

Research Report on Oil & Gas Drilling Industry

December 2025

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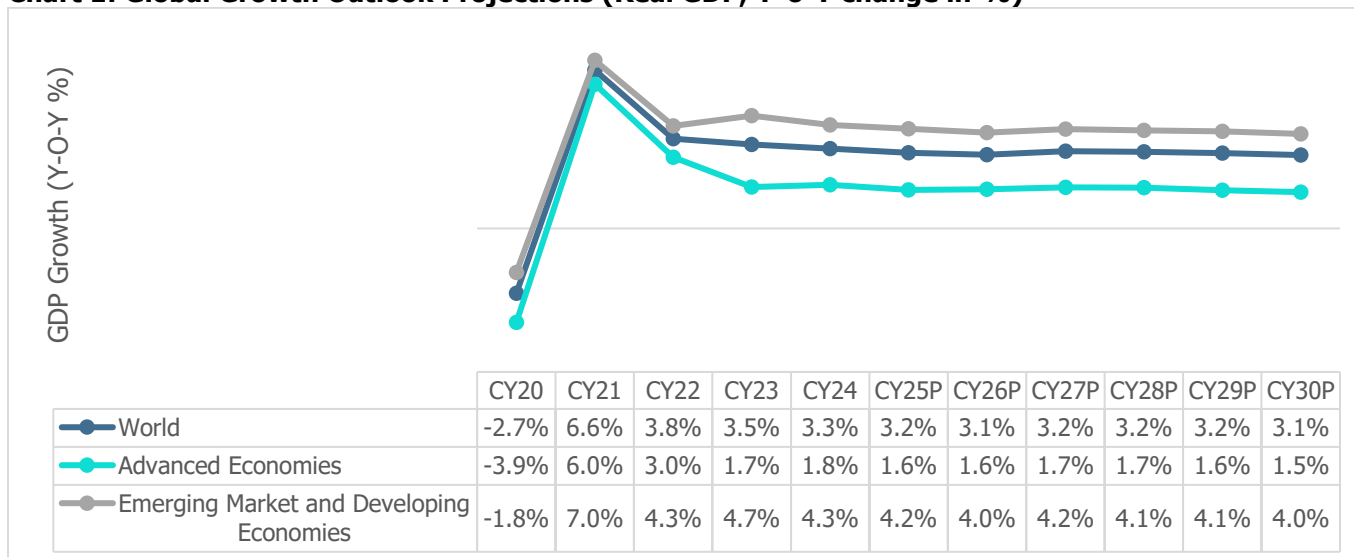
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1. Economic Outlook

1.1 Global Economy

Global growth, which peaked at 3.5% in CY23, moderated to 3.3% in CY24 and is projected to decline further to 3.2% in CY25 and 3.1% in CY26. This slowdown is largely attributed to escalating trade tensions, particularly the imposition of new U.S. tariffs and retaliatory measures from key trading partners. These developments are expected to push global tariff levels to historic highs, dampening trade flows and weakening growth prospects. In response, countries are reassessing their strategic priorities and policy frameworks. Central banks are likely to recalibrate monetary policies, while prudent fiscal management and structural reforms will be essential to address rising debt levels and mitigate widening global inequalities

Chart 1: Global Growth Outlook Projections (Real GDP, Y-o-Y change in %)



Source: IMF – World Economic Outlook, October 2025; Notes: P-Projection, E-Estimated

Table 1: GDP growth trend comparison - India v/s Other Economies (Real GDP, Y-o-Y change in %)

	Real GDP (Y-o-Y change in %)										
	CY20	CY21	CY22	CY23	CY24	CY25P	CY26P	CY27P	CY28P	CY29P	CY30P
India	-5.8	9.7	7.6	9.2	6.5	6.6	6.2	6.4	6.5	6.5	6.5
China	2.3	8.6	3.1	5.4	5.0	4.8	4.2	4.2	4.0	3.7	3.4
Indonesia	-2.1	3.7	5.3	5.0	5.0	4.9	4.9	5.0	5.0	5.1	5.1
Saudi Arabia	-3.8	6.5	12.0	0.5	2.0	4.0	4.0	3.3	3.3	3.3	3.3
Middle East	-2.3	4.7	6.4	2.6	2.6	3.5	3.8	3.8	3.7	3.7	3.7
Latin America	-6.9	7.4	4.3	2.4	2.4	2.4	2.3	2.6	2.7	2.8	2.6
Brazil	-3.3	4.8	3.0	3.2	3.4	2.4	1.9	2.2	2.3	2.4	2.5
Euro Area	-6.0	6.4	3.6	0.4	0.9	1.2	1.1	1.4	1.3	1.2	1.1
United States	-2.1	6.2	2.5	2.9	2.8	2.0	2.1	2.1	2.1	1.9	1.8

Source: IMF- World Economic Outlook Database (October 2025)

Note: P- Projections, E-Estimated; India's fiscal year (FY) aligns with the IMF's calendar year (CY). For instance, FY24 corresponds to CY23.

1.2 Indian Economic Outlook

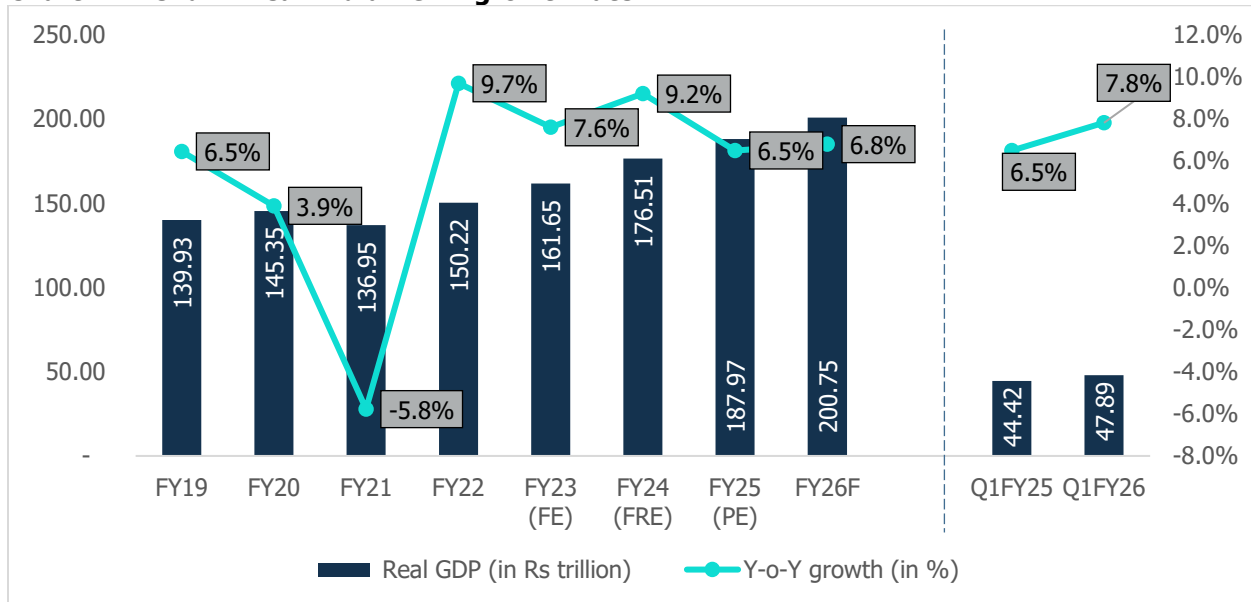
1.3 GDP Growth and Outlook

Resilience to External Shocks remains Critical for Near-Term Outlook

India's economy continues to show rapid growth. In the first quarter of FY26, the country's GDP grew by 7.8% compared to the same period last year, which saw a 6.5% increase. For the full year FY26, GDP is expected to grow by 6.8%, supported by rising rural demand, better job opportunities, and active business conditions.

In FY25, provisional estimates show a growth of 6.5% (Rs 187.97 trillion), led by robust performance in manufacturing, construction, and financial services. Consumer spending rose by 7.6%, and government spending increased by 3.8%, both contributing to the overall growth. In FY24, India's GDP grew by 9.2% (Rs 176.5 trillion), the highest in over a decade (excluding the pandemic year).

Chart 2: Trend in Real Indian GDP growth rate



Source: MOSPI, Reserve Bank of India.

Note: FE – Final Estimates, FRE- First Revised Estimates, PE – Provisional Estimates, F - Forecasted

GDP Growth Outlook (October 2025)

FY26 GDP Outlook: The RBI projects real GDP growth at 6.8% for FY26, driven by strong private consumption, steady investment, and resilient rural and urban demand. A favourable monsoon, robust services sector and improving corporate balance sheets support this outlook.

However, risks from prolonged geopolitical tensions, global trade disruptions, and weather-related uncertainties remain. Taking these into account, the RBI has reaffirmed its growth projections.

Table 2: RBI's GDP Growth Outlook (Y-o-Y %)

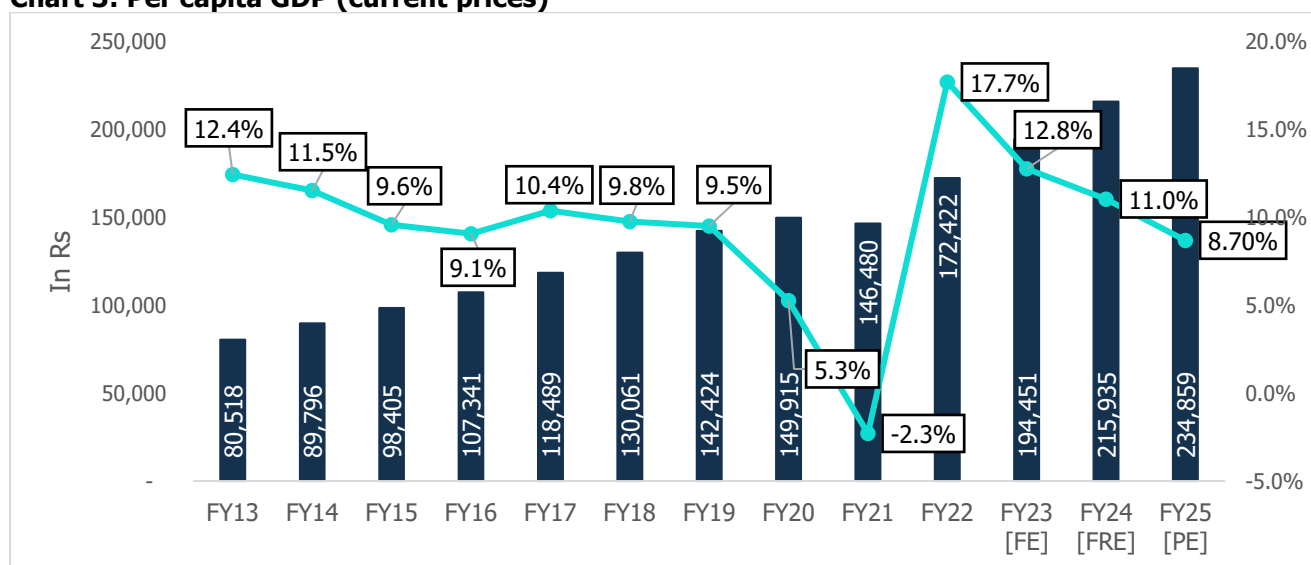
FY26P (complete year)	Q2FY26P	Q3FY26P	Q4FY26P	Q1FY27P
6.8%	7.0%	6.4%	6.2%	6.4%

Source: Reserve Bank of India; Note: P-Projected

1.4 India's GDP Per Capita

India's per capita GDP has shown a consistent upward trend over the past decade, reflecting steady economic growth. Rising per capita income, driven by robust economic development, enhances consumer confidence and discretionary spending, reflecting a higher standard of living and overall prosperity. From FY13 to FY25, the per capita GDP is expected to increase from Rs 80,518 to Rs 234,859, with an average growth rate of around 9% annually. Key drivers of this growth include structural reforms, digitalization, rising domestic consumption, and increased foreign investment. However, there was a slight dip in FY20, primarily due to the economic impact of the COVID-19 pandemic. Despite this, the country has rebounded with strong growth rates in subsequent years, supported by economic recovery and continued expansion in various sectors.

