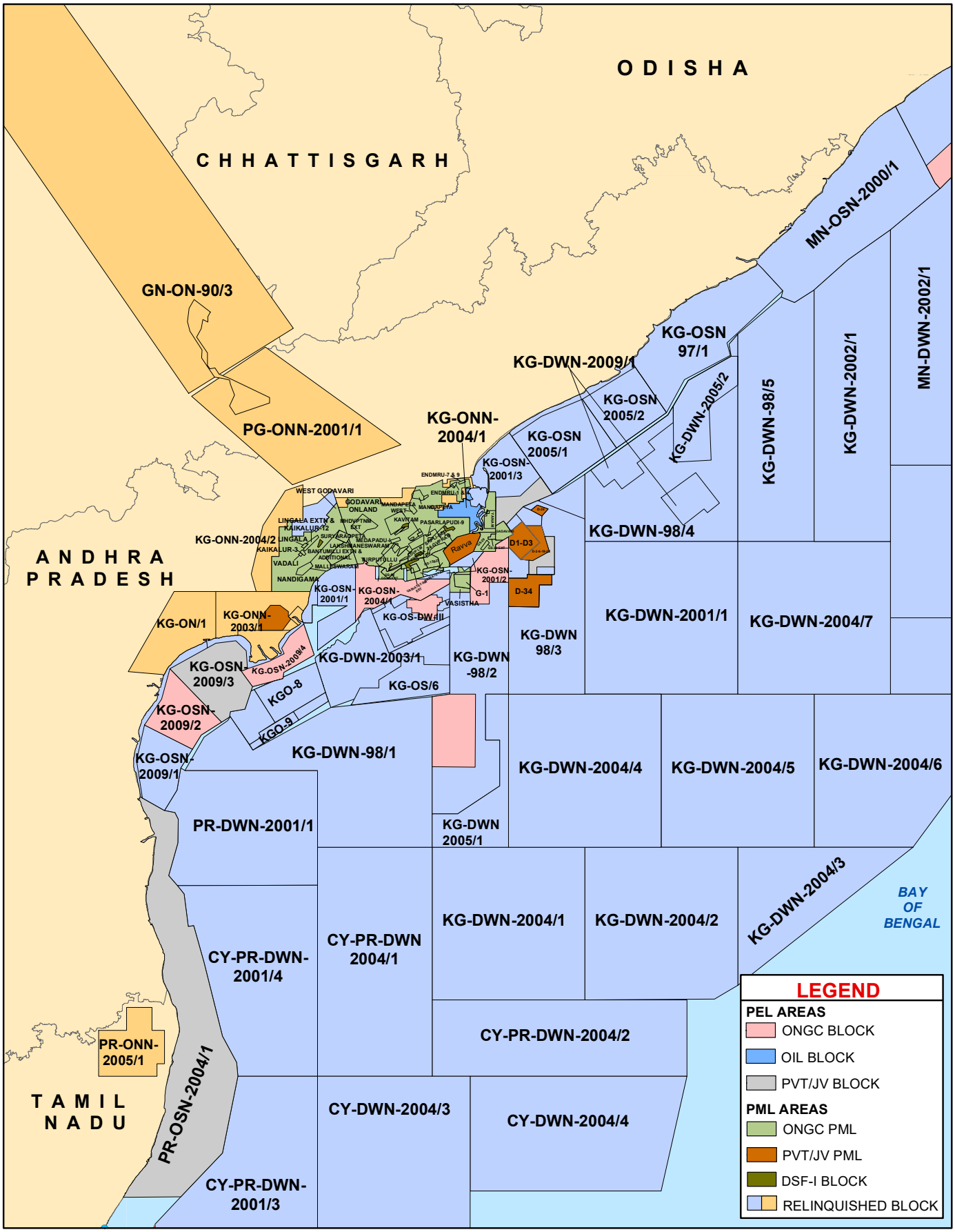
4. KUTCH-SAURASHTRA BASIN



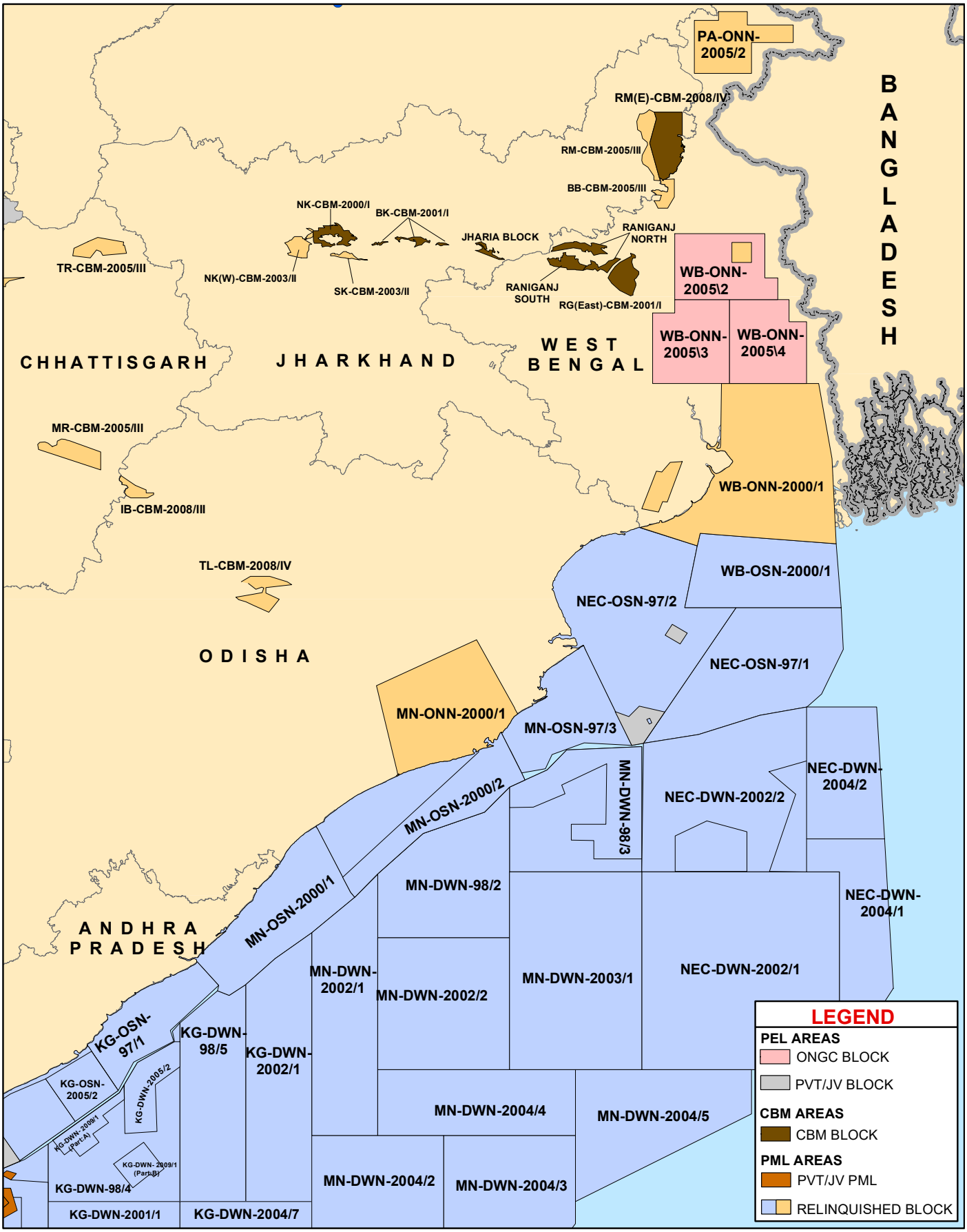
5. MUMBAI OFFSHORE & KERALA - KONKAN BASIN



