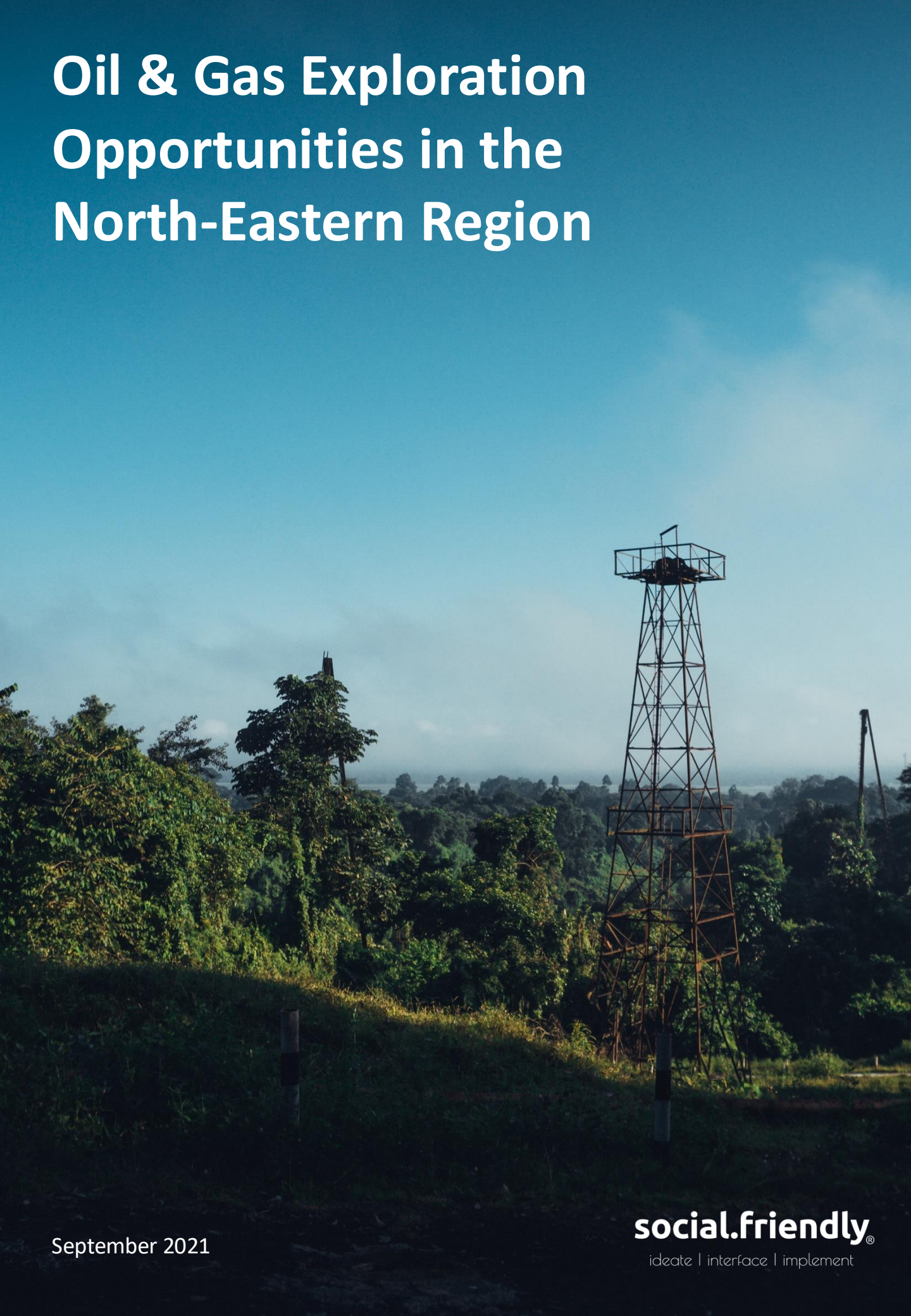


Oil & Gas Exploration Opportunities in the North-Eastern Region



September 2021

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Country Profile

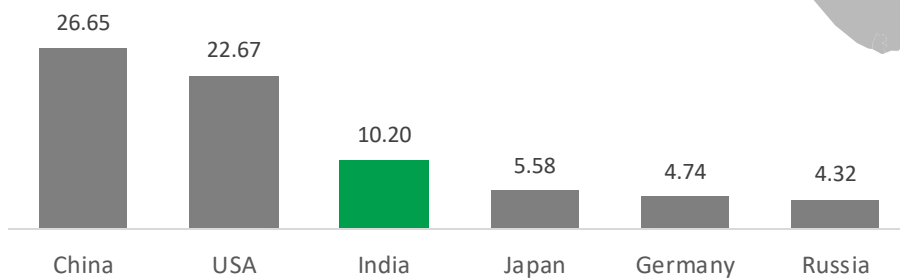
India

The Republic of India is the seventh-largest country by area, the most populous democracy in the world, and the second-most populous country with over 1.38 billion people. India boasts of a diverse and rich cultural heritage, including several languages, and traditions.

Pakistan and Afghanistan share political borders with India on the west, while Bangladesh and Myanmar stand adjacent on the eastern borders. The northern boundary borders with China, Tibet, Nepal and Bhutan. Sri Lanka is another neighbouring country.

Since liberalization in the 1990s, the Indian economy has welcomed international companies to invest with open arms. The Indian citizens have also been very pro-active in adopting global approach and skills. Modern industries and the professional services sectors are growing in a big way, attracting global investors towards strategic opportunities, owing to the range of industries, investment avenues and a supportive Government with favourable policies. A sizeable population, comprising mostly of youth, is a strong driver for demand and an ample source of manpower.

PPP Adjusted GDP in Trillion USD (IMF 2021e)



At a Glance

Capital: New Delhi

Official Languages: Hindi and English