Chart 3: Per capita GDP (current prices)



Source: MOSPI; Note: FE – Final Estimates, FRE- First Revised Estimates, PE- Provisional Estimates

1.5 Gross Value Added (GVA)

Gross Value Added (GVA) is the measure of the value of goods and services produced in an economy. GVA gives a picture of the supply side whereas GDP represents consumption. India's recovery in FY25 was powered by a broad-based rebound across sectors. The gap between GDP and GVA growth stood at 0.1 percentage point in FY25, with GDP growing at 6.5% and GVA at 6.4%, as per MoSPI's provisional estimates released in August 2025.

The agriculture and allied sector grew by 4.6% in FY25 (up from 2.7% in FY24), supported by a good monsoon, better crop output, and strong allied activities. The industrial sector grew by 5.9% in FY25, down from 10.8% in FY24 due to weaker manufacturing, with FY24 growth driven by strong manufacturing sales, construction (9.4%), utilities, and supportive policies. The services sector grew by 7.2% in FY25, down from 9.0% in FY24, supported by public administration (8.9%), financial services (7.2%), and trade and transport (6.1%), contributing Rs 94.4 trillion to the economy.

From Q1FY25 to Q1FY26, the overall GVA at basic price grew from 6.5% to 7.6%, indicating a stronger economic performance. Most sectors showed growth, with Services sector growing significantly from 6.8% to 9.3%, and Agriculture, Forestry & Fishing rebounding from 1.5% to 3.7%. However, Mining & Quarrying declined sharply from 6.6% to -3.1%, and Electricity, Gas & Water supply slowed considerably from 10.2% to 0.5%.

Table 3: Sectoral Growth (Y-o-Y % Growth) - at Constant Prices

At constant Prices	FY19	FY20	FY21	FY22	FY23 (FE)	FY24 (FRE)	FY25 (PE)	Q1FY25	Q1FY26
Agriculture, Forestry & Fishing	2.1	6.2	4.1	4.6	6.3	2.7	4.6	1.5	3.7
Industry	5.3	-1.4	-0.9	12.2	2.5	10.8	5.9	8.5	6.3
Mining & Quarrying	-0.9	-3.0	-8.6	6.3	3.4	3.2	2.7	6.6	-3.1
Manufacturing	5.4	-3.0	2.9	10.0	-1.7	12.3	4.5	7.6	7.7
Electricity, Gas, Water Supply & Other Utility Services	7.9	2.3	-4.3	10.3	10.8	8.6	5.9	10.2	0.5
Construction	6.5	1.6	-5.7	19.9	9.1	10.4	9.4	10.1	7.6
Services	7.2	6.4	-8.2	9.2	10.3	9.0	7.2	6.8	9.3
Trade, Hotels, Transport, Communication & Broadcasting	7.2	6.0	-19.7	15.2	12.3	7.5	6.1	5.4	8.6
Financial, Real Estate & Professional Services	7.0	6.8	2.1	5.7	10.8	10.3	7.2	6.6	9.5
Public Administration, Defence and Other Services	7.5	6.6	-7.6	7.5	6.7	8.8	8.9	9.0	9.8
GVA at Basic Price	5.8	3.9	-4.2	9.4	7.2	8.6	6.4	6.5	7.6

Source: MOSPI; Note: FRE – First Revised Estimates, FE- Final Estimates, PE – Provisional Estimates

1.6 Trends in Per capita State Domestic Product (SDP)

State Domestic Product is the total value of goods and services produced, during any financial year, within the geographical boundaries of a state. The top 10 best performing states on per capita SDP include Delhi, Gujarat, Karnataka, and Tamil Nadu.

As of FY25, major states having a per capita SDP below national average include Andhra Pradesh, Rajasthan, Madhya Pradesh, and Uttar Pradesh growing y-o-y by 8.0%, 6.9%, 4.7%, and 7.9% respectively. Bihar is the poorest performing state with a per capita SDP of Rs. 33,996. It has consistently been performing the poorest since FY18, growing merely at a CAGR of 4.5% from FY18 to FY25.

Table 4: Per Capita State Domestic Product (SDP) for Key States (at constant prices, in Rs.)

State\UT	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25
Andhra Pradesh	1,03,177	1,08,853	1,10,587	1,10,971	1,18,349	1,23,853	1,31,083	1,41,609
Bihar	26,719	29,092	29,798	26,839	27,674	30,678	33,966	36,342
Gujarat	1,43,604	1,54,887	1,64,060	1,56,285	1,70,519	1,81,963	NA	NA

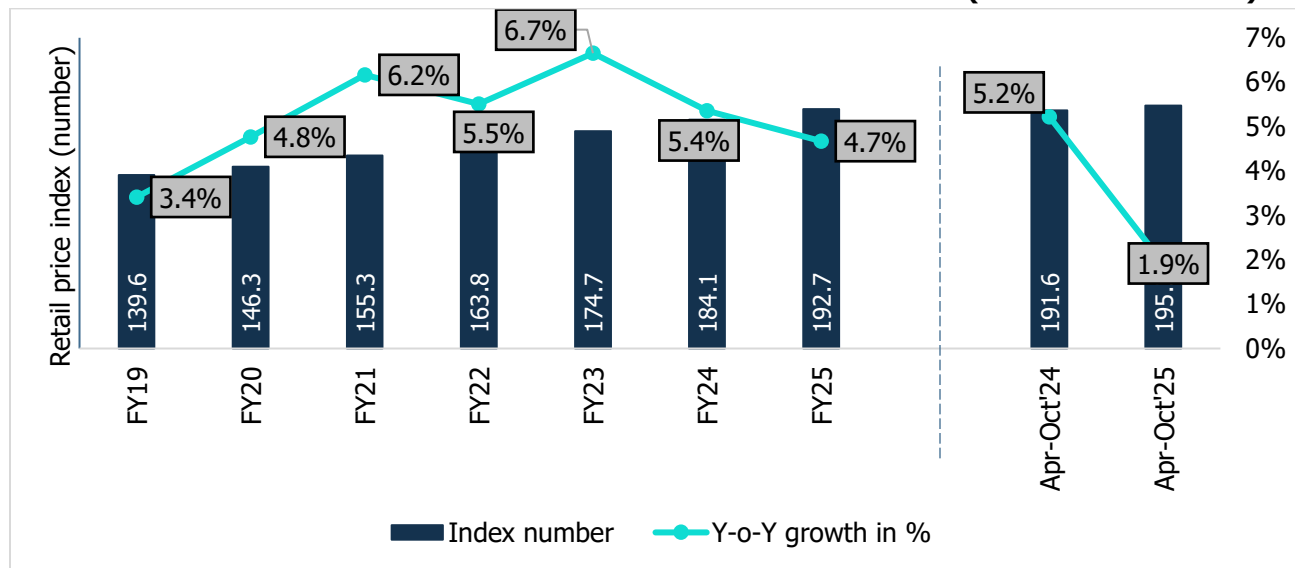
Karnataka	1,40,747	1,49,024	1,56,478	1,49,673	1,65,517	1,82,371	1,91,970	2,04,605
Madhya Pradesh	54,824	59,005	60,452	56,086	61,011	63,681	67,301	70,434
Maharashtra	1,37,808	1,40,782	1,45,626	1,27,550	1,41,651	1,54,979	1,66,013	1,76,678
Rajasthan	73,529	73,975	76,840	73,447	79,490	84,585	90,414	96,638
Tamil Nadu	1,33,029	1,41,844	1,44,845	1,43,482	1,54,269	163,205	1,78,496	1,97,747
Uttar Pradesh	41,771	42,333	43,061	39,866	45,294	48,014	51,898	55,990
Delhi	2,52,960	2,57,597	2,60,559	2,28,162	2,39,821	2,52,768	2,71,490	2,83,093

Source: MOSPI

1.7 Consumer Price Index

The Consumer Price Index (CPI) for the April–October 2025 recorded a combined inflation rate of 1.9%, marking the lowest quarterly retail inflation of the current CPI series. The moderation was driven by the impact of decline in GST, favorable base effect and to drop in inflation of Oils and fats, Vegetables, Fruits, Egg, Footwear, Cereals and products, Transport and Communication etc.

Chart 4: Retail Price Inflation in terms of index and Y-o-Y Growth in % (Base: 2011-12=100)

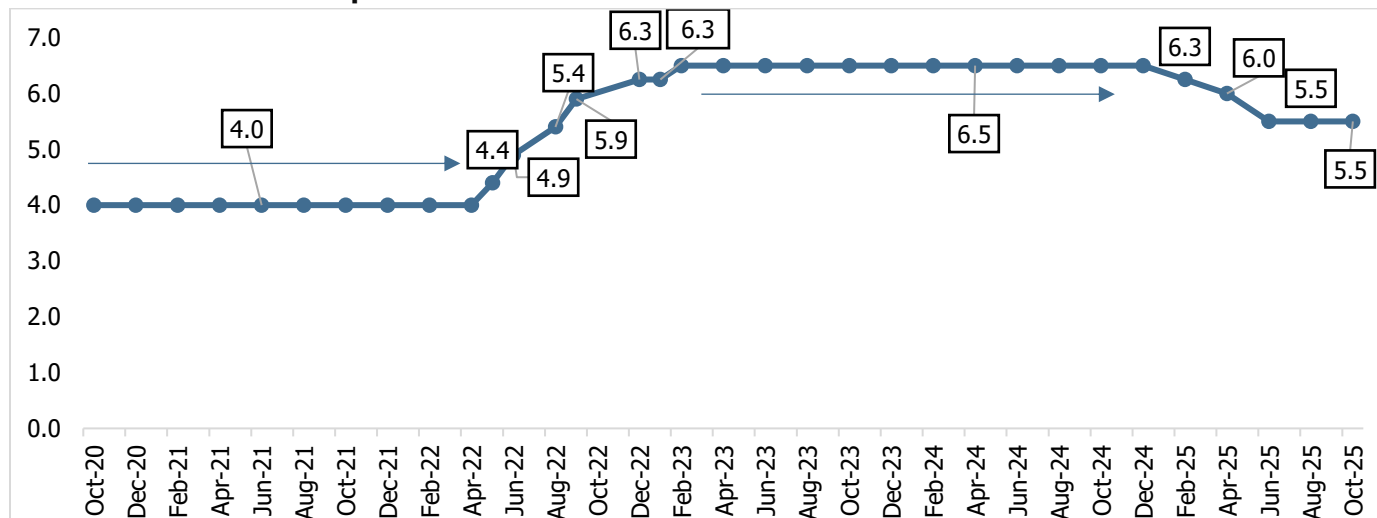


Source: MOSPI

The CPI is primarily factored in by RBI while preparing their bi-monthly monetary policy. At the bi-monthly meeting held in October 2025, RBI projected inflation at 3.1% for FY26 with inflation during Q2FY26 at 2.1% and Q3FY26 at 3.1%, Q4FY26 at 4.4% and Q1FY27 at 4.9%.