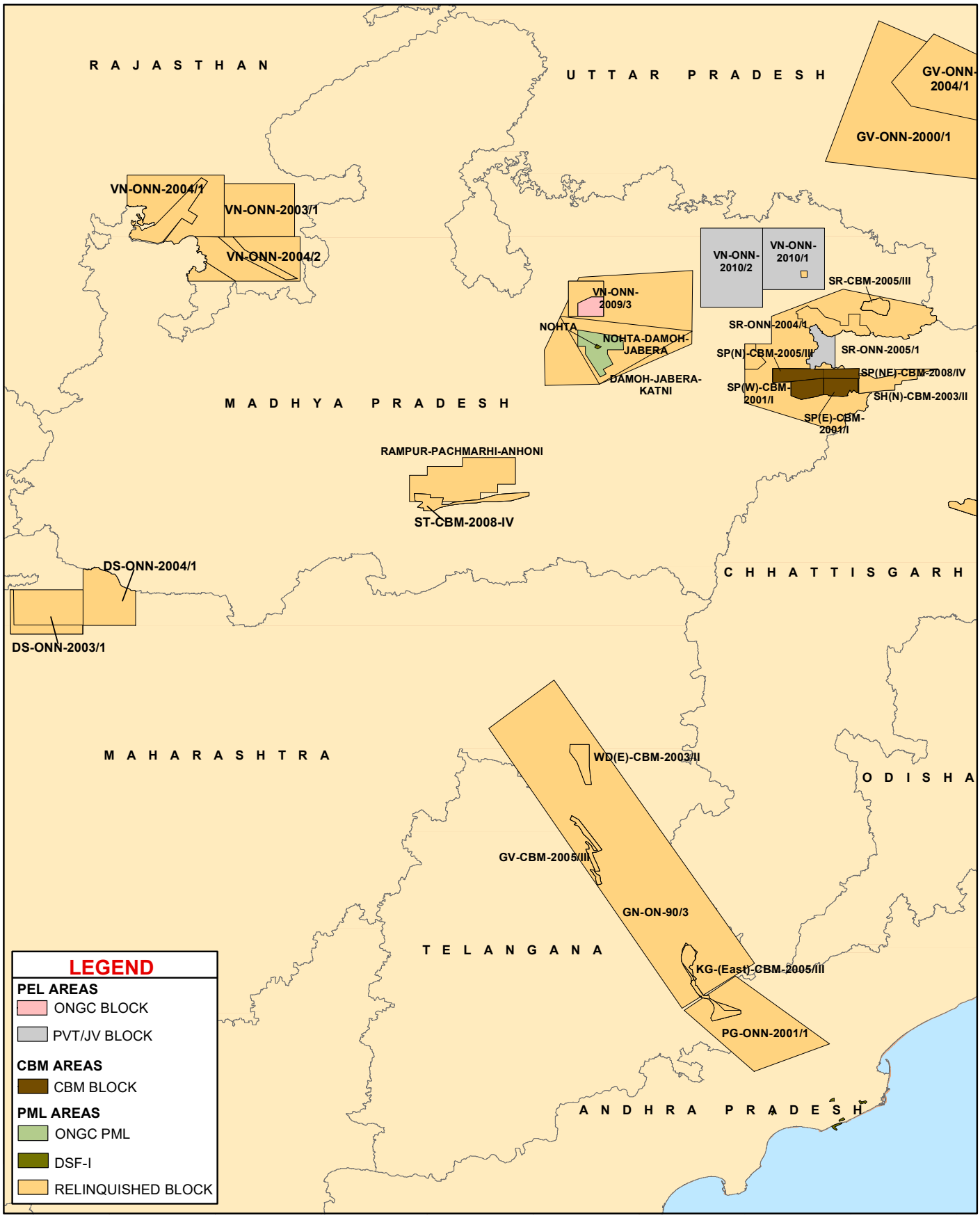
6. KRISHNA-GODAVARI BASIN



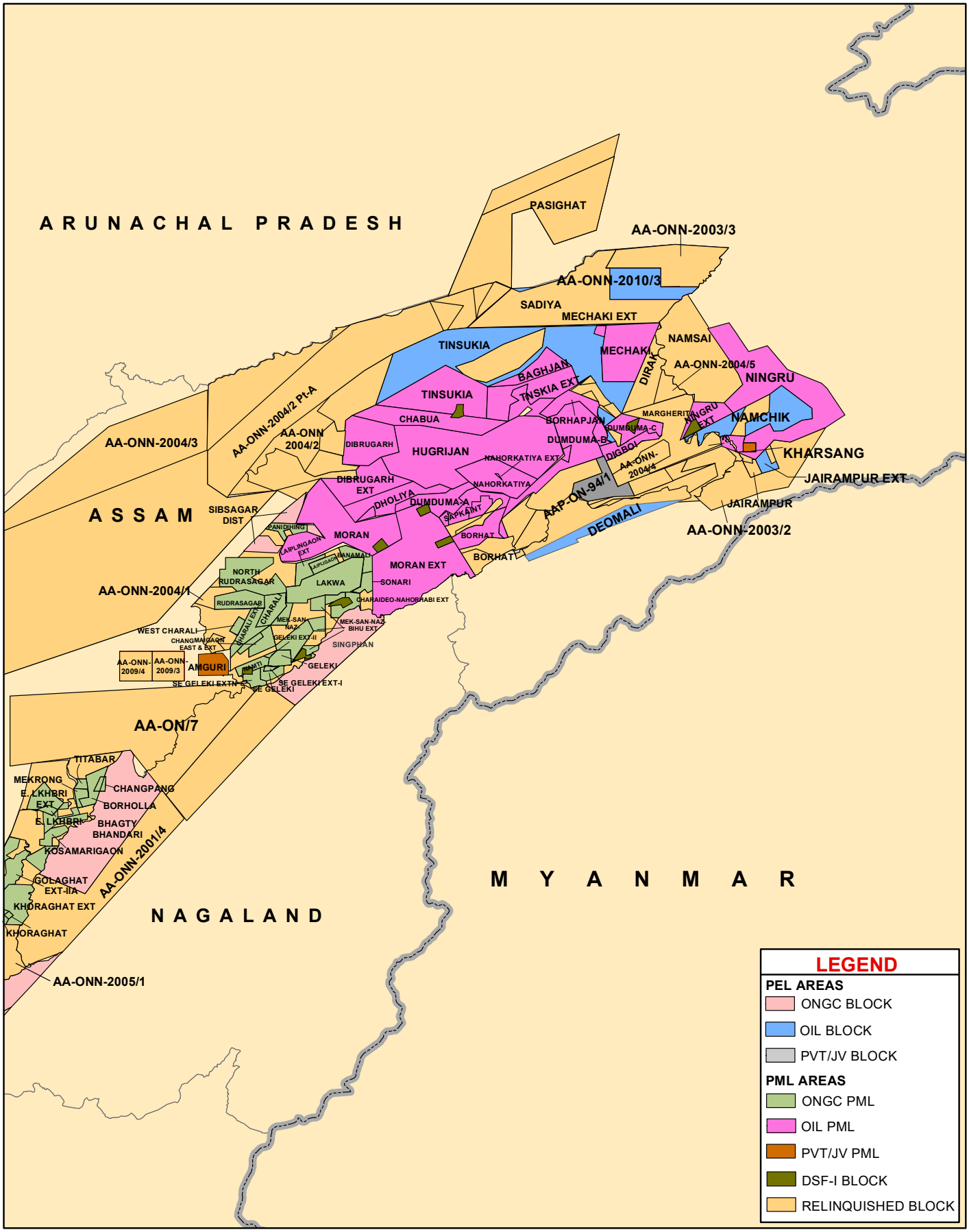
7. MAHANADI - NEC - BENGAL - DAMODAR BASIN