Population: 1.38 billion

Nominal GDP (est. 2021): 3.05 trillion

Head of State: President, Shri Ram Nath Kovind

Head of Government: Prime Minister, Shri Narendra Modi

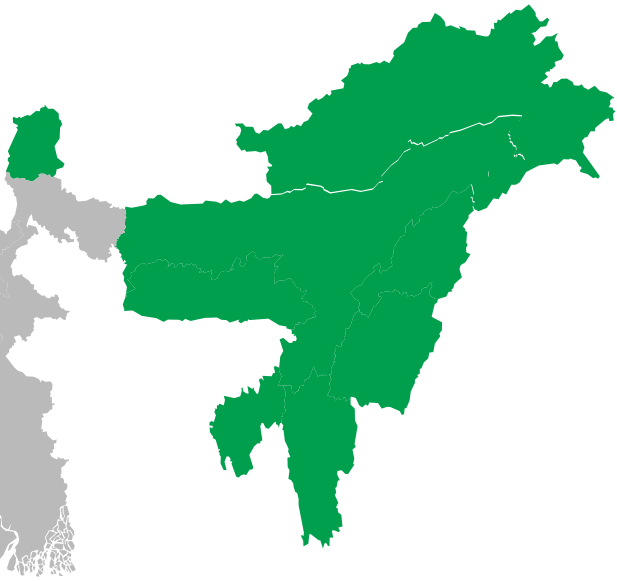
Minister of Petroleum & Natural Gas: Shri Hardeep Singh Puri

Minister of State for PNG: Shri Rameswar Teli

An Overview of India's North-Eastern Region

The North Eastern Region (NER) of India refers collectively to the eight states located in the midst of the East Himalayan region in the north-eastern part of India, constituting **Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim** and **Tripura**. The NER shares 2,000 km of international borders with Nepal, Bhutan, China, Myanmar and Bangladesh, and is connected to the rest of India by a 22-km wide stretch of land at Siliguri in West Bengal.

The NER covers an area of 262,000 sq. km, accounting for 7.9 per cent of India's total geographical area.



	Population (in Millions)	GSDP (in billion USD)	% of GDP
Arunachal Pradesh	1.38	4.13	0.23%
Assam	31.17	56.29	3.09%
Manipur	2.72	5.19	0.29%
Meghalaya	2.96	4.79	0.26%
Mizoram	1.09	3.76	0.21%
Nagaland	1.98	4.53	0.25%
Sikkim	0.61	4.61	0.25%
Tripura	3.67	8.20	0.45%

Source: Census of India, Directorate of Economics & Statistics, IBEF

Snapshot of Indian Oil & Gas

Exploration & Production

There are a total of 26 sedimentary basins in India, covering a total area of 3.36 million square kilometres.