Considering the current inflation situation, RBI has maintained the repo rate to 5.5% in the October 2025 meeting of the Monetary Policy Committee.

Chart 5: RBI historical Repo Rate



Source: RBI

Further, the central bank continued its stance as 'neutral'. The economic growth outlook for India is expected to maintain momentum, supported by private consumption and continued growth in fixed capital formation. The uncertainty has resurfaced as the temporary pause on US tariff hikes has ended and higher duties on some Indian exports now apply, even though trade talks have resumed.

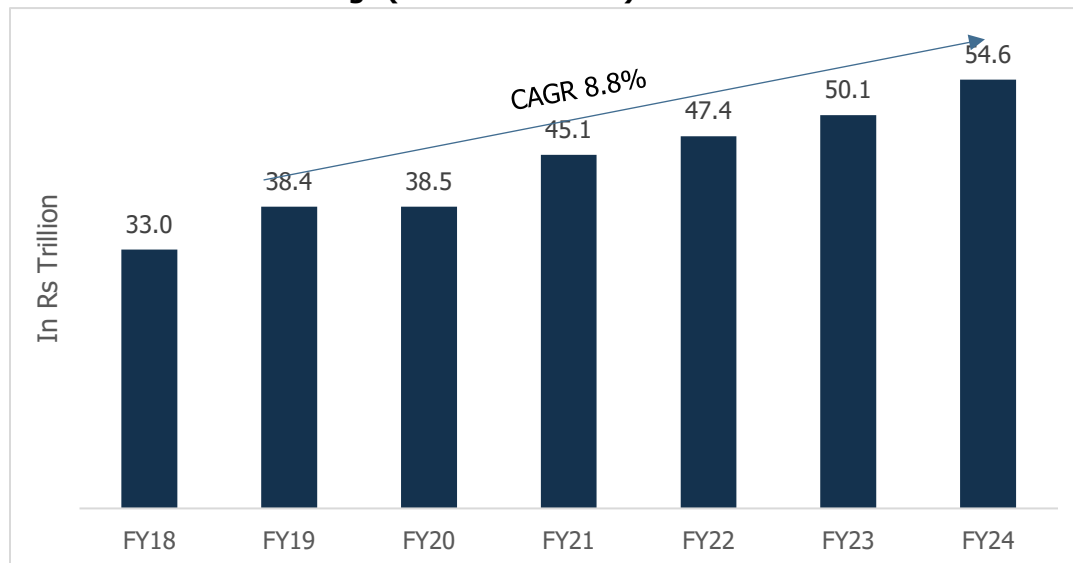
The RBI has adopted for a non-inflationary growth with the foundations of strong demand and supply with a good macroeconomic balance. The domestic growth and inflation curve require the policies to be supportive with the volatile trade conditions.

1.8 Trends in Household and Gross Savings

Household savings are of the household sector, measured as its excess of income over consumption and invested in financial assets and physical assets. Household savings in India have grown at an 8.8% CAGR since FY18, reaching Rs 54.6 trillion in FY24, a 9.0% y-o-y increase. A shift toward physical assets, particularly housing and gold/silver ornaments, reflects a preference for tangible investments amid high inflation and slow growth in monetary assets.

This trend is driven by heavy borrowing, especially in housing, auto, and personal loans, leading to a six-year high in household financial liabilities. Savings in mutual funds and life insurance also grew, with an 11.5% and 13.6% y-o-y increase, respectively, while investment in equities and capital market instruments rose as they offer higher returns than bank deposits.

Chart 6: Household Savings (at Current Prices)

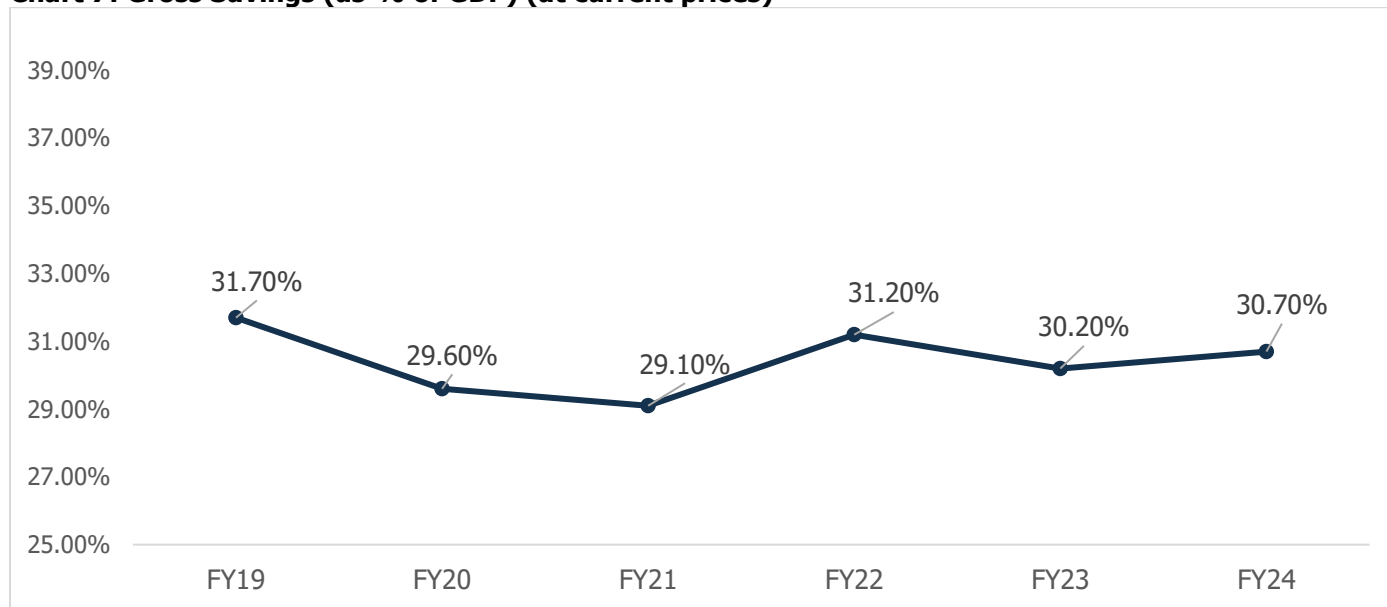


Source: MOSPI

Gross domestic savings are the total savings within the economy, comprising the savings of the household, private corporate and public sectors. Gross Domestic Savings as percentage of GDP, has seen a flat growth moving within a narrow range. Within the last five years, it was highest in FY19 at 31.7%. It declined to less than 30% during FY20 and FY21 on account of pandemic increasing again to 31.2% in FY22 before declining to 30.2% in FY23. The trend picked up marginally in FY24 to 30.70%.

As of FY24, Savings were Rs. 92.59 trillion indicating a y-o-y growth of 12.3% while GDP was at Rs. 301.23 trillion showing a growth of 12.0%.

Chart 7: Gross Savings (as % of GDP) (at current prices)



Source: MOSPI

1.9 Growth of the middle class in India and the rural economy in India

India's rural economy is becoming a significant driver of the Fast-Moving Consumer Goods (FMCG) sector's resurgence, signalling a promising turnaround in aggregate demand after a slow start to the 2024-25 financial year. The Reserve Bank of India (RBI) highlights that rising incomes and improved infrastructure are fuelling increased rural consumption of FMCG products. This boost is supported by a rise in rural savings, marked by growing numbers of savings bank accounts and balances, and a reduction in inflationary pressures, which has allowed rural consumption to catch up with urban areas. Additionally, favourable monsoon conditions and improved sowing data are expected to sustain this growth, complemented by increased government spending on rural development and infrastructure.

The expansion of middle-income households in rural India is transforming the country's economic landscape. This growth is driven by rising incomes, increased discretionary spending, a shift towards online and omnichannel shopping, and advancements in payment and logistics infrastructure. There is also a notable dietary shift in rural areas from carb-based foods to more protein-rich diets. India's middle class, characterized by significant income variability, exhibits diverse spending patterns. Lower-middle-class households allocate much of their income to private healthcare, education, and essential consumer goods, such as motorbikes and basic appliances. In contrast, the upper-middle-class invests in luxury items, entertainment, property, and personal services, with a higher propensity to own assets like cars, computers, and air conditioners. Both segments of the middle class are substantial and emerging as key drivers of consumption and economic growth in India. Recent policies, including the Mahatma Gandhi National Rural Employment Guarantee Act, have increased rural incomes, enabling more rural households to enter the middle class. The growing, more inclusive, and politically engaged middle class reflects broader economic growth, although there is a risk of social strain if growth falters and quality job creation does not keep pace.

The India Meteorological Department (IMD) expects a stronger-than-usual southwest monsoon, which should improve crop production and refill water reservoirs helping boost spending in rural areas.. Improvements in agriculture and rural spending are emerging as bright spots in demand conditions. The government's Budget measures, which focus on agriculture, infrastructure, and rural development, aim to increase incomes and revitalize

the rural sector. These measures include transforming agricultural research, introducing new crop varieties, promoting natural farming, and enhancing digital infrastructure for agriculture. Successful implementation of these programs, coupled with proper fund allocation, is crucial for improving farm incomes and strengthening supply chains. A shift towards diversified, high-value agricultural production, along with marketing and trade reforms, is needed to foster more inclusive, environmentally friendly, and climate-resilient agriculture.

Despite higher absolute incomes among the wealthy, the sheer size of India's middle class indicates it will become a major force in the economy, creating one of the world's largest markets. This burgeoning middle class, with its growing discretionary spending power, is poised to drive investment, generate employment, and spur further economic growth. Assuming effective reforms are implemented, and the middle class expands to over one billion people, its role will be pivotal in India's economic and social fabric, influencing a wide range of activities from consumption to employment and political change.