8. SATPURA - PRANHITA GODAVARI BASINS

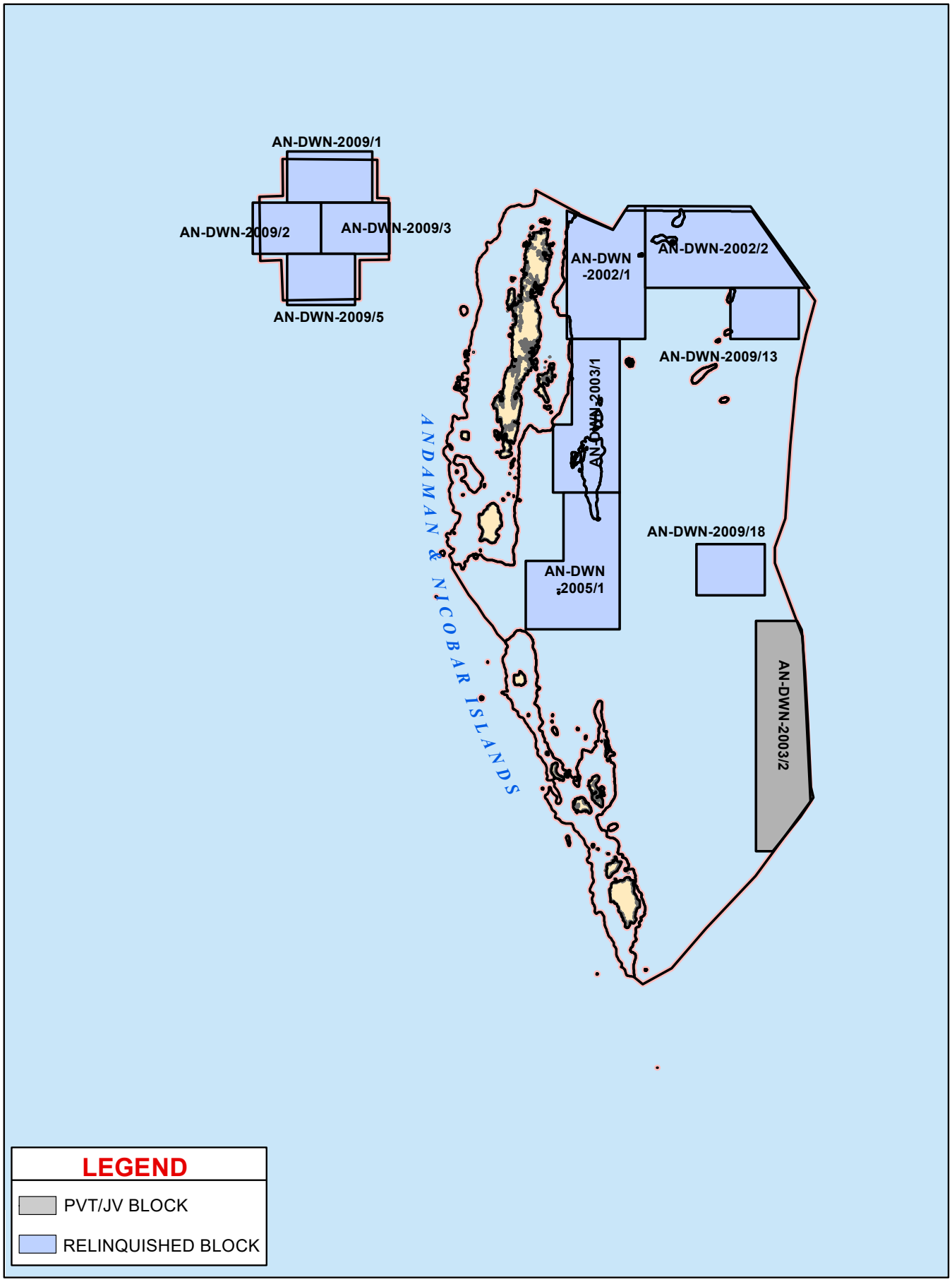


9. UPPER ASSAM ARAKAN BASIN

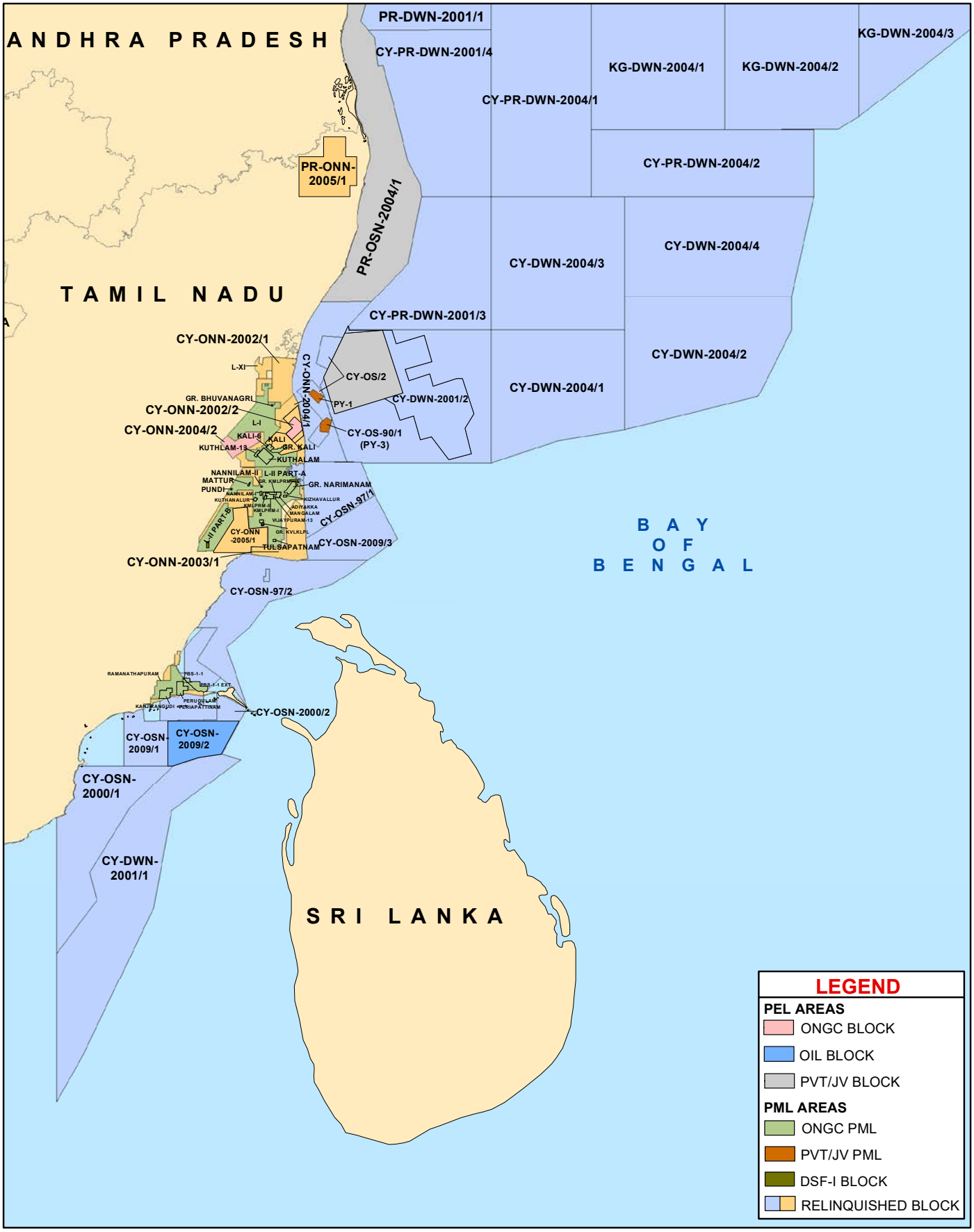


10. LOWER ASSAM ARAKAN BASIN

11. ANDAMAN NICOBAR BASIN

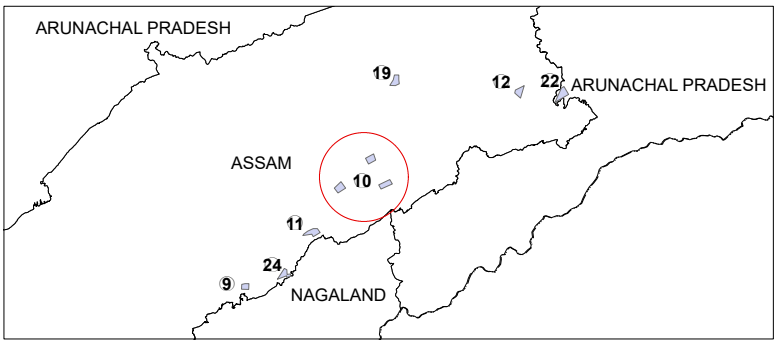


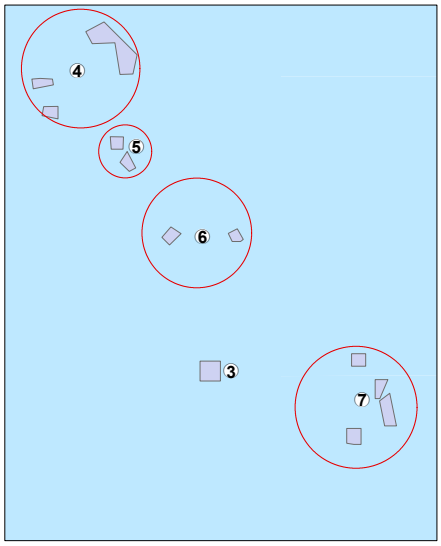
12. CAUVERY BASIN

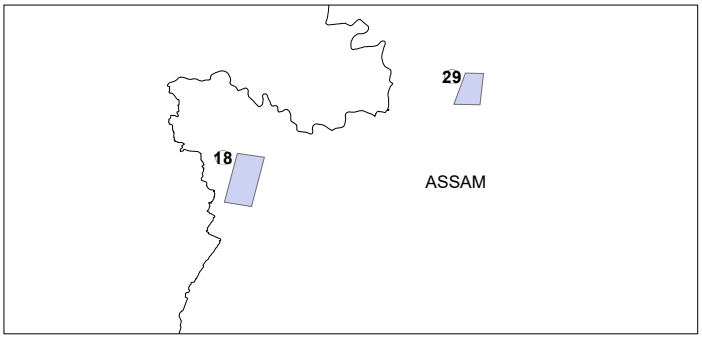


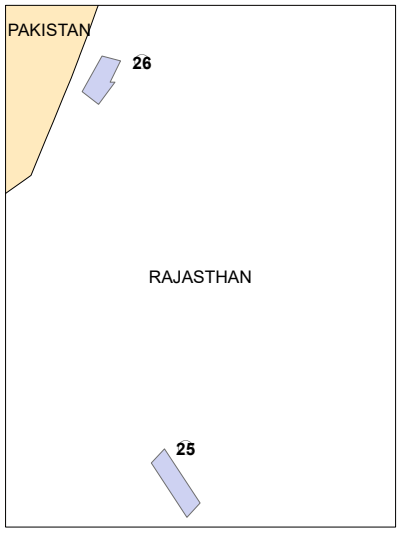
DSF Blocks Awarded under DSF Round-2016

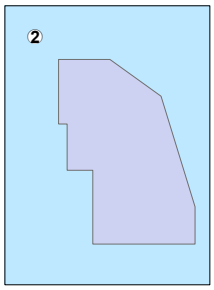
S.No.	Block Name	Location
1	VN/ONDSF/**NOHTA**/2016	Madhya Pradesh
2	GK/OSDSF/**KD**/2016	Kutch Offshore
3	MB/OSDSF/**B80**/2016	Mumbai Offshore
4	MB/OSDSF/**B9**/2016	Mumbai Offshore
5	MB/OSDSF/**B15**/2016	Mumbai Offshore
6	MB/OSDSF/**B127E**/2016	Mumbai Offshore
7	MB/OSDSF/**B-37**/2016	Mumbai Offshore
8	KG/OSDSF/**GSKV1**/2016	KG Offshore
9	AA/ONDSF/**BARSILLA**/2016	Assam
10	AA/ONDSF/**DIPLING**/2016	Assam
11	AA/ONDSF/**CHARAIDEO**/2016	Assam
12	AA/ONDSF/**DUARMARA**/2016	Assam
13	CB/ONDSF/**KAMBOI**/2016	Gujarat
14	CB/ONDSF/**WEST BECHRAJI**/2016	Gujarat
15	CB/ONDSF/**ELAO**/2016	Gujarat
16	CB/ONDSF/**KHAMBEL**/2016	Gujarat
17	CB/ONDSF/**SOUTH PATAN**/2016	Gujarat
18	AA/ONDSF/**PATHARIA**/2016	Assam
19	AA/ONDSF/**JERAIPATHAR**/2016	Assam
20	KG/ONDSF/**ACHANTA**/2016	Andhra Pradesh
21	KG/ONDSF/**BHIMANAPALLI**/2016	Andhra Pradesh
22	AA/ONDSF/**KHEREM**/2016	Arunanchal Pradesh
23	KG/ONDSF/**KORAVAKA**/2016	Andhra Pradesh
24	AA/ONDSF/**LAXMIJAN**/2016	Assam
25	RJ/ONDSF/**BAKHRI TIBBA**/2016	Rajasthan
26	RJ/ONDSF/**SADEWALA**/2016	Rajasthan
27	CY/ONDSF/**NEDUVASAL**/2016	Tamil Nadu
28	CY/ONDSF/**KARAIKAL**/2016	Tamil Nadu
29	AA/ONDSF/**HILARA**/2016	Assam
30	KG/ONDSF/**SANARUDRAVARAM**/2016	Andhra Pradesh