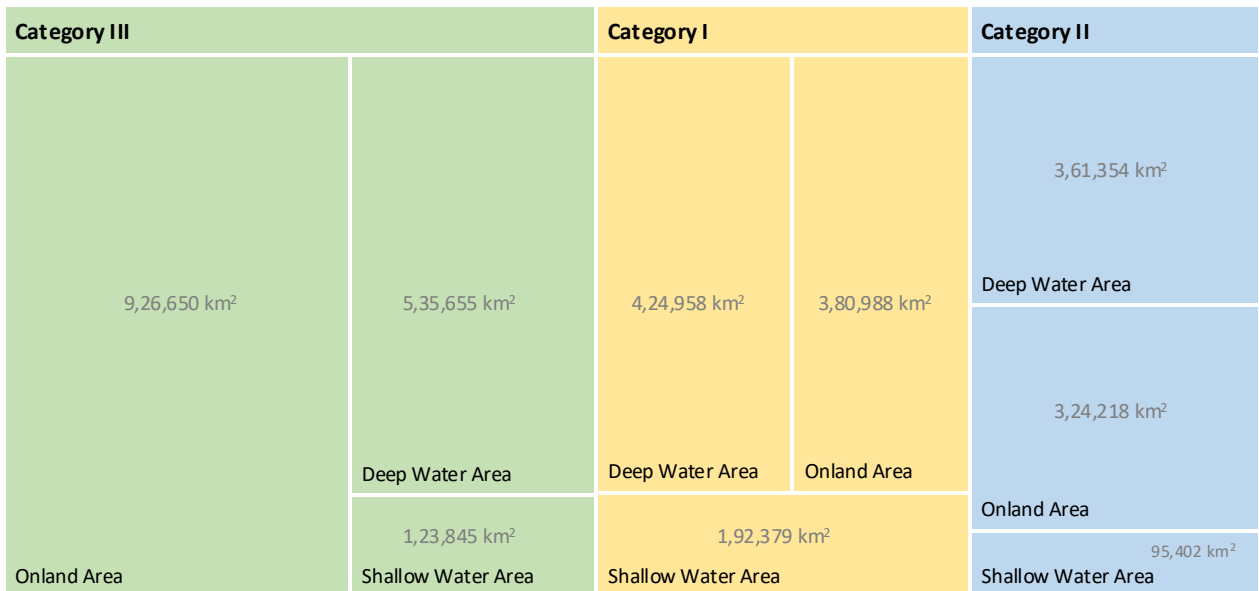
The area is spread across onland, shallow water up to 400 meter water depth and deepwater farther up to Exclusive Economic Zone (EEZ). Of the total sedimentary area, 49% of total area is located onland, 12% in shallow water and 39% in the deepwater area. There are 16 onland basins, 7 located both onland and offshore and 3 completely offshore. Tectonically, these basins are classified into 3 groups, based on origin from rifting (intra-cratonic and peri-cratonic), plate collision and crustal sag. These basins are divided into three categories based on maturity of hydrocarbon resources as under:

Category I: Basins, which have reserves and already producing.

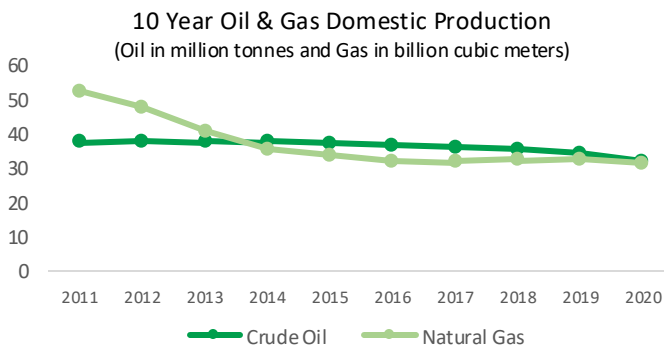
Category II: Basins, which have contingent resources pending commercial production.

Category III: Basins, which have prospective resources awaiting discovery.

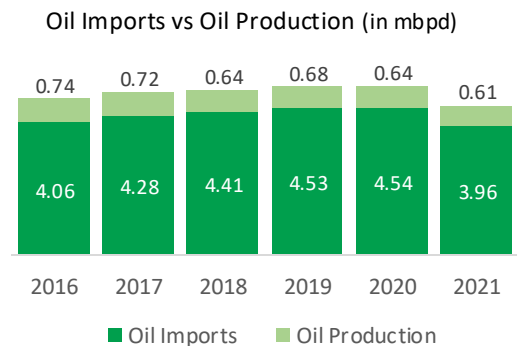
The matured resources comprising of Category I and Category II basins are spread over 53% of the entire basin area of the country. The remaining 47% fall under Category III, which are yet to be discovered.