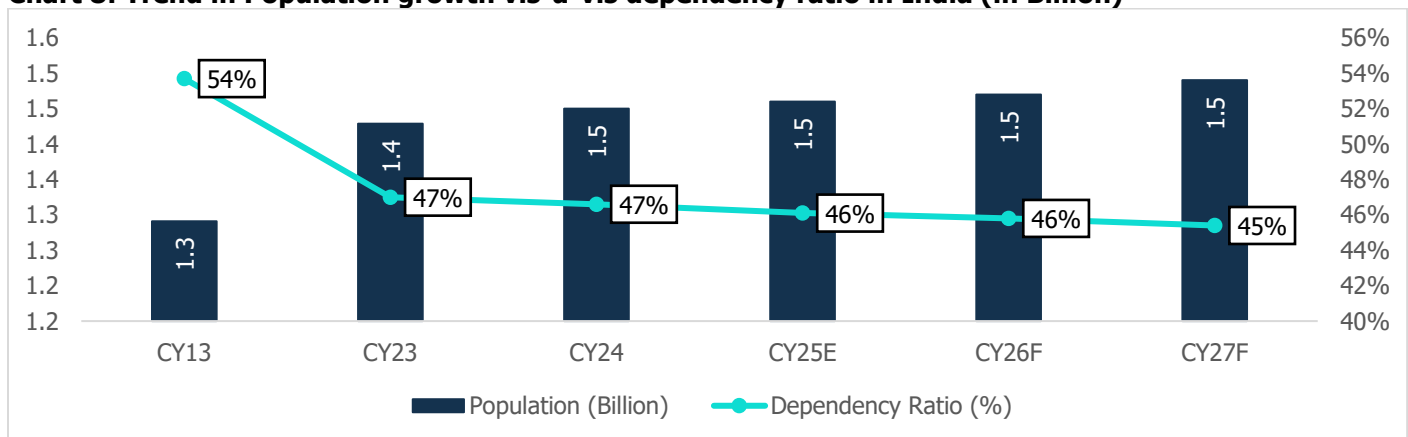
1.10 Overview on Key Demographic Parameters

- **Population growth and Urbanization**

The trajectory of economic growth of India and private consumption is driven by socio-economic factors such as demographics and urbanization. According to the world bank, India's population in CY22 surpassed 1.42 billion, slightly higher than China's population (1.41 billion) and became the most populous country in the world.

Age Dependency Ratio is the ratio of dependents to the working age population, i.e., 15 to 64 years, wherein dependents are population younger than 15 and older than 64. This ratio has been on a declining trend. Declining dependency means the country has an improving share of working-age population generating income, which is a good sign for the economy. It was as high as 76% in 1983, which has reduced to 47% in CY23. However, this ratio is expected to rise again to 54% by CY36, driven by an increase in the elderly population as life expectancy improves.

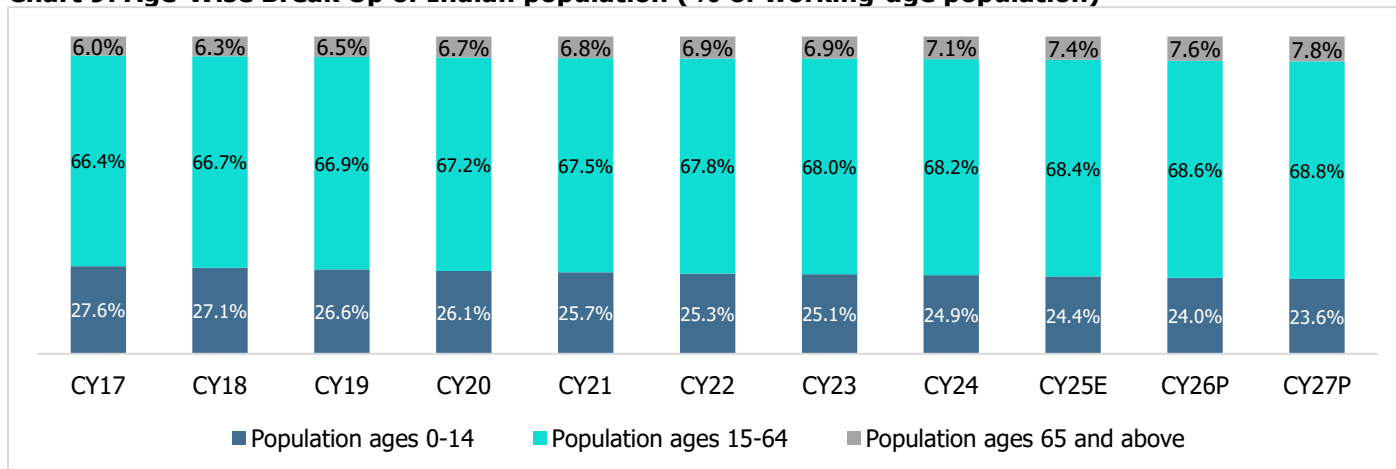
Chart 8: Trend in Population growth vis-à-vis dependency ratio in India (in Billion)



Source: World Bank Database, MOSPI; Note; E- Estimated, F- Forecasted

Despite a projected rise in the dependency ratio to 54% by CY36, India's young and growing workforce, especially in newly urbanised towns, will continue to drive income growth and consumer demand. This presents strong opportunities for sectors like consumer electronics, transportation, and railways. Rising employment, urbanisation, and government investment in rural development and digital infrastructure will further boost demand, while increased tech adoption supports long-term consumption growth across both urban and rural markets.

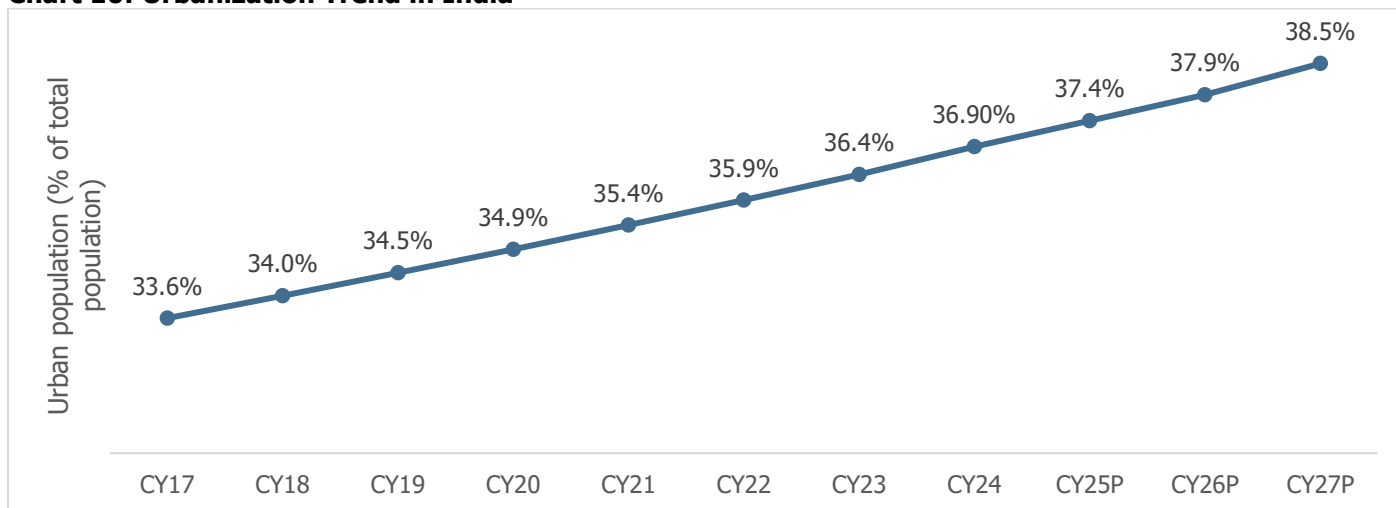
Chart 9: Age-Wise Break Up of Indian population (% of working-age population)



Source: World Bank Database; Note; E- Estimated, F- Forecasted

The urban population is significantly growing in India. The urban population in India is estimated to have increased from 413 million (32% of total population) in CY13 to 519.5 million (36.4% of total population) in the year CY23. India is undergoing a significant urban transformation, with the urban population projected to rise to 40% by CY36. This shift is driven by factors such as improved living standards, increased employment opportunities in urban areas, and government initiatives aimed at urban development. This rapid urbanisation might necessitate substantial investments in infrastructure, housing, and transportation.

Chart 10: Urbanization Trend in India



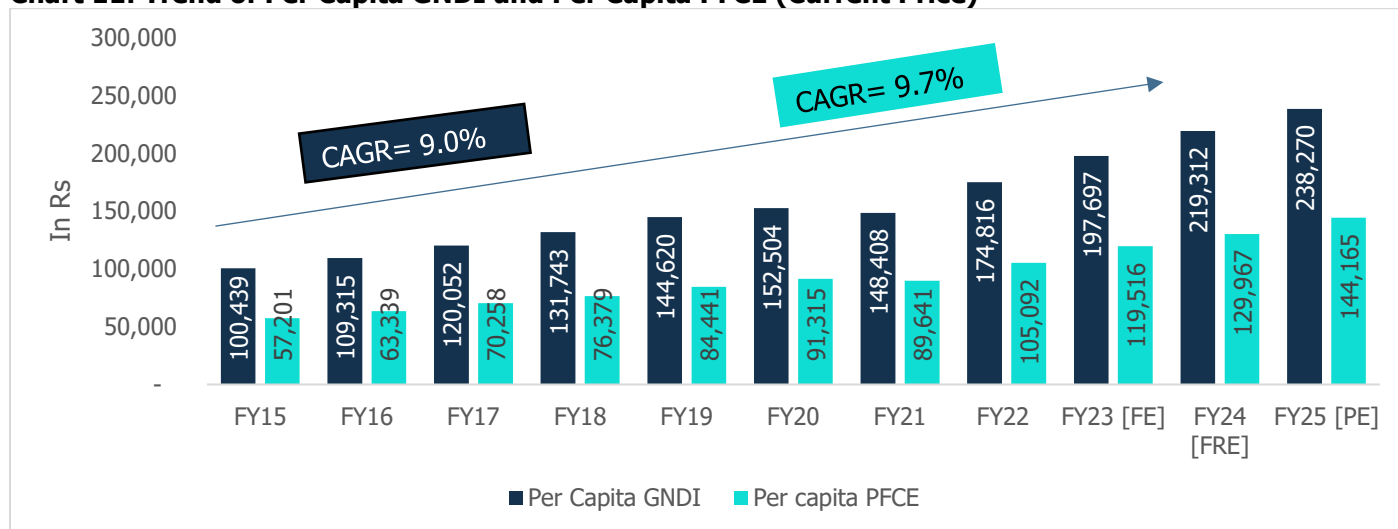
Source: World Bank Database; Note; E- Estimated, F- Forecasted

• Increasing Disposable Income and Consumer Spending

Gross National Disposable Income (GNDI) is a measure of the income available to the nation for final consumption and gross savings. Between the period FY15 to FY25, per capita GNDI at current prices registered a CAGR of 9.02%. More disposable income drives more consumption, thereby driving economic growth.