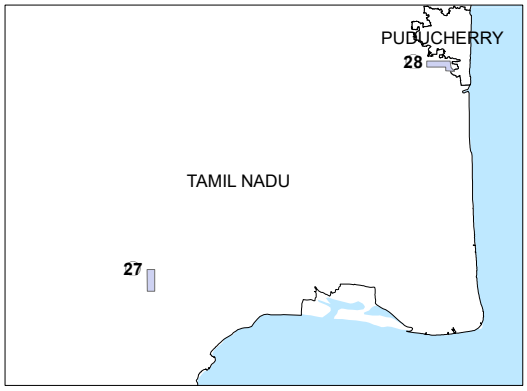

ARUNACHAL PRADESH
19
12
22
ARUNACHAL PRADESH
ASSAM
10
11
24
9
NAGALAND

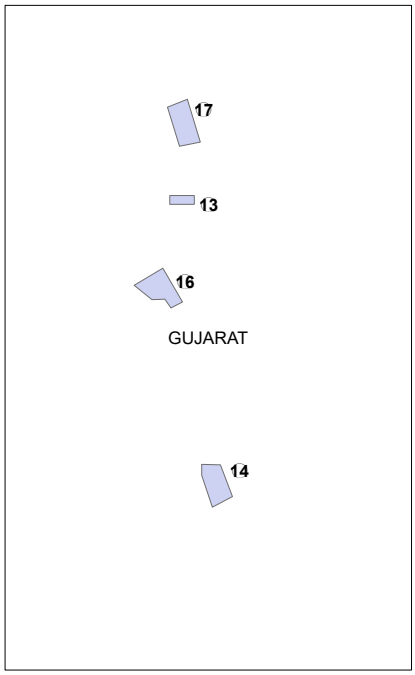

4
5
6
3
7

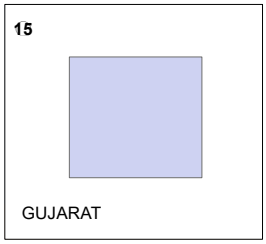

29
18
ASSAM

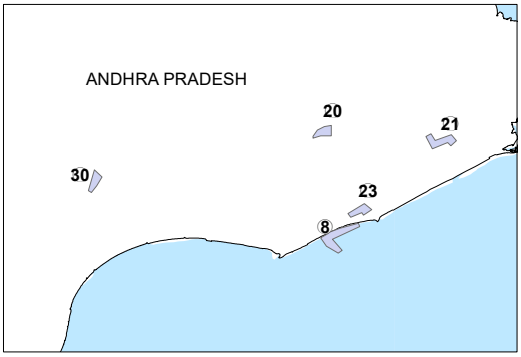

PAKISTAN
26
RAJASTHAN
25

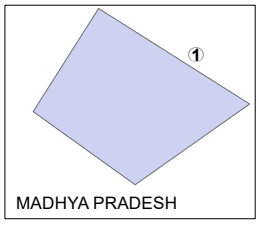

2


PUDUCHERRY
28
TAMIL NADU
27

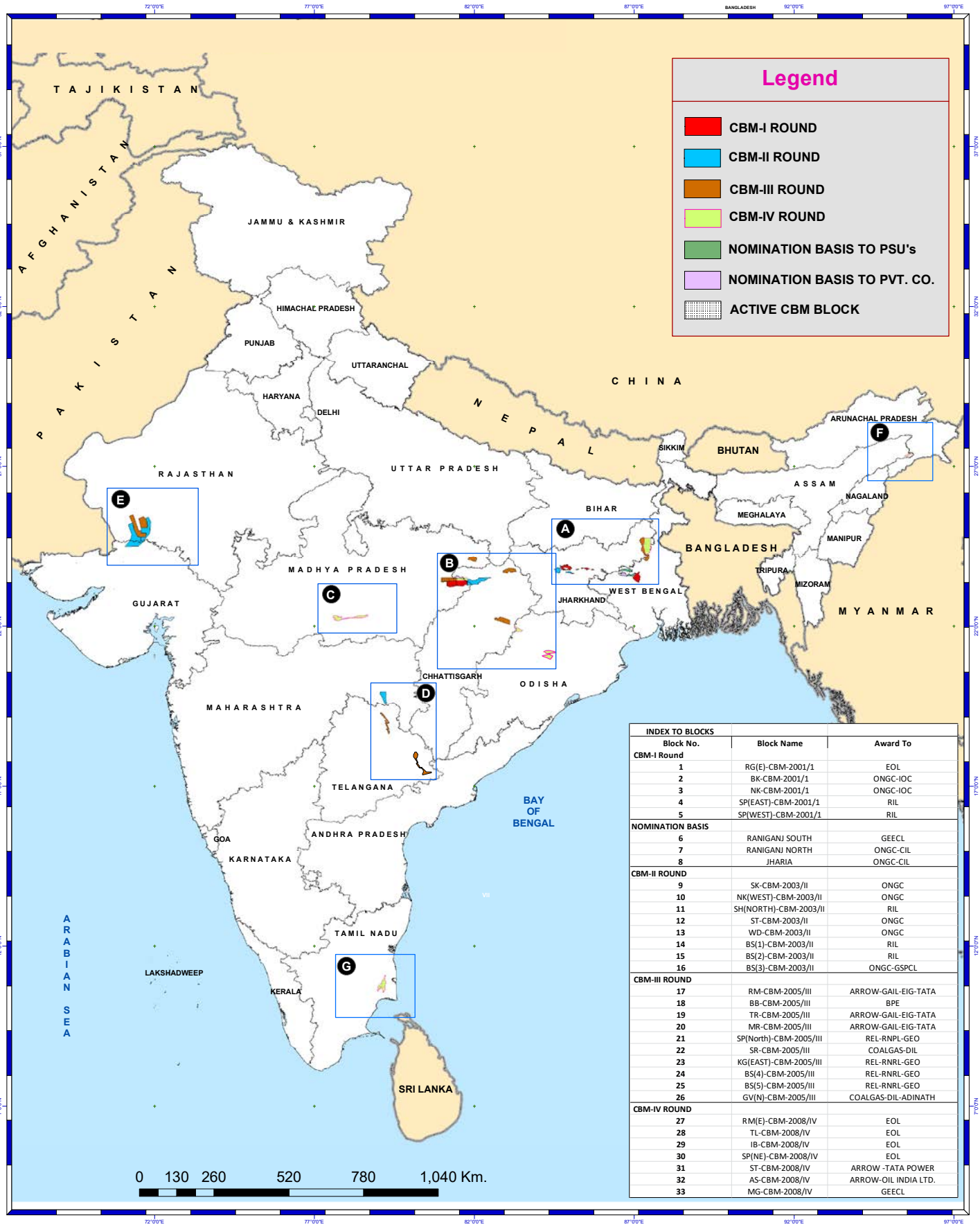

17
13
16
GUJARAT
14


15
GUJARAT


ANDHRA PRADESH
20
21
30
23
8

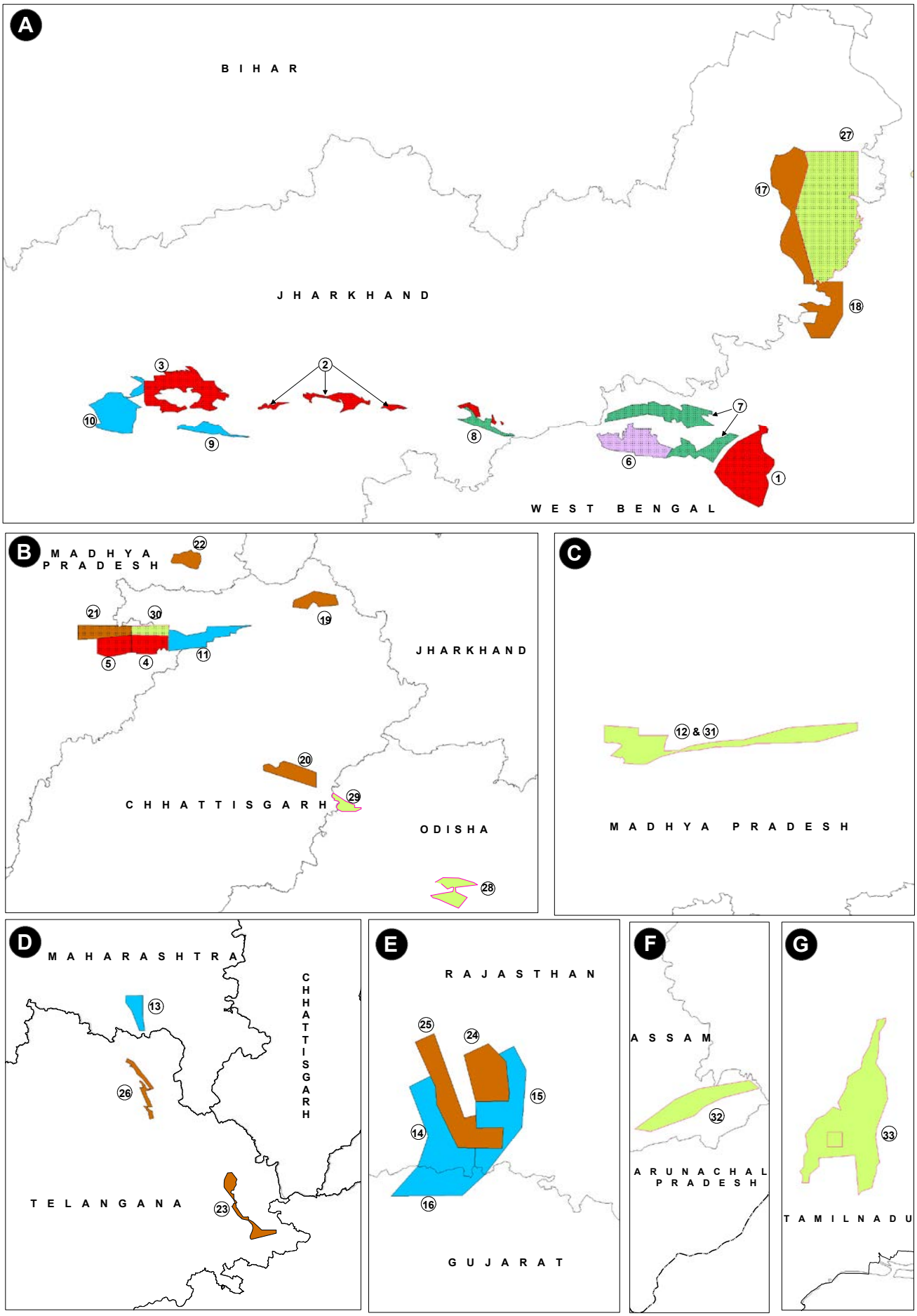

1
MADHYA PRADESH

CBM BLOCKS AWARDED UNDER CBM ROUND-I, II, III , IV AND ON NOMINATION BASIS

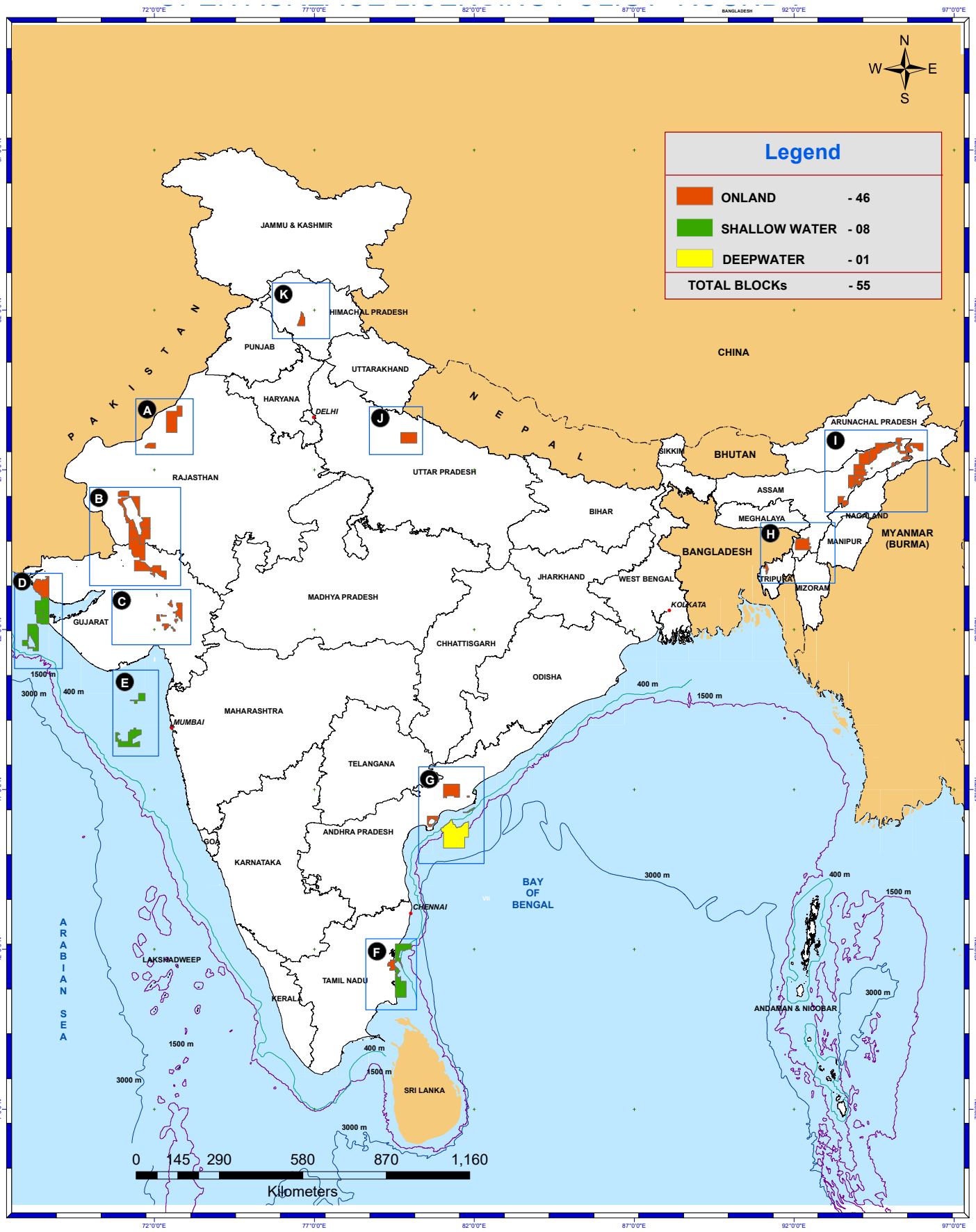


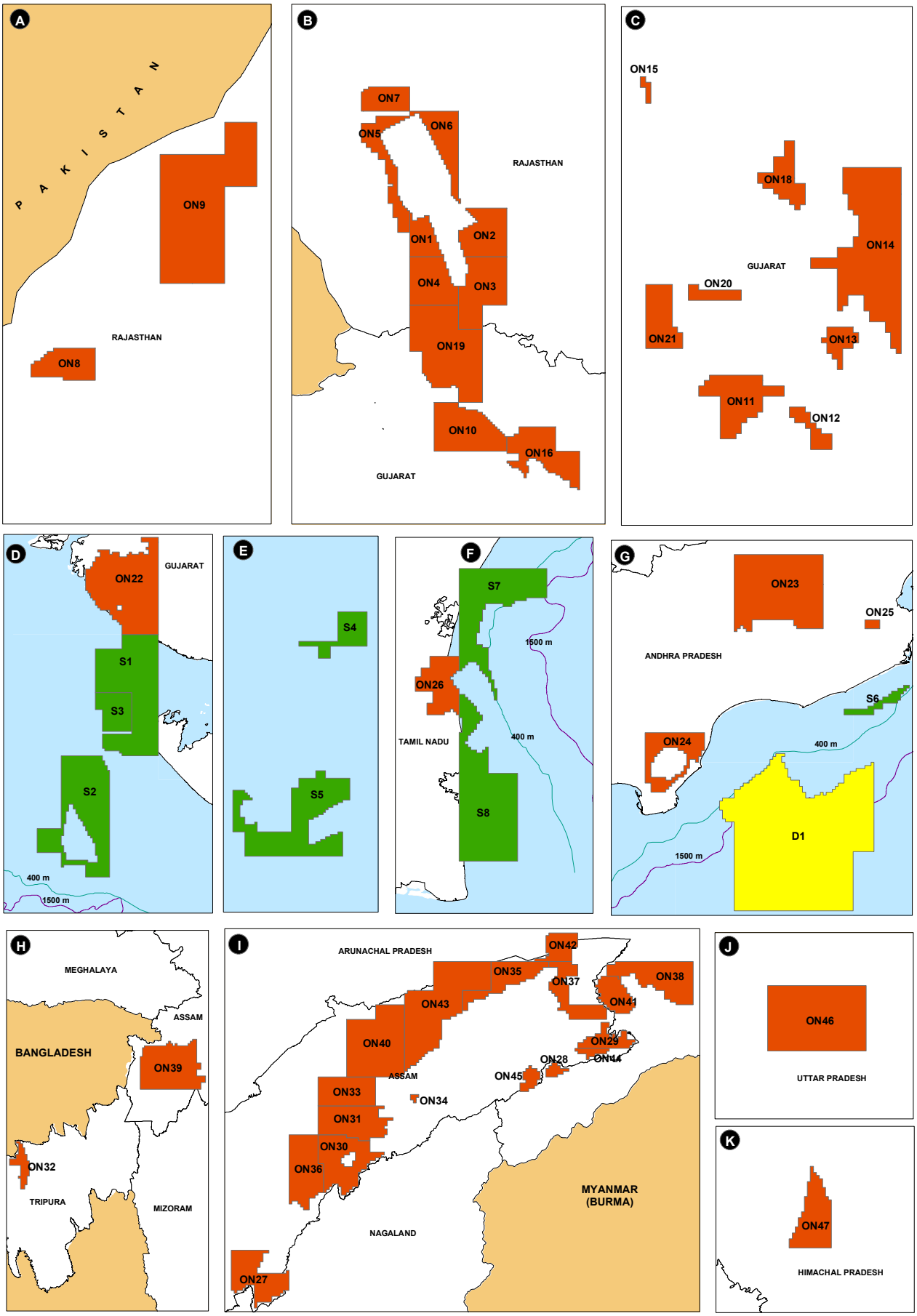
INDEX TO BLOCKS		
Block No.	Block Name	Award To
CBM-I Round		
1	RG(E)-CBM-2001/1	EOL
2	BK-CBM-2001/1	ONGC-IOC
3	NK-CBM-2001/1	ONGC-IOC
4	SP(EAST)-CBM-2001/1	RIL
5	SP(WEST)-CBM-2001/1	RIL
NOMINATION BASIS		
6	RANIGANJ SOUTH	GEECL
7	RANIGANJ NORTH	ONGC-CIL
8	JHARIA	ONGC-CIL
CBM-II ROUND		
9	SK-CBM-2003/II	ONGC
10	NK(WEST)-CBM-2003/II	ONGC
11	SH(NORTH)-CBM-2003/II	RIL
12	ST-CBM-2003/II	ONGC
13	WD-CBM-2003/II	ONGC
14	BS(1)-CBM-2003/II	RIL
15	BS(2)-CBM-2003/II	RIL
16	BS(3)-CBM-2003/II	ONGC-GSPCL
CBM-III ROUND		
17	RM-CBM-2005/III	ARROW-GAIL-EIG-TATA
18	BB-CBM-2005/III	BPE
19	TR-CBM-2005/III	ARROW-GAIL-EIG-TATA
20	MR-CBM-2005/III	ARROW-GAIL-EIG-TATA
21	SP(North)-CBM-2005/III	REL-RNPL-GEO
22	SR-CBM-2005/III	COALGAS-DIL
23	KG(EAST)-CBM-2005/III	REL-RNRL-GEO
24	BS(4)-CBM-2005/III	REL-RNRL-GEO
25	BS(5)-CBM-2005/III	REL-RNRL-GEO
26	GV(N)-CBM-2005/III	COALGAS-DIL-ADINATH
CBM-IV ROUND		
27	RM(E)-CBM-2008/IV	EOL
28	TL-CBM-2008/IV	EOL
29	IB-CBM-2008/IV	EOL
30	SP(NE)-CBM-2008/IV	EOL
31	ST-CBM-2008/IV	ARROW -TATA POWER
32	AS-CBM-2008/IV	ARROW-OIL INDIA LTD.
33	MG-CBM-2008/IV	GEECL

Back to Content Page


A
BIHAR
JHARKHAND
WEST BENGAL
B
MADHYA PRADESH
JHARKHAND
CHHATTISGARH
ODISHA
C
12 & 31
MADHYA PRADESH
D
MAHARASHTRA