Source: DGH



Source: MoPNG



Source: IBEF

Indian Oil & Gas Industry Regulatory Structure

	Upstream	Midstream	Downstream
Concerned Ministry	Ministry of Petroleum and Natural Gas (MoPNG)		
Legal Framework	<ul style="list-style-type: none"> Oilfields Regulation and Development Act, 1948 Petroleum & Natural Gas Rules, 1959 Mines Act, 1952 	<ul style="list-style-type: none"> Petroleum and Natural Gas Regulatory Board (PNGRB) 	
Regulators	<ul style="list-style-type: none"> Directorate General of Hydrocarbons (DGH) Oil Industry Development Board (OIDB) 	<ul style="list-style-type: none"> Petroleum and Natural Gas Regulatory Board (PNGRB) Oil Industry Development Board (OIDB) 	
Policies and Regulations	<ul style="list-style-type: none"> Hydrocarbon Exploration and Licensing Policy (HELP) Open Acreage Licensing (OALP) Policy Discovered Small Fields (DSF) Policy Coal Bed Methane (CBM) Policy 	<ul style="list-style-type: none"> Authorization Tariff Affiliate Code of Conduct 	<ul style="list-style-type: none"> Authorization Tariff Determination Exclusivity for CGD networks Technical Standards
Foreign Direct Investments (FDI)	100% under automatic route	100% under automatic route	Up to 49% in PSUs engaged in petroleum refining. Rest 100% through the automatic route

The Ministry of Petroleum & Natural Gas is concerned with exploration and production of Oil & Natural Gas, refining, distribution and marketing, import, export and conservation of petroleum products.

The Directorate General of Hydrocarbons (DGH) was established under Regulation No.O-20013/2/92-ONG, D-III, Ministry of PNG, Government of India on April 8, 1993. The DGH, under the administrative control of the Ministry of PNG, is responsible for the environmental, safety, technological, and economic activities related to the oil and gas industry. The DGH facilitates E&P activities through regulation as well as research. In unexplored or poorly explored areas, the DGH conducts studies, surveys, information drilling, and other related activities. The DGH reviews the exploration programs and reservoir production of companies for adequacy and advises the Government of India on such activities. Further, the DGH oversees matters concerning production sharing

contracts for discovered field and exploration blocks.

Oil Industry Development Board (OIDB) was established through the Oil Industry (Development) Act of 1974 ("Oil Development Act"). This legislation was enacted in response to increasing international prices of crude oil since the 1970s. Accordingly, the Oil Development Act's purpose was to facilitate increased self-reliance in petroleum and natural gas through various measures such as providing financial assistance to the organizations engaged in development programs of the oil industry.

Petroleum & Natural Gas Regulatory Board (PNGRB) was established in 2006 in terms of Section 3 (2) of the Petroleum and Natural Gas Regulatory Board Act, 2006. The Regulatory Board is empowered to regulate the refining, processing, storage, transportation, distribution, marketing and sale of petroleum and petroleum products and

natural gas, and to foster fair trade and competition amongst oil and gas companies.

The Oilfields (Regulation and Development) Act, 1948 constitutes the basic statute for licensing and leasing of petroleum and gas blocks by Government of India, empowering the same with broad authority to make rules providing for the basic regulation of oilfields and for the development of mineral oil resources.

The Petroleum and Natural Gas Rules, 1959 provides a framework for grant of exploration licenses and mining leases.

The Petroleum and Natural Gas Regulatory Board Act, 2006 provides for the setting up of the Petroleum and Natural Gas Regulatory Board to regulate the refining, processing, storage, transportation, distribution, marketing and sale of petroleum, petroleum products and natural gas (excluding production of crude oil and natural gas).

Indian Oil & Gas Industry

Policy Framework

Hydrocarbon Exploration and Licensing Policy (HELP)

The Hydrocarbon Exploration and Licensing Policy (“HELP”) was introduced in 2016, in order to revamp the oil and gas sector and address various industry concerns in the New Exploration and Licensing Policy (“NELP”) regime. HELP is a huge improvement from NELP in so far as it provided (a) uniform license for exploration and production of all forms of hydrocarbon; (b) marketing and pricing freedom for the crude oil and natural gas produced; (c) easy to administer revenue sharing model; and (d) an open acreage policy.