With increase in disposable income, there has been a gradual change in consumer spending behaviour as well. Per capita Private Final Consumption Expenditure (PFCE) which is measure of consumer spending has also showcased significant growth from FY15 to FY25 at a CAGR of 9.7%.

Chart 11: Trend of Per Capita GNDI and Per Capita PFCE (Current Price)



Source: MOSPI; Note: FRE – First Revised Estimates, FE – Final Estimates, PE- Provisional Estimates

1.11 Concluding Remarks

From a macroeconomic standpoint, India remains one of the most resilient large economies in a challenging global environment. The IMF forecasts GDP growth of 6.6% in CY25, far outpacing the estimated CY25 global average of 3.2%. This performance reflects a combination of strong domestic fundamentals, policy stability, and a sustained focus on capital formation. While the global economy continues to face uncertainty from geopolitical conflicts, commodity price volatility, and rising public debt, India’s diversified growth drivers, stable policy framework, and expanding export ecosystem position it well to navigate these headwinds.

The latest phase of India–U.S. trade relations has been shaped by Washington’s decision in 2025 to impose higher tariffs on select imports, including steel, aluminium, chemicals, and certain electronics. These measures form part of a wider recalibration of U.S. trade policy aimed at reducing strategic dependencies and protecting domestic manufacturing. While India was among the affected countries, the direct impact on its export performance is expected to be limited. The affected categories constitute less than 4% of India’s total exports, and key sectors such as steel subject to a 50% tariff have only modest exposure to the U.S. market. With strong domestic demand from infrastructure and energy sectors, Indian steel producers are likely to absorb the impact with minimal disruption.

Conversely, sectors such as textiles and apparel may benefit indirectly, as U.S. buyers continue diversifying sourcing away from China and other high-cost Asian economies. India’s competitive cost base, skilled labour availability, and expanding production capacity especially under the government’s Production-Linked Incentive (PLI) scheme are positioning it as a preferred manufacturing alternative. Electronics and engineering goods have similarly seen strong investment momentum, reflected in the rapid scale-up of smartphone production and Apple’s decision to expand iPhone assembly operations in India.

Despite the tariff frictions, the overall tenor of India–U.S. engagement remains constructive. During their meeting on February 13, 2025, Prime Minister Narendra Modi and President Donald Trump reaffirmed a shared goal to enhance bilateral trade from USD 200 billion to USD 500 billion by 2030. As of September 2025, the Ministry of Commerce and Industry has described ongoing negotiations as “positive and forward-looking,” with both sides

exploring ways to reduce duties on pharmaceuticals, auto components, and IT hardware. These developments underline a broader effort to establish a more balanced and durable trade relationship that aligns with India's manufacturing ambitions and America's supply chain resilience goals.

Beyond the U.S., India is actively broadening its export base to reduce dependency on any single market. Strengthening trade links with the European Union, ASEAN, and African economies is helping diversify risk and stabilize export earnings. Policy initiatives supporting logistics modernization, lower tariff barriers, and industrial corridor development continue to enhance India's competitiveness as a global manufacturing hub.

Domestically, policy momentum remains strong. The 56th meeting of the GST Council marked a major structural reform by proposing a simplified two-rate system of 5% and 18%, replacing the earlier four-slab framework, along with a 40% demerit rate for luxury and sin goods. This rationalization aims to reduce compliance burdens, enhance efficiency, and stimulate private consumption. Together with recent revisions in personal income tax rates, these measures are projected to release savings exceeding Rs 2.5 billion into the economy, supporting demand and easing inflationary pressures.

The Union Budget's allocation of Rs 11.21 billion for capital expenditure in FY26 further reinforces the government's commitment to infrastructure-led growth. Public investment is expected to catalyse private sector activity, evidenced by rising project announcements and growing imports of capital goods. Improving rural demand, supported by healthy monsoon progress, favourable sowing conditions, and adequate reservoir levels, provides additional tailwinds for consumption and investment.

In sum, while the recent U.S. tariff actions introduce short-term challenges, their overall economic impact on India is likely to be marginal. Supported by robust domestic demand, diversified trade linkages, and a deepening industrial base, India remains firmly on a high-growth trajectory. Over the medium term, these dynamics are expected to strengthen its position as a resilient, cost-competitive, and strategically significant player in the evolving global economic order.

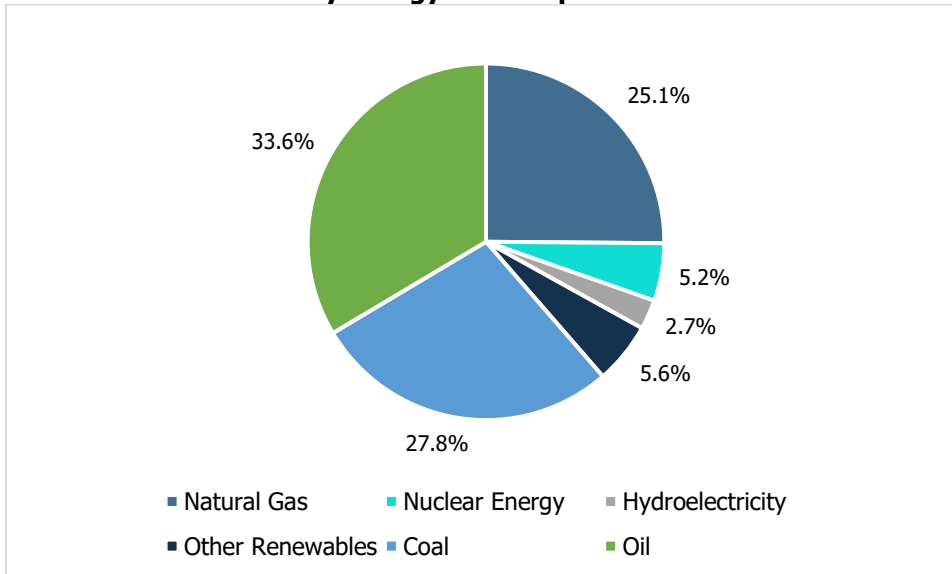
2. Global Energy Sector overview

The global energy sector is undergoing a significant transformation as the world shifts from traditional fossil fuels like oil, coal, and natural gas toward cleaner, renewable energy sources such as solar, wind, and hydropower. This transition is driven by increasing concerns over climate change, government policies aimed at reducing carbon emissions, and advancements in technology. While fossil fuels still dominate the energy mix, their share is gradually decreasing as investments in renewables grow rapidly. Energy demand continues to rise, especially in developing countries, creating a complex balance between ensuring energy access, affordability, and sustainability.

At the same time, the energy sector faces challenges related to energy security, infrastructure modernization, and equitable access to electricity for underserved populations. Innovations in energy storage, smart grids, and hydrogen technology offer promising solutions to these challenges. Overall, the sector is moving toward a more diversified and sustainable future, with cleaner energy sources playing an increasingly central role in powering economies and addressing global environmental concerns.

2.1 Global Primary Energy Consumption % Mix

Chart 12: Global Primary Energy Consumption

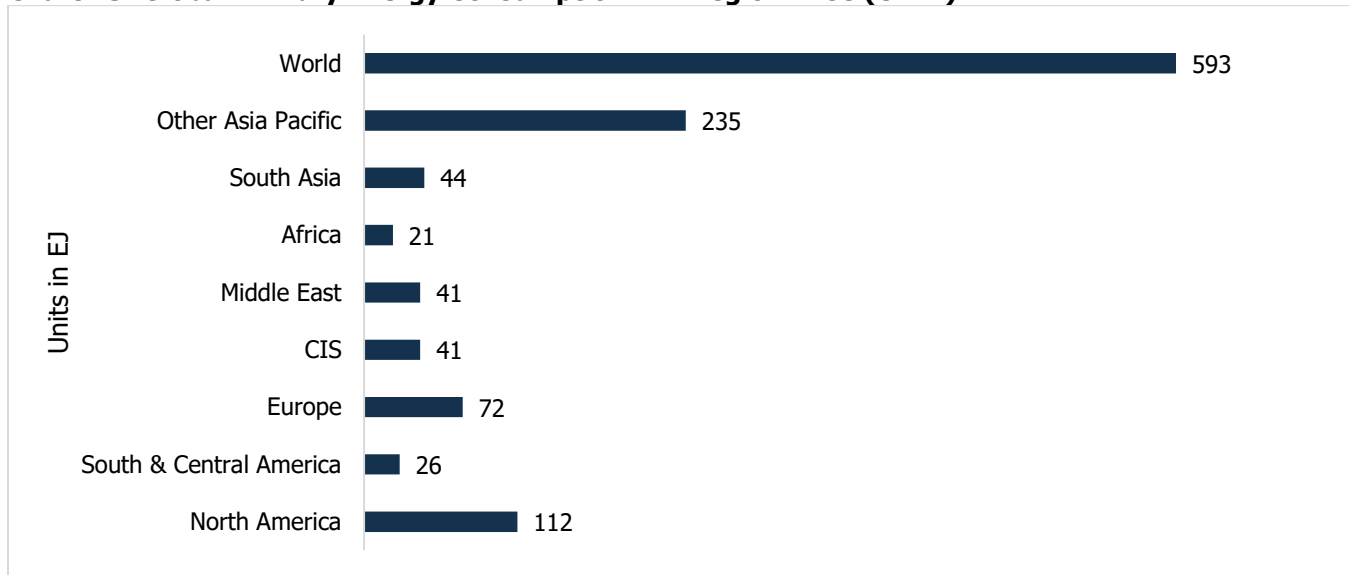


Source: Energy Institute Statistical Review of World Energy 2025, CareEdge Research

According to the 2024 Regional Overview on Access to Energy and Sustainability, the total global energy supply amounts to 593 exajoules (EJ).

In 2024, global energy demand rose by 2%, driven primarily by non-OECD (Organization for Economic Co-operation and Development) countries, which are experiencing rapid economic growth and industrialization. These countries dominate both the absolute energy demand and the highest annual growth rates. Despite significant growth in renewable energy sources, fossil fuels continue to dominate the global energy mix, accounting for 87% of total consumption. Oil remains the largest single energy source at 199 EJ, followed by coal (165 EJ) and natural gas (149 EJ). Renewable sources such as hydroelectricity (16 EJ) and other renewables (33 EJ), alongside nuclear energy (31 EJ), make up a smaller but growing portion of the energy supply.