CHHATTISGARH
TELANGANA
E
RAJASTHAN
GUJARAT
F
ASSAM
ARUNACHAL PRADESH
G
TAMILNADU

BLOCKS ON OFFER UNDER HELP, OALP ROUND-I




A
PAKISTAN
ON9
RAJASTHAN
ON8
B
ON7
ON5
ON6
RAJASTHAN
ON1
ON2
ON4
ON3
ON19
ON10
ON16
GUJARAT
C
ON15
ON18
ON14
GUJARAT
ON20
ON21
ON13
ON11
ON12
D
GUJARAT
ON22
S1
S3
S2
400 m
1500 m
E
S4
S5
F
S7
1500 m
ON26
TAMIL NADU
400 m
S8
G
ON23
ON25
ANDHRA PRADESH
S6
ON24
400 m
D1
1500 m
H
MEGHALAYA
ASSAM
BANGLADESH
ON39
ON32
TRIPURA
MIZORAM
I
ARUNACHAL PRADESH
ON42
ON35
ON37
ON38
ON43
ON41
ON40
ON29
ON28
ON44
ASSAM
ON45
ON33
ON34
ON31
ON30
ON36
MYANMAR
(BURMA)
NAGALAND
ON27
J
ON46
UTTAR PRADESH
K
ON47
HIMACHAL PRADESH

8.3 COMPANIES IN INDIAN E&P SECTOR

Public Sector Undertakings (PSUs)	
Andhra Pradesh Gas Infrastructure Corp.Pvt.Ltd. 2nd Floor #5-9-58/B, FatehMaidan Road, Basheerbagh Hyderabad- 500 004, Andhra Pradesh, India Ph: 040-67304930, Facsimile: 040-67304951 E-mail: info@apgic.in, Website: www.apgic.in	**Bharath Petro Resources Ltd.** Bharat PetroResources Limited. Maker Towers, 'E' Wing, 9th Floor, Cuffe Parade, Mumbai, Maharashtra - 400005 Facsimile No.: +91-22-2215 4364 Ph: +91-22- 2217 5600
Bharat Petroleum Corp. Ltd. Bharat Bhavan, 4 and 6 Currimbhoy Road, Ballard Estate, Mumbai – 400001, India Ph: 022-22713000/4000, Facsimile: 022-22713874 Website: www.bharatpetroleum.co.in	**Engineers India Limited** El Bhavan, 1, Bhikaiji Cama Place, New Delhi – 110 066, India Ph: 011-26762121, Facsimile: 011-26178210, E-mail: eil.mktg@eil.co.in Website: www.engineersindia.com
GAIL (Indian) Ltd. 16, Bhikaiji Cama Place, R. K. Puram New Delhi – 110066, India Ph: 011-26172580, 26182955 Facsimile: 011-26178210, 26194715 Website: www.gailonline.com	**Gujarat State Petroleum Corporation Limited GSPC** Bhavan, Behind Udyog Bhavan, Sector – 11, Gandhinagar – 382 010, Gujarat, India Ph: 079-6670 1005, Facsimile: 079-2323 6375 E-mail: info@gspc.in Website: www.gspcgroup.com