Unlike the multiple license model under NELP, HELP brings in a **uniform licensing model**, allowing drilling of all forms of hydrocarbons, including shale gas, coal bed methane, oil and gas, to be done under a single contract. Under the new regime, a common license for all hydrocarbons is awarded to firms offering maximum revenue to the Government of India would be given. It does away with complex investment multiples and provides for a lot more autonomy and flexibility to the operator.

NELP mechanism of profit-sharing was such where explorers first recovered their costs and then shared profits with the Government of India. HELP introduces **revenue-sharing mechanism** which replaced the profit sharing model under NELP. Where the government would not micro-manage the costs incurred, and would instead concentrate on receiving a share of the gross revenue. Revenue sharing will not be subject to cost recovery, monitoring will be simple, and the government share will acquire immediately on production, unlike in cost-recovery, monitoring will be simple, and the government share will accrue immediately on production.

The HELP policy provides for **freedom in the marketing and pricing** of crude oil and natural gas from these blocks, which are produced under the new contractual and fiscal regime. This is in sharp contrast with the previous NELP policy. In addition, the HELP policy is aimed at incentivizing production.

The **Open Acreage Licensing Policy (“OALP”)**

was introduced as part of the HELP. Blocks would be allocated under the policy wherein companies can submit bids for areas of their choice. Companies can choose blocks from the designated area round the year without waiting for roadshows and auctions like in NELP. OALP is aimed at increasing the domestic production of petroleum and expediting the appraisal of Indian sedimentary basin by providing the investors with an access to geo-scientific data available in National Data Repository (NDR). OALP further provides the flexibility to carve out exploration acreages through an open acreage licensing process and increased operational autonomy through a new revenue sharing model. Under the OALP, an Expression of Interest (EOI) can be made round the year with bidding round every six months. The EOIs would form the basis of blocks being offered in the bidding rounds.

Discovered Small Fields (DSF) Policy

The Discovered Small Fields Policy and Bidding Round (“DSF Bid Round”) was launched in 2016 in order to develop and commercialize production from the already discovered small fields and marks India’s move towards a new era of hydrocarbon production. Forty six contract areas consisting of sixty seven fields spread across nine sedimentary basins were offered in this bidding round. Some of the key fiscal benefits were: no oil cess applicable on crude oil production, moderate royalty rates, no upfront signature bonus and pricing and marketing freedom for oil and gas. Under the DSF Bid Round, a total of 134 e-bids were received for 34 contract areas. Subsequently, in February 2017, 22 companies (singly or in consortium) were shortlisted for 31 contract Areas.

Some salient features of the DSF Policy are as follows:

- Revenue Sharing contract
- Single license for conventional & unconventional hydrocarbon
- No restriction on exploration activity during contract period
- Freedom to sell and price crude oil and gas
- No oil cess applicable on crude oil production
- Up to 100% FDI allowed
- Custom duty exempted on import of goods and services for petroleum operations

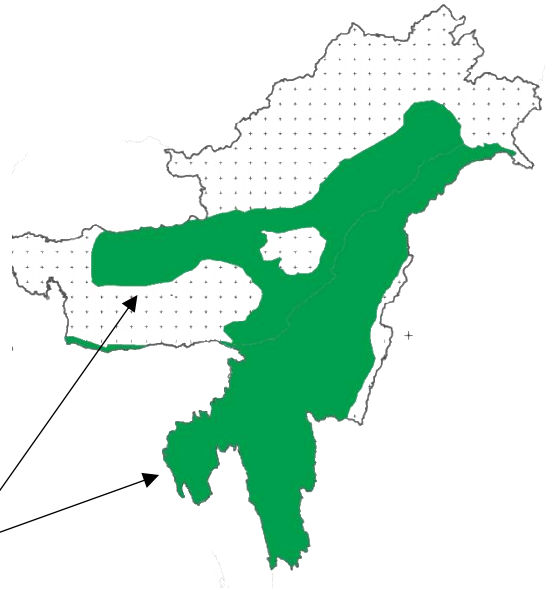
North-Eastern Region E&P Overview

The North-Eastern Region of India has a huge hydrocarbon resource potential of 7,600 MMtoe, of which only about 2,000 MMtoe has been discovered so far. Therein lies the opportunity for monetizing the remaining 5,600 MMtoe of hydrocarbon resources.