Chart 13: Global Primary Energy Consumption Mix Region Wise (CY24)



Source: Energy Institute Statistical Review of World Energy 2025, CareEdge Research

*Given that South Asia and the Middle East are listed separately in the map, "Other Asia Pacific" would mainly encompass East Asia, Southeast Asia, and Oceania countries,

**EJ stands for exajoule, which is a very large unit of energy equal to 1 quintillion (10^{18}) joules

Global energy demand in 2024 was distributed unevenly across regions, shaped by varying levels of economic development, climate conditions, and national energy policies. North America and Europe recorded the slowest growth rates, at 0.4% YoY and 0.7% YoY, contributing 112 EJ and 72 EJ to global demand, respectively. Africa registered the smallest absolute increase, adding only 0.2 EJ to reach 21 EJ, constrained by slower industrial growth and limited access to modern energy infrastructure. By contrast, the Asia Pacific region accounted for 68% of the global increase in demand and represented nearly 47% of total global demand, driven by rapid industrialization, urbanization, and rising living standards. South Asia contributed 44 EJ, reflecting its fast-growing population and energy-intensive economic expansion.

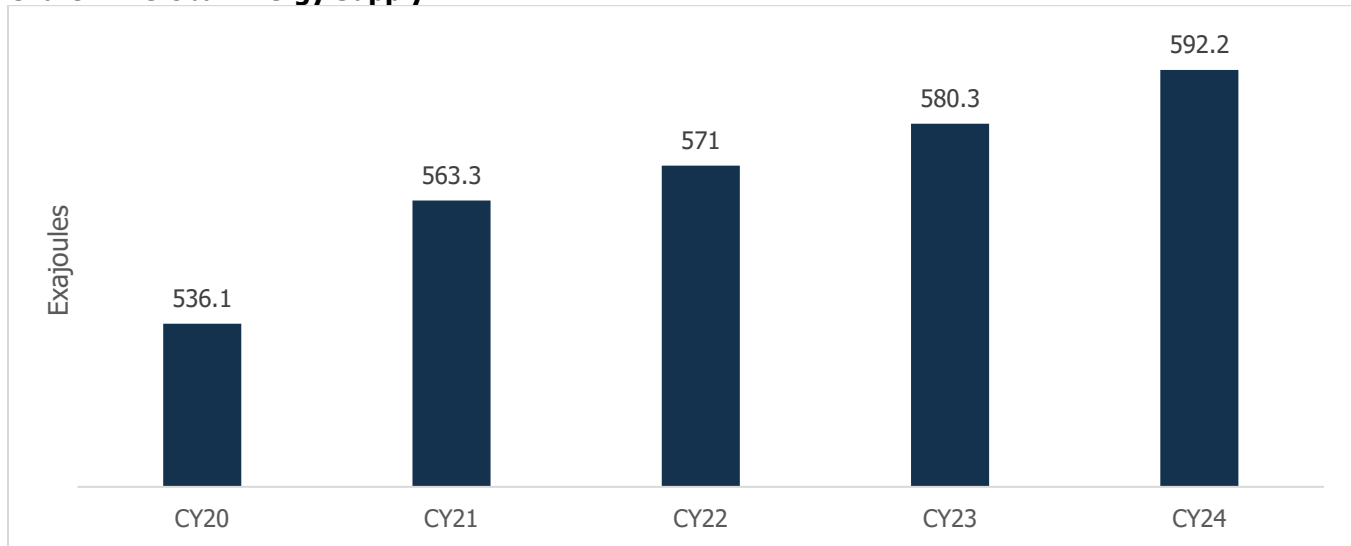
Renewables and electricity were the key growth engines of the global energy mix. Renewable demand rose by 7% YoY, with China responsible for 56% of this increase, owing to its aggressive clean energy investments and industrial capacity in solar and wind. Electricity demand expanded faster than total energy demand worldwide, underpinned by the electrification of transport, digitalization, and higher air-conditioning loads in warmer regions. The Asia Pacific and the Middle East registered the fastest growth in electricity generation at 5.4% YoY and 5.3% YoY, respectively. This reflects both the surging consumption in developing economies and the need for reliable power systems to support economic diversification and industrial competitiveness.

2.2 Energy Outlook – Supply, Crude oil/natural gas prices outlook

Global energy encompasses the production, distribution, and consumption of various energy sources that power economies and societies worldwide. The energy mix is currently dominated by fossil fuels coal, oil, and natural gas which supply most of the global demand due to their reliability and existing infrastructure. However, the increasing urgency to address climate change has accelerated the adoption of renewable energy technologies such as solar, wind, and hydropower, which are rapidly expanding their share in electricity generation. Despite these shifts, the global energy landscape remains complex, balancing economic growth, energy security, and environmental sustainability, with developing countries driving much of the growth in energy consumption.

Global Energy Supply

Chart 14: Global Energy Supply



Source: Energy Institute Statistical Review of World Energy 2025, CareEdge Research

From 2020 to 2024, the total global energy supply exhibited a consistent upward trend, rising from 536 EJ in 2020 to 592.22 EJ in 2024. The sustained growth in energy supply reflects the return of global economic activity, increased industrial production, and higher energy consumption as countries emerged from the pandemic's impact. Additionally, this growth underscores the gradual diversification of energy sources and the expanding energy demands driven by ongoing urbanization, technological advancements, and economic development worldwide. This trend highlights the resilience of the global energy sector and its critical role in supporting expanding economic growth.

In 2024, the countries with the highest total energy supply are China (158.88 EJ), the United States (91.83 EJ), India (38.76 EJ), Russian Federation (31.77 EJ), and Japan (16.44 EJ). China leads global energy supply due to its large population, extensive industrial base, and role as the world's manufacturing hub. The United States follows, supported by its energy-intensive economy and abundant natural resources. India ranks third, driven by its rapid urbanization, expanding industrial sector, and substantial coal reserves that continue to support high domestic energy consumption, alongside growing investments in renewable energy sources. Russia holds fourth place, attributed to its vast reserves of oil, natural gas, and coal that support both domestic consumption and exports. Japan, despite limited domestic fossil fuel resources, remains a major consumer through substantial energy imports to meet its industrial and residential demand.

2.2.1 Overview on Crude Oil

Crude oil and natural gas are two of the most critical fossil fuels in the global energy mix, playing a central role in powering economies worldwide. Crude oil is primarily used for transportation fuels like gasoline, diesel, and jet fuel, as well as for petrochemical products such as plastics and fertilizers. As of 2024, oil remained the largest single energy source globally, accounting for 199 EJ of total energy consumption. Despite efforts to transition to cleaner energy, oil demand remains high in many developing countries due to expanding transportation sectors and industrial needs. However, advanced economies are beginning to see slower growth in oil use, largely due to climate policies and the adoption of electric vehicles.

Crude Oil Production (Annual production (Million Barrels Per Day))

	CY24	CY25 P	CY26 P
OPEC + Other Participants	36.03	36.57	37.05

United States	13.23	13.44	13.30
Non-OPEC + excluding United States	27.33	28.38	28.55
World	76.59	78.39	78.9

Source: EIA, CareEdge Research

*OPEC = Organization of the Petroleum Exporting Countries: Algeria, Congo (Brazzaville), Equatorial Guinea, Gabon, Iran, Iraq, Kuwait, Libya, Nigeria, Saudi Arabia, United Arab Emirates, and Venezuela

**OPEC members subject to OPEC+ agreements plus Azerbaijan, Bahrain, Brunei, Kazakhstan, Malaysia, Mexico, Oman, Russia, South Sudan, and Sudan.

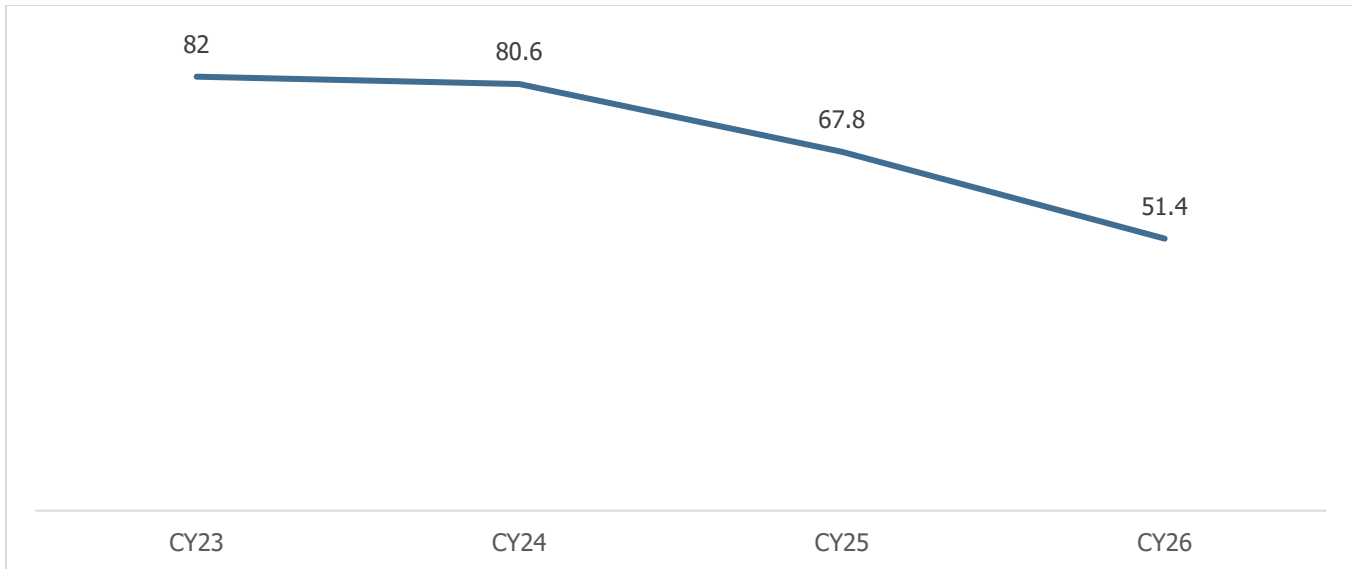
Iran, Libya, and Venezuela are not subject to the OPEC+ agreements.

Global crude oil production has shown a modest yet steady increase, rising from 76.6 million barrels per day (mb/d) in 2024 to a projected 78.9 mb/d by 2026. This growth reflects a cautious recovery in global supply, supported by stable demand and strategic production management. OPEC+ and other participating countries remain the dominant producers, increasing their output from 36.0 mb/d in 2024 to a projected 37.1 mb/d in 2026, largely due to coordinated production strategies and substantial reserve capacities. The United States, the largest individual non-OPEC producer, maintains relatively stable output rising from 13.2 mb/d in 2024 to 13.4 mb/d in 2025, before a projected decline to 13.3 mb/d in 2026. This slight decrease is attributed to producers responding to lower oil prices, which have led to reduced drilling activity. According to the U.S. Energy Information Administration (EIA), a sharper-than-expected drop in active drilling rigs and is further expected to limit the number of new wells drilled and completed in 2026, thereby moderating future output.