Indian Oil Corporation Ltd. Corporate Office, 3079/3, J B Tito Marg, Sadiq Nagar New Delhi – 110049, India Ph: 011 – 26260000 Facsimile: N/A E-mail: N/A Website: www.iocl.com	**National Thermal Power Corporation (NTPC)** NTPC Bhawan, SCOPE Complex, Institutional Area, Lodhi Road, New Delhi – 110003 Ph: 011-24360100, 24387000, 24387001 Facsimile: 011-24361018 E-mail: info@ntpc.co.in Website: www.ntpc.co.in
Oil and Natural Gas Corporation Limited. Head-EXCOM Group 'Deendayal Urja Bhavan' 5, Nelson Mandela Marg, Vasant Kunj New Delhi – 110070, India Facsimile No.: 011-26129091 Telephone No.:011-26751320 Email: excom@ongc.co.in	**Oil India Limited.** Executive Director (E&D), E&D Directorate, Oil India Limited, 5th Floor, NBCC Centre, Plot No 2, OKHLA Phase I, New Delhi 110020 Phone: +91 11 71901200 / 201 Email: oalp@oilindia.in
Prize Petroleum Company Ltd. 3rd Floor, UCO Bank Building, Sansad Marg, New Delhi – 110001 Facsimile: 91 11 23737898, Ph: 91 11 23312996 E-mail: vgulati@hpcl.in	**Coal India Limited** 5th Floor, Core-I & II, Scope Minar, Laxmi Nagar District Centre, New Delhi, Delhi 110092 Ph: 011 2201 8457 Website: www.coalindia.in/
International Companies	
BP India Services Pvt. Ltd. (CBM) B.P. India Services Pvt. Ltd 15th Floor, Dr. Gopal Das Bhawan 28, Barakhamba Road New Delhi, DH, 110001 Ph: 011-43755000 Fax: 011-43755001 Website: www.bp.com	**BP Exploration (Alpha) Limited** Unit No 71& 73, 7th Floor, 2nd North Avenue Maker Maxity, BandraKuria complex, Bandra (E) Mumbai – 400051, India Ph: 022 7177 7000 Facsimile: 22 7177 7001 E-mail: N/A Website: www.bp.com
Deep Energy Llc 4133 North Lincoln Blvd Oklahoma City, OK 73105, United States Phone: 1-405-209-5560 Fax: 1-405-524-5227 Website: www.deepindustries.com	**Geo-Global Resources Inc. (GGR)** Plot No. 273/2, Sector 7A Gandhinagar, Gujarat, - 382007, India Ph: 079-232443684 E-mail: info@geoglobal.com Website: www.geoglobalresources.com