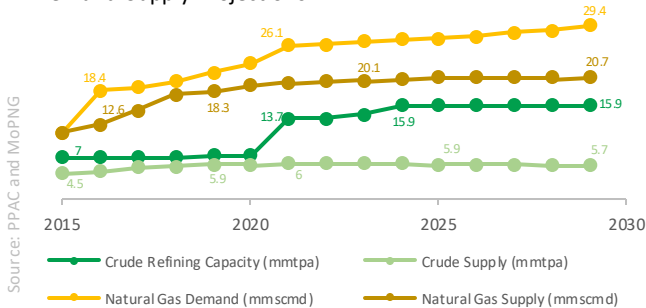
In the North-Eastern Region of India, there are two sedimentary basins – the Upper Assam Shelf and the Assam-Arakan Basin. The Assam-Arakan basin comprises of the states of Assam, Tripura, Arunachal Pradesh, Meghalaya, Mizoram, Manipur and Nagaland. About 10% of the total oil & gas produced in the country is from these two basins.

The Upper Assam Shelf basin covers the plains of Upper Assam and part of Arunachal Pradesh whereas Assam-Arakan Fold Belt basin covers the hilly terrains of Assam, Arunachal Pradesh, Nagaland, Manipur, Mizoram and Tripura. The Upper Assam Basin is well explored, and the current production of oil and gas is primarily from this basin. Assam-Arakan Fold belt is a well-established Gas province.

The adjoining figure shows both the Upper Assam Shelf and Assam-Arakan basins in the North Eastern Region.



Crude Oil & Natural Gas in the North-East Demand-Supply Projections



Government of India released the Hydrocarbon Vision Document 2030 for NE Region with the aim of preparing a roadmap for increasing the production of oil and gas in NE and outlining the necessary investment in the hydrocarbon sector to increase exploration activities.

The goal is to develop the NE Region as a dominant hydrocarbon hub at the forefront of India's energy economy, and double the production of O+OEG by 2030.

The key operators in the Oil & Gas sector in the North-Eastern Region are ONGC, Oil India Ltd., HOEC, GeoEnpro Petroleum Limited, Cairn Oil & Gas (Vedanta Ltd.), Ramayana Ispat, Oilmax Energy, IOCL, Antelopus Energy, Prize Petroleum, BDN Enterprises, Duggar Fiber, Mahendra Infratech, Megha Engineering And Infrastructures Limited, Vijayasri Bhaskar Industries, Invenire Energy, Arsh Corporate Services, Shanti G.D. Ispat and Power, Bagadiya Brothers, Shanno Business India, Jubilant Oil & Gas, Assam Company Ltd., and Jubilant Energy Kharsang Limited.

State	Blocks / Fields Assigned
Arunachal Pradesh	18
Assam	102
Mizoram	3
Nagaland	4
Tripura	23
Total	150

Source: Directorate General of Hydrocarbons

North-Eastern Region

Area Under E&P

At present, ONGC and OIL, and a few Indian and Foreign private companies are engaged in the exploration and production of hydrocarbons in the north-eastern region.

The national oil companies – Oil and Natural Gas Corporation (ONGC) and Oil India Limited (OIL) are the major operators in the north-eastern region. All oil blocks allotted in the country for the exploration and production of oil and gas have been operated under three operating regimes:

- Nomination Regime
- Production Sharing Contracts Regime (Pre-NELP and NELP)
- Revenue Sharing Contracts Regime (HELP and DSF)

ONGC and OIL are the public sector enterprises which were allotted blocks on a nomination basis, during the nomination period of India's E&P regime. Subsequently, blocks were allotted under the PSC and RSC regime.