Non-OPEC+ producers excluding the U.S., such as Canada, Brazil, and Norway, are also contributing to global growth, with production increasing from 27.3 mb/d in 2024 to 28.6 mb/d by 2026, driven by long-term investments in offshore and unconventional resources.

The overall trend suggests a gradual rebound from the pandemic-era lows, supported by recovering economies and OPEC+ efforts to manage market stability. However, the pace of growth remains moderate, reflecting ongoing demand uncertainties and the broader global shift toward clean energy alternatives.

Chart 15: Brent Crude Oil Spot Price



Source: Energy Institute Statistical Review of World Energy 2025, CareEdge Research

The projected trend in Brent crude oil spot prices from 2024 to 2026 indicates a significant downward trajectory, with prices falling from USD 80.6 per barrel in 2024 to a projected USD 67.8 in 2025, and further to USD 51.4 by 2026. According to the U.S. Energy Information Administration (EIA), crude oil prices are expected to decline below USD 60 per barrel by the end of 2025 and average around USD 50 per barrel throughout 2026. This outlook aligns with anticipated global inventory growth and slower demand, which together are expected to keep downward pressure on prices over the forecast period.

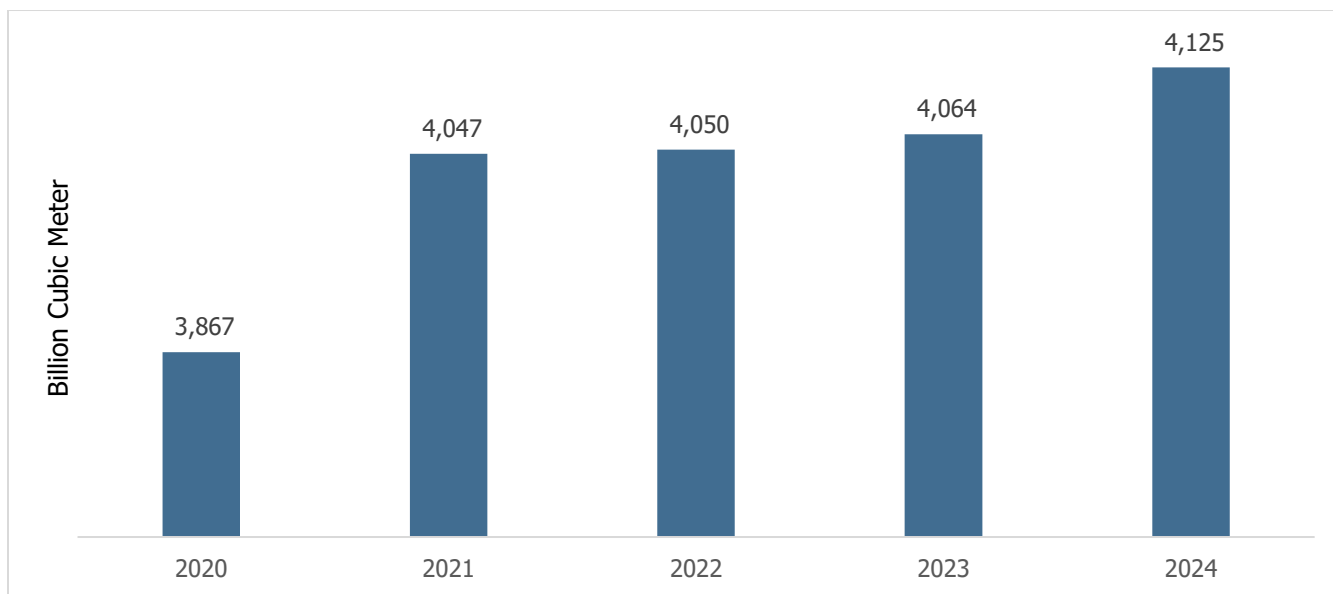
However, geopolitical tensions remain a critical factor that could temporarily disrupt this downward trend. Conflicts or instability in key oil-producing regions such as the Middle East, Russia, or parts of Africa can constrain supply, trigger market uncertainty, and result in short-term price spikes, even amidst an overall declining trend. Consequently, while the general trajectory points toward lower prices, geopolitical developments may introduce volatility, creating intermittent upward pressures on Brent crude oil prices.

2.2.2. Overview on Natural Gas

Natural gas is a versatile, cleaner-burning fossil fuel composed primarily of methane. It plays a crucial role in the global energy system, used widely for electricity generation, residential and industrial heating, and as a feedstock for fertilizers and petrochemicals. It is also increasingly used as a transitional energy source in the global shift from coal and oil to lower-emission alternatives due to its relatively lower carbon dioxide (CO₂) emissions per unit of energy.

In recent years, natural gas demand has grown significantly, especially in Asia and the Middle East, driven by population growth, urbanization, and efforts to reduce coal dependency. However, the industry faces challenges such as price volatility, geopolitical risks (e.g., pipeline disruptions, export controls), and methane leakage concerns, which affect its long-term environmental impact. The expansion of liquefied natural gas (LNG) infrastructure has enabled global trade, making natural gas more accessible to countries without pipeline networks. While still a fossil fuel, natural gas is often viewed as a "bridge fuel" that supports the energy transition toward more sustainable sources.

Chart 16: Global Production of Natural Gas (Billion cubic metres)- Years in CY

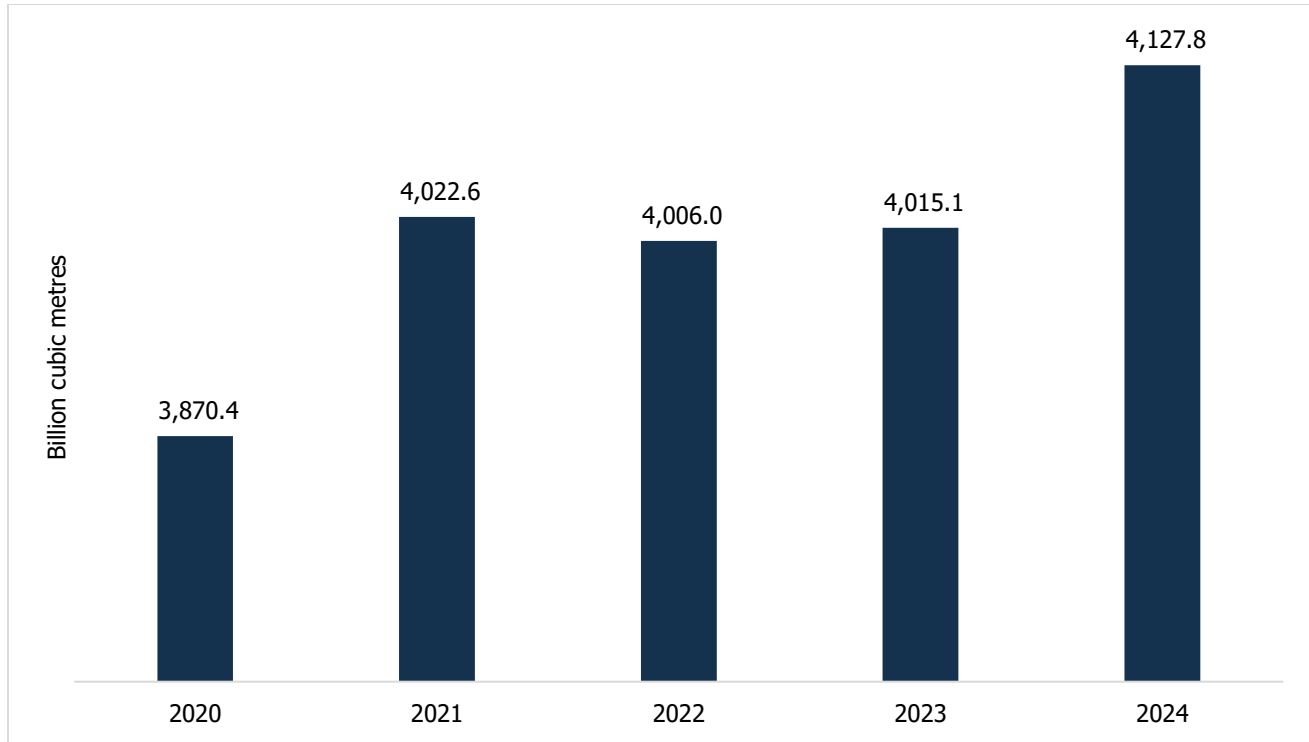


Source: Energy Institute Statistical Review of World Energy 2025, CareEdge Research

In 2024, global natural gas production grew by 1.2%, reaching 4,124.5 billion cubic meters (bcm). The United States, Russia, Iran, and China remained the top producers, collectively accounting for 53% of total global output. In contrast, European production continued its structural decline, decreasing by 3.4% compared to 2023, mainly due to reduced output from Norway, the United Kingdom, and the Netherlands.

Global gas demand also rebounded, increasing by 2.5% (101 bcm) in 2024. Asia Pacific accounted for half of this growth, led by rising consumption in China, Japan, and India. European demand saw a slight recovery, increasing by 6 bcm to 469 bcm, marking its first year-on-year growth since 2021. Global LNG trade remained stable, with the U.S. retaining its position as the leading exporter at 115 bcm. However, U.S. LNG exports to Europe declined by 16 bcm from 2023, with most of the redirected volumes going to Asia Pacific. Pipeline gas trade rose by 43 bcm, driven by Russia's increased exports including 6 bcm more to Europe, 8 bcm to CIS neighbours, and 5 bcm to China.