Geo-Petrol International Inc.
DLF Jasola Tower – A, 624, 6th Floor, DDA District Center Jasola, Delhi – 110025
Ph: 011-41755008, Facsimile: 011-1755009
E-mail: N/A
Website: www.geopetrol.net

Hardy Exploration & Production (India) Inc.
V Floor, Westminister Building
108, Dr. RadhakrishnanSalai
Chennai – 600 004, India
Ph: 044 28471990
Facsimile: 044 28471064
E-mail: info@hardyoil.co.in
Website: www.hardyoil.com

Joshi Tech. Inc.
India Project Office, 701-Parshwanath E Square,
Prahladnagar Garden Corporate Road,
Near Titanium Bldg, Satellite, Ahmedabad – 380015 (Gujarat), India
Ph: 079 29702304, Facsimile: 079 29702304
E-mail: JTI@joshitech.com
Website: www.joshioilandgas.com

Dart Energy (India) Pty.ltd. (CBM)
Unit No 406 - 406A, 4th Floor, Tower-B,
Global Business Park, MG Road Gurgaon, 122002, India
Ph: +91 124 499 0502
Facisimile: +91 124 499 0501
E-mail: N/A

Niko Resources Limited.
4th Floor, Landmark Building, Race Course Rd, Near Race Course Circle, Chakali Circle, Diwalipura,
Vadodara – 390007 (Gujarat) India
Ph: (0265) 231-3620
Facsimile: (0265) 235-4658
E-mail: nikogspc@nikoindia.com
Website: www.nikoresources.com

Oilex- NL Holdings Ltd.
Cambay Square, 2nd Floor, X22-24, GIDC Electronics Estate
Sector-25, Gandhinagar - 382044, Gujarat, India
Ph: 079 3981 0300
Facsimile: 079 3981 0310
E-mail: OilexIndiaContracts@Oilexcom.au
Website: www.Oilex.com.au

Indian Private Companies

Abdhoot Estates Private Limited
Janpriya Crest 113, Panthoen Road, Egmore
Chennai, 600008
Facsimile No.: 91 44 28195527
Telephone No.: 91 44 49060606
Email: secretarial@aban.com

Adani Welspun Exploration Ltd.
Adani House, Nr Mithakhali Circle.
Navrangpura, Ahmedabad 380 009 Gujarat, India
Facsimile No.:-91 22 24908020
Telephone No.:-91 22 66136000
Email: arvind.hareendran@awel.com

Assam Company India Ltd.
Assam Tea House
52, Chowringhee Road, Kolkata -700 071, India
Tel: 033 - 2283-8306, 22838309, 22838312
Facsimile: 033 - 22838334, 22838333
E-mail: assamco@vsnl.com
Website: www.assamco.com

BDN Enterprises Private Limited.
1297, Sector-15, Faridabad-1213003, Haryana
Tel: 91 0129 2283808, 91 981156706
E-mail: vjindal@shivalikdesign.com

BF Infrastructure Ltd.
Mundhwa, Pune Cantonment
Pune 411 036 Maharashtra, INDIA.
Phone: 91-20-268 225 52 , 91-20-267 027 77
Fax: 91-20-268 230 61
Email: bfutilitiesltd@vsnl.net

Vedanta Limited (Cairn Oil & Gas)
DLF, Atria Phase-2, Jacaranda Marg,
DLF City, Gurgaon-122002, Haryana
Tel: +91 124 459 3000
Fax: +91 124 414 5612
E-mail: exploration@cairnindia.com

Duggar Fiber Pvt Ltd.
BD-76, Vishakha Enclave, Pitampura, Delhi-110034
Telephone No.:- 011 42709009,91 9999000555
Email: duggar_fiber@hotmail.com

Deep Industries Ltd.
Opp. Suryanaryan Bunglows,
Sabarmati Kalol Highway, N.H No. 8, Motera,
Ahmedabad – 380005, India
Ph: 91 79 2757 1128 , 91 79 2750 2461
Fax:91-79-2686 2077

Essar Oil Limited
Equinox Business Park (Peninsula Techno Park),
Off Bandra Kurla Complex, LBS Marg, Kurla (West)
Mumbai 400 070, Maharashtra, India
Ph: 022-6733 5000, Facsimile: 022-67082183
E-mail: N/A, Website: www.essar.com

Focus Energy Ltd.
3rd Floor Gopala Tower, 25 Rajendra Place,
New Delhi-110008 India
Ph: 011-42300400, 25065011/12, Facsimile: 011-41667766
E-mail: info@focusenergy.co.in
Website: www.focusenergy.co.in

Frost International Ltd.
Aria Towers - 3rd Floor, Commercial Block,
JW Marriott Hotel, Aerocity, Asset Area4, Hospitality District
New Delhi – 110037, India
Ph: 011-40694444, Facsimile: 011-40694474
E-mail: frostglobal@singnetcom.sg
Website: http://www.frostinternational.in

GEM Laboratories Private Limited(GLPL)
22, Pomodi Towers, 2nd Floor, lst Main Road, Gandhinagar,
Bangalore - 560 009, Karnataka, India
Facsimile No.:-91 080 22203172, 22250259
Telephone No.:-91 080 22256511
Email:gemlabs@gmgroup.in, gemlabs@gm.com

GeoEnpro Petroleum Ltd
Express Trade Towers-1, 2nd Floor 15-16, Sector-16A
Film City, Noida - 201301, UP India
Ph: 0120-4060450, Facsimile: 0120-4060499
E-mail: geoenpro@geoenpro.com
Website: www.geoenpro.com

Gujrat Natural Resources Limited (GNRL)
2nd Floor, V V Mansion, #6-3-885/7/B/4,
Somajiguda, Hyderabad – 500082, Andhra Pradesh, India
Ph: 040 23332525/4646/5656, Facsimile: 040 23332323
E-mail: www.gnrl.in
Website: gnrl.in

Hindustan Oil Exploration Co Ltd.
HOEC House, Tandalja Road, Off Old Padra Road
Vadodara - 390 020 Gujarat, India
Ph: 0265 - 2330766 / 2333568
Facsimile: 0265 - 2333567 / 2333918
E-mail: contact@hoec.com, Website: www.hoec.com

IMC Limited
"Neeladri" III Floor ,9, Cenotaph Road, Alwarpet,
Chennai 600 018, India
Tel: +91 44 4590 2222 / 4590 2299
Fax: +91 44 4590 2200
Email: marketing@imc.net.in

iServices Investment Ltd.
D-10, Sector 2, Noida - 201301
Near Police Fire Station
Ph: +91 9711417872, 120 244 06 63
Facsimile: +91-120-2440238

Jay Polychem (India) Ltd.
D-143 Defence Colony, New Delhi – 110024, India
Ph: 011 4279 1000, Facsimile: N/A
E-mail: info@jaypolychemcom
Website: www.jaypolychem.com

Jubilant Energy
Plot No. 15, Knowledge Park II, Greater Noida -201306
Ph: 0120-4025700 / 0120-4246213, Facsimile:N/A
E-mail: contactus@jubilantenergy.com
Website: www.jubilantenergy.com

Kanvel Finance Limited.
13 Krishna Society, Ellisbridge
Ahmedabad, 380006
India

KEI-RSOS Petroleum &Energy Private Limited
81-32-4, Walkers Road, Venkateswara Nagar,
Rajahmundry (AP) – 533103
Facsimile No.: 91 0883 2427576, Ph.: 91 0883 2423562
Email:kr_petroleum@yahoo.com,kr_cng@yahoo.com,
rsospltd@yahoo.com

Mahendra Infratech Private Limited
GF-2, ATS Green-II, Sector-50
Noida-201301
Telephone No.:- 91 011 46597980, 91 9811746665
Email: mahendra1955.mg@gmail.com

Megha Engineering and Infrastructures Limited
S-2, Technocrat Industrial. Estate,
Balanagar, Hyderabad-500037, Telengana, India
Facsimile No.:-91 40 44336800
Telephone No.:-91 40 44336700
Email: doraiah@meil.