A snapshot of the acreages and estimated reserves in the North-Eastern states can be found below:

State	State Area (in sq. km)	Sedimentary Area (in sq. km)	Sedimentary Area % of State	Estimated Hydrocarbon Resources (MMToe)	No. of PELs	No. of PMLs
Assam	78,438	59,697	76	6,766	25	77
Arunachal Pradesh	83,743	8,733	10	43	14	3
Manipur	22,327	21,337	96	70	0	0
Mizoram	21,081	21,081	100	113	3	0
Nagaland	16,579	12,810	77	80	3	1
Tripura	10,486	10,486	100	560	5	18
Meghalaya	22,429	2,681	12	2	-	-
Sikkim	7,096	-	-	-	-	-
TOTAL	2,62,179	1,36,825	52	7,634	50	99

Source: Directorate General of Hydrocarbons

North-Eastern Region Oil & Gas Production

Company	Asset	2016-17	2017-18	2018-19	2019-20	2020-21
Oil Production (in MMT)						
OIL	Arunachal Pradesh	0.01	0.01	0.01	0.02	0.02
	Assam	3.25	3.37	3.28	3.08	2.90
OIL TOTAL		3.26	3.38	3.29	3.10	2.92
ONGC	Assam	0.95	0.97	0.99	0.99	0.96
	Tripura	0	0	0	0	0.003
ONGC TOTAL		0.95	0.97	0.99	0.99	0.96
PSC	Arunachal Pradesh	0.05	0.04	0.03	0.03	0.03
	Assam	0	0	0.03	0.03	0.03
PSC TOTAL		0.05	0.04	0.06	0.06	0.06
GRAND TOTAL		4.26	4.40	4.35	4.15	3.96
Gas Production (in BCM)						
OIL	Arunachal Pradesh	0.01	0.01	0.01	0.04	0.05
	Assam	2.69	2.66	2.48	2.38	2.2
OIL TOTAL		2.70	2.67	2.49	2.42	2.30
ONGC	Assam	0.44	0.51	0.48	0.46	0.39
	Tripura	1.43	1.44	1.55	1.47	1.63
ONGC TOTAL		1.87	1.95	2.04	1.93	2.02
PSC	Arunachal Pradesh	0.02	0.02	0.02	0.01	0.005
	Assam	0	0.05	0.32	0.30	0.37
	Tripura	-	-	-	-	0
PSC TOTAL		0.02	0.07	0.34	0.31	0.37
GRAND TOTAL		4.59	4.69	4.87	4.66	4.68

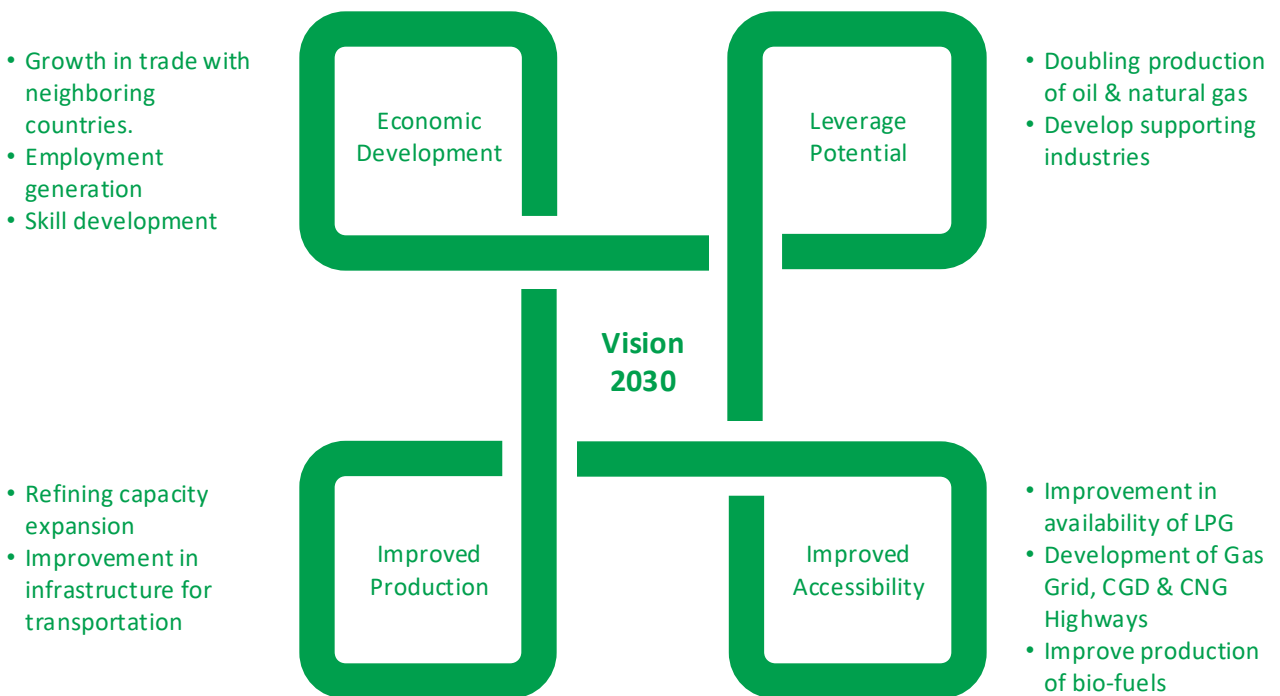
Source: Directorate General of Hydrocarbons