Mercator Limited
3rd Floor, Mittal Tower, B-wing, Nariman Point,
Mumbai-400021, India
Ph: 022-66373333 / 40373333, Facsimile: 022-66373344
E-mail: mercator@mercator.in
Website: www.mercator.in

Monnet Ispat and Energy Ltd.
Monnet Ispat and Energy Ltd.
Monnet House,11, Masjid Moth, Greater Kailash Part – II
New Delhi – 110048, India
Ph: 011-2921 8542-46, Facsimile: 011-2921 8541
E-mail: monnet@monnetgroup.com
Website: www.monnetgroup.com

Nippon Power Limited
4A & 4B 240b, AJC Bose Road,
Kolkata-700020,WestBengal
Facsimile No: 91 33 22832201
Telephone No: 91 33 2283-2200/3300/4400
Email:nipponpower@rediffmail.com
info@nipponpowerltd.com

Oilmax Energy Private Limited(OEPL)
3A Omkar Esquare, Chunnabhatti Signal,
Eastern Express Highway, Sion (East), Mumbai – 400 022
Facsimile No.: 91 22 42441111
Telephone No.: 91 22 42441100
Email: rabi@oilmax.in

Omkar Natural Resources Pvt. Ltd.
Omakr Esquare, off Eastern Express Highway,
Opp Sion Chunnabhatti Signal, Sioneast
Mumbai-400022, Maharashtra, India
Ph: N/A, Fax: N/A , Email: N/A
Website: N/A

Pan India Consultants Pvt. Ltd.
No1 & 2, D-4, Commercial Area, Vasant Kunj
New Delhi - 110 070, India
Ph: 011 26137657, 26137659, 26899952
Facsimile: 011 26138633
E-mail: nmspl@panindiagroup.com
Website: www.panindiagroup.com

PFH Oil and Gas Private Limited
34, C.R. Avenue, 3rd Floor, Kolkata – 700 012
Facsimile No.: 91 33 40508326
Telephone No.: 91 33 40508300
Email: hvp@pfhcapital.com

Pratibha Oil and Natural Gas Pvt. Ltd.
1201/2, 12th Floor, Arcadia Bldg, NCPA Marg,
Nariman Point, Mumbai –400021, Maharashtra, India
Ph: 022 2288 6002/3/4, Facsimile: 022 2288 6001
E-mail: N/A , Website: http://pratibhaong.com

Ramayna Ispat Private Limited
BD-76, Vishakha Enclave, Pitampura, Delhi-110034
Telephone No.:-91 11 42709009, 91 9811452874
Email: duggar_fiber@hotmail.com

Reliance Industries Ltd.
Maker Chambers - IV Nariman Point Mumbai 400 021
Maharashtra, India
Ph: 022-2278 5000 , Facsimile: N/A
E-mail: info@ril.com, Website: www.ril.com

Sankalp Oil and Natural Resources Ltd.
10/4 Alipore Park Place, Kolkata – 700027
Ph: N/A, Fax: N/A
Email: company@sankalpOil.com, Website: N/A

Savla Electronics Pvt. Ltd.
Krishna Villa, 2nd floor
RBH Road, Mumbai

Selan Exploration Technology Ltd.
Indrora EPS, Palaj Village, Gandhinagar District
Gujarat - 382 355 Ph: N/A
Facsimile: N/A, E-mail: cs@selanOilcom
Website: www.selanOil.com

Sun Petrochemicals Private Limited .
17B, Mahal Industrial Estate, Mahakali Caves Road,
Andheri (East), Mumbai, 400093, India
Facsimile No.: 91 22 66455685, PhNo.: 91 22 66455919
Email: padam.singh@sunpetro.com

Tata Petrodyne Limited
Bombay House, 24, Homi Mody Street, Fort
Mumbai - 400001
Ph: 022-66658282, Facsimile: 022-66658800
E-mail: njt@tatapetrodyne.in, Website: www.tatapetrodyne.in

Videocon Petroleum Limited.
221, 2nd Floor, Fort House, Dr D N Road, Fort, Mumbai -
400001, Opposite Deutsche Bank (Map)
Ph: 022 6611 3500
Website: www.videoconindustriesltd.com

Vijayasri Bhaskar Industries Private Limited (VBIPL)
24-194, HIG-11
Simhapuri Layout, Vepagunta Post, Visakhapatnam- 530047
Telephone No.:- 91 891 2722349
Email: info@vbgroupind.com

Great Eastern Energy Corporation ltd.
Signature Towers – 'A' , 14th Floor, South City,
NH-8, Gurgaon – 122 001, Haryana, India
Ph: 0124-455 9900
Facsimile: 0124-258 0467
E-mail: info@geecl.com
Website: www.geecl.com

Prabha Energy Private Limited
12A, Abhishree Corporate Park,
Opp. Swagat Bungalows BRTS Bus Stop,
Ambli Bopal Road, Ambli, Ahmedabad - 380058
Phone : 02717 - 298 510, Fax : 02717 - 298 520
E-mail : info@prabhaenergy.com

Coal Gas Mart
Coal Gas Mart, LLC.
C/O Deep Industries Limited
6th Floor Astron Tower,
Opp. Fun Republic Cinema,
S. G. Highway,Ahmedabad-380015
Phone : +91 79 26862076
Fax : +91 79 26862077

Achievement of an organization are the results of combined efforts of every individual

1993

Dr. Avinash Chandra
May 1993 – Sept 2003

2004

Shri V.K.Sibal
Nov 2004 – Oct 2009

Shri S. K. Srivastava
Nov 2009 – April 2012

2009

Shri R. N. Choubey
June 2012 – Feb 2014

2012

Shri B. N. Talukdar
Feb 2014 – June 2015

2014

" A leader is the one who knows the way, goes the way and shows the way "

2015

Shri Ajay Sawhney
July 2015 – April 2016

2016

Shri. Atanu Chakraborty
April 2016 – May 2018

Dr. Avinash Chandra (May 1993 – September 2003)

Policy Implementation

- Formulation of Policy for Exploration and Production of CBM
- National Gas Hydrate programme (NGHP)
- New Exploration Licensing Policy (NELP)
- NELP-I, II, III & IV bid rounds

Key Initiative

- First Director General of Directorate of Hydrocarbons (DGH), served the longest period as DG, DGH till date Re-assessment of Hydrocarbon Resources in India
- Spearheaded mapping of over 130 Deepwater plays (25,000 LKM of 2D seismic surveys)

Shri V. K. Sibal (November 2004 – October 2009)

Policy Implementation

- Policy for Extension of Exploration Phase Under NELP and Pre-NELP PSC
- Ideation of National Data Repository (NDR)
- Guideline for Announcement of New Discovery
- Guidelines for Uniform System of Classification of Hydrocarbon Resources & Reserves

Key Initiative

- Conducted NELP-V, VI & VII bidding Rounds and CBM-II, III Rounds
- 12000 LKM of 2D seismic data of west coast reprocessed during the 2007-08
- S type blocks offered no requirement of technical capability for PQC
- Initiated oil shale deposits and syn-crude resource estimation project for North Eastern part of India

Shri S. K. Srivastava (November 2009 – April 2012)

Policy Implementation

- Gas Production under PSC increased by 171% as production from KG-DWN-98/3 started in FY 2009-10
- NELP-VIII and NELP-IX bidding Rounds & 1 round of CBM bidding

Key Initiative

- 3607.5 LKM of 2D speculative surveys; 10,000 LKM of reprocessing of old seismic data text and Airborne survey covering 13994.64 LKM in block 3 in Kutch area

Shri R. N. Choubey, IAS (June 2012 – February 2014)

Policy Implementation

- Policy Guidelines of Exploration and Exploitation of Shale Gas and Oil in Nomination ML area of National Oil Companies

Key Initiative

- Re-assessment of Hydrocarbon Resources in India

Shri B. N. Talukdar (February 2014 – June 2015)

Policy Implementation

- Site Restoration guidelines on petroleum operations
- Policy for Extension of Production Sharing Contracts
- Uniform Licensing Policy
- Marginal Field Policy
- Open Acreage Licensing Policy

Key Initiative

- Encouraging E&P Activities in North East
- Multi Client Geo-Scientific Surveys
- National Data Repository (NDR)
- Standing Committee on Petroleum Industry Practices GIPIP

Shri Ajay Sawhney, IAS (July 2015 – March 2016)

Policy Implementation

- Discovered Small Field (Marginal) Policy
- Hydrocarbon Exploration and Licensing Policy
- Policy for extension of Production Sharing Contracts
- Exploration in Mining Lease Areas
- Policy framework for development of Underground Coal Gasification in coal and lignite bearing areas in India

Key Initiative

- NE Hydrocarbon Vision 2030
- 10% Import Reduction by FY 2021-22
- Site Restoration Guidelines on Petroleum Operations
- Standing Committee on Petroleum Industry Practices
- Marketing and Pricing freedom for new gas production from Deepwater, Ultra Deep water and High Pressure-High Temperature Areas

Shri Atanu Chakraborty, IAS (April 2016– June 2018)

Policy Implementation

- DSF Bid Round-I (award of 30 fields)
- Policy framework for early monetization of CBM
- Pre-NELP Exploration Blocks
- Site Restoration Guidelines for Petroleum Operations
- Enhanced Recovery Policy
- DSF Bid Round-II and OALP Bid Round-I

Key Initiative

- National Core Repository
- NDR-Secondary Data Centre
- Centre for Advanced Data Research
- National Seismic Program
- Re-assessment of hydrocarbon resources of India in all 26 sedimentary basins undertaken by ONGC, OIL and DGH

DGH

OIDB

DIRECTORATE GENERAL OF HYDROCARBONS

Ministry of Petroleum and Natural Gas, Government of India

OIDB Bhawan, Tower-A, Sector-73, Noida 201301, Uttar Pradesh, India

+91 120 2472000 +91 120 2472049 dg@dghindia.gov.in www.dghindia.gov.in

#DGHIndia