Hydrocarbon Vision 2030

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

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

Out of the total Rs 1.30 lakh crore investment envisaged in the North-Eastern Region under the Hydrocarbon Vision 2030, projects worth Rs 1 lakh crore have already been approved and are under various stages of implementation.



The NER accounts for about 20% of the country's total natural gas output of 75 million standard cubic metres per day. Assam, Arunachal Pradesh and Tripura have established gas production potential while Manipur and Nagaland are also believed to have substantial reserves.

An ambitious project to connect major cities across north-eastern India with a gas grid envisioned by Prime Minister Narendra Modi in 2016 is well on track. The first phase of this Rs 9265 crore venture will be commissioned by early 2024. MoPNG created **Indradhanush Gas Grid Limited (IGGL)** in 2018, as part of the Urja-Ganga scheme to execute and administer the project. IGGL is a joint venture between the five National Oil & Gas Companies ONGC, OIL, GAIL, IOCL and NRL.

The Indian E&P Investor Advantage

India's energy consumption is projected to double as the country's GDP grows to an estimated USD 8.6 trillion by 2040. India aims to become Energy Independent by boosting domestic production by the year 2047.

Increasing Energy Needs of a Fast-Growing Nation

A nation of 1.3 billion people, India is a fast-growing nation, with an ever-increasing demand for energy. The opportunities in the hydrocarbon sector, therefore, are plenty. Regulatory framework and recent policy reforms make the market conditions favourable and provides a conducive environment for investments in the sector.

Over the last 30 years, industrialization has been a major driver for India, leading to 10% of Global Growth in Industrial Value-added. By 2040, India is expected to be accountable for 20% of Global Growth in Industrial Value-added. At present, India is the fourth-largest global energy consumer behind China, USA and the EU. It is expected that India will overtake EU's energy consumption by 2030 to become the third-largest energy consumer in the world. Pre-pandemic India's energy demand was projected to increase by almost 50% by 2030, but now it is expected to be around 35%. By 2040, however, India is expected to nearly double its energy consumption. The goal is to become a USD 5 trillion economy by 2040, and that could be achieved through a growth in the energy sector. The Indian government is looking to increase the contribution of natural gas by 15% by 2030.

India's demand for oil is seen to rise by 74% i.e. 8.7 million barrels per day by 2040, under the current framework and policies. This growing need for energy will make India more dependent on fossil fuel imports, as domestic oil & gas production has been stagnant for years. For this very reason India aims to become Energy Independent by the year 2047, to avoid huge energy import bill running into billions.

Opportunities in the Indian E&P Sector

Most of the Indian sedimentary basins are either unexplored or not well-explored, meaning there is a good potential for significant hydrocarbon discoveries. Investors should look out for upcoming bidding rounds to invest in, and contribute to growing India's E&P sector.

The Deepwater areas largely remain untapped due to the technological challenges. This challenge can easily be turned into an opportunity by leveraging technology and public-private partnerships.

There is also a goal to become Energy Independent by the year 2047. This is a priority as energy security plays a crucial role in growth of a nation. The boost to increase domestic production offers a lot of opportunities to the service providers and equipment manufacturers too. National Oil Companies such as ONGC and OIL are investing in Increased Oil Recovery (IOR) and Enhanced Oil Recovery (EOR) techniques.

The India government is working hard to attract investment and make the environment suitable for investors and operators alike, to increase E&P operations in the country. Incentives such as early production royalty concession of 10%, 20% and 30% for Category I, Category II and Category III basins respectively, and policies like Discovered Small Fields (DSF), National Data Repository (NDR), National Seismic Programme (NSP), 100% FDI in exploration projects are big positive leaps towards inviting investors to the country's E&P sector.

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The SFC Asia Advantage

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