Chart 17: Global Consumption of Natural Gas (Billion cubic metres)- Years in CY

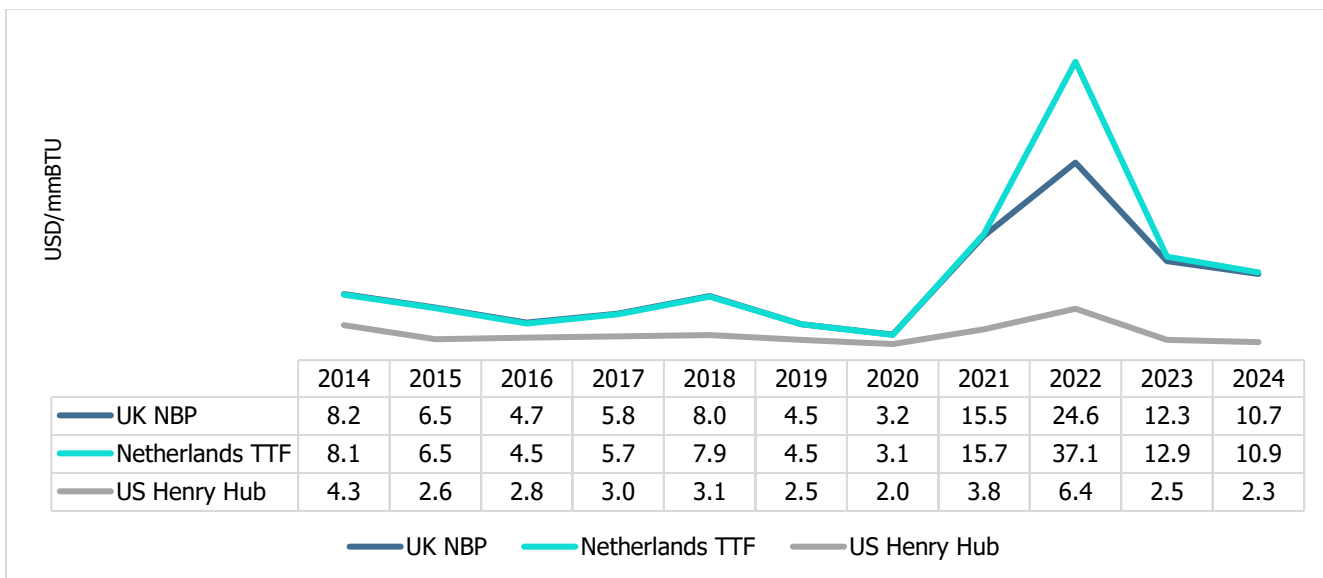


Source: Energy Institute Statistical Review of World Energy 2025, CareEdge Research

Global natural gas consumption grew from 3,870.4 bcm in 2020 to 4,127.8 bcm in 2024, reflecting a moderate but uneven recovery. A strong rebound occurred in 2021 as economies reopened, driving up demand in both the power and industrial sectors. However, growth stalled in 2022 and 2023 due to high prices and geopolitical disruptions particularly the Russia-Ukraine conflict, which disrupted supply chains and pushed Europe to diversify away from pipeline gas.

By 2024, global demand resumed its upward trend, rising by 2.8% over the previous year. This increase was mainly driven by strong consumption in the North America and Asia-Pacific region, especially in China, India, and Japan, where industrial recovery and power generation needs remained high. Europe also saw a modest rebound in gas usage as LNG imports stabilized prices. Despite this growth, natural gas continues to face long-term challenges from energy transition policies, rising renewable adoption, and concerns over methane emissions.

Chart 18: Global Natural Gas Prices and outlook- Years in CY



Source: Energy Institute Statistical Review of World Energy 2025, CareEdge Research

ICIS Heren Energy Ltd to 2004. From 2005, S&P Global Commodity Insights, ©2025 by S&P Global Inc

US Henry Hub-US Energy Information Administration (EIA) to 2004. From 2005, S&P Global Commodity Insights, ©2025 by S&P Global Inc

*Metric Million British Thermal Unit, -mmBTU

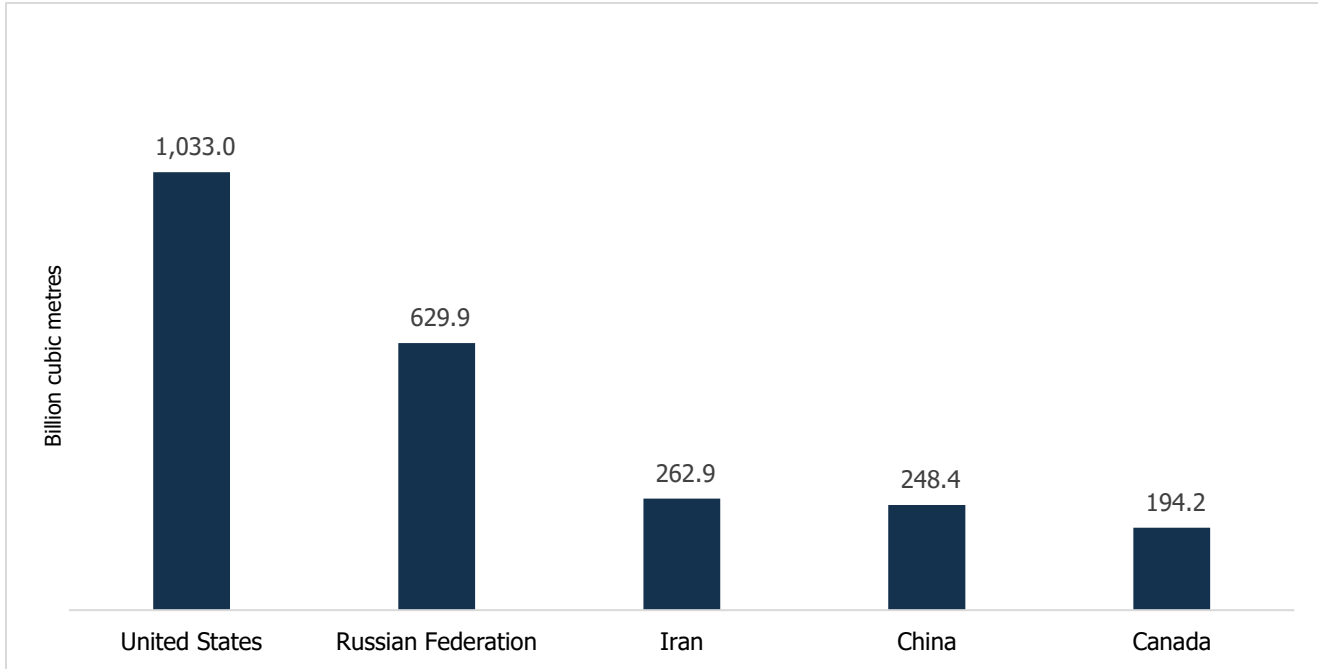
** TTF is a virtual trading point for natural gas in the Netherlands.

From 2014 to 2020, natural gas prices across key benchmarks UK NBP, Netherlands TTF, and US Henry Hub declined steadily, reflecting a period of abundant global supply and relatively weak demand. The COVID-19 pandemic in 2020 further suppressed industrial activity, contributing to historic price lows. Throughout this period, Henry Hub prices remained consistently lower than their European counterparts, largely due to the United States' strong domestic production capacity and limited reliance on imports, whereas European markets remained more exposed to external supply dynamics.

A sharp shift occurred in 2021 and 2022, when European gas prices spiked dramatically, with TTF (Title Transfer Facility) reaching USD 37.1/mmBTU in 2022, driven by supply disruptions following the Russia-Ukraine conflict and Europe's urgent need to replace Russian pipeline gas with LNG. While US prices also rose, the increase was more modest, peaking at USD 6.4/mmBTU, reflecting domestic supply stability. In 2023 and 2024, prices in all regions declined but remained above pre-pandemic levels. European prices moderated as LNG infrastructure expanded and storage levels improved, while US prices dropped to USD 2.3/mmBTU. This decrease was primarily due to record-high production, flat consumption, and rising inventories

2.3 Global Natural gas Supplier Centres

Chart 19: Global Natural gas Supplier Centres (CY2024)

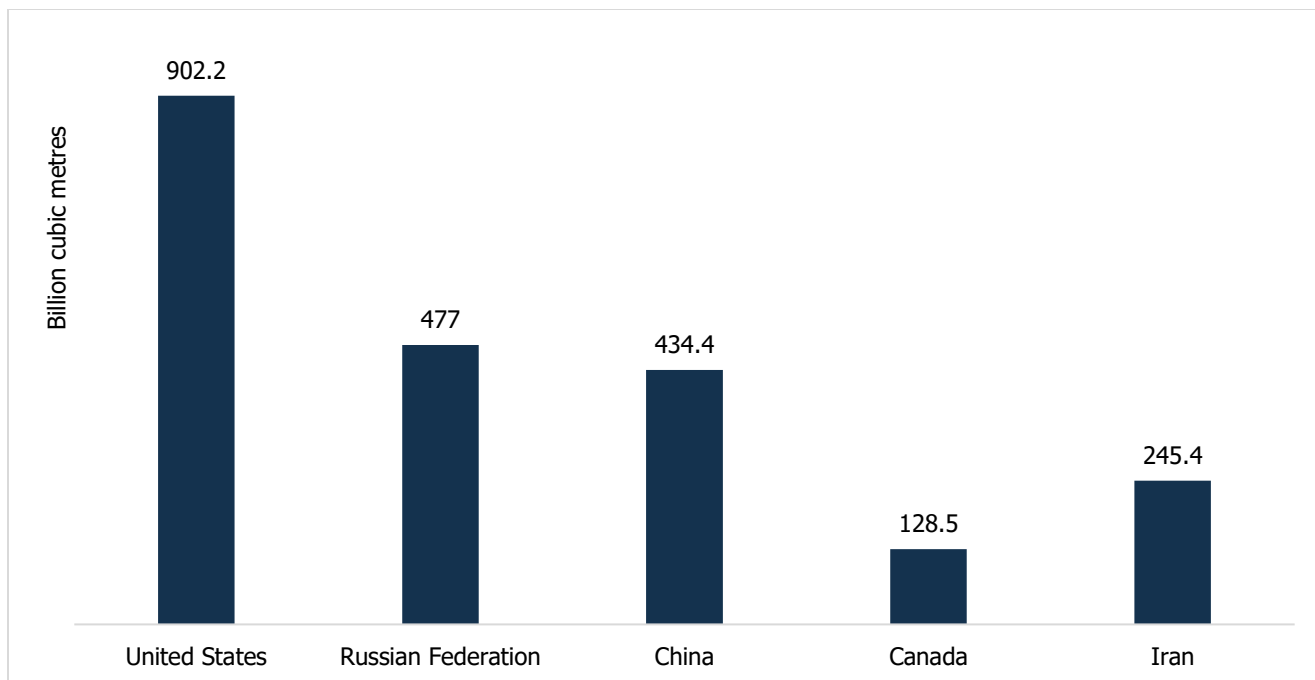


Source: Energy Institute Statistical Review of World Energy 2025, CareEdge Research

In the calendar year 2024, global natural gas production was dominated by five key producers. The United States, Russia, Iran, China, and Canada. The United States led the way with a production volume of 1,033 billion cubic meters, followed by Russia with 629.9 billion cubic meters. Iran, China, and Canada produced 262.9, 248.4, and 194.2 billion cubic meters respectively. Together, these countries accounted for a significant portion of the world’s natural gas supply, reflecting their vast natural reserves, advanced extraction technologies, and established infrastructure.

The dominance of these countries can be attributed to several factors. The United States benefits from extensive shale gas reserves and advanced hydraulic fracturing techniques, enabling it to maintain its top position. Russia holds some of the largest conventional natural gas reserves globally, with well-developed pipeline networks for export Asia. Iran’s production is driven by its massive gas reserves and ongoing development of its energy sector. China has been expanding its natural gas production to meet growing domestic demand and reduce reliance on coal, investing heavily in both conventional and unconventional gas sources. Canada, with rich natural resources primarily in Alberta and British Columbia, benefits from proximity to the large U.S. market and ongoing investments in LNG infrastructure to boost exports. These factors collectively position these nations as the leading contributors to global natural gas production in 2024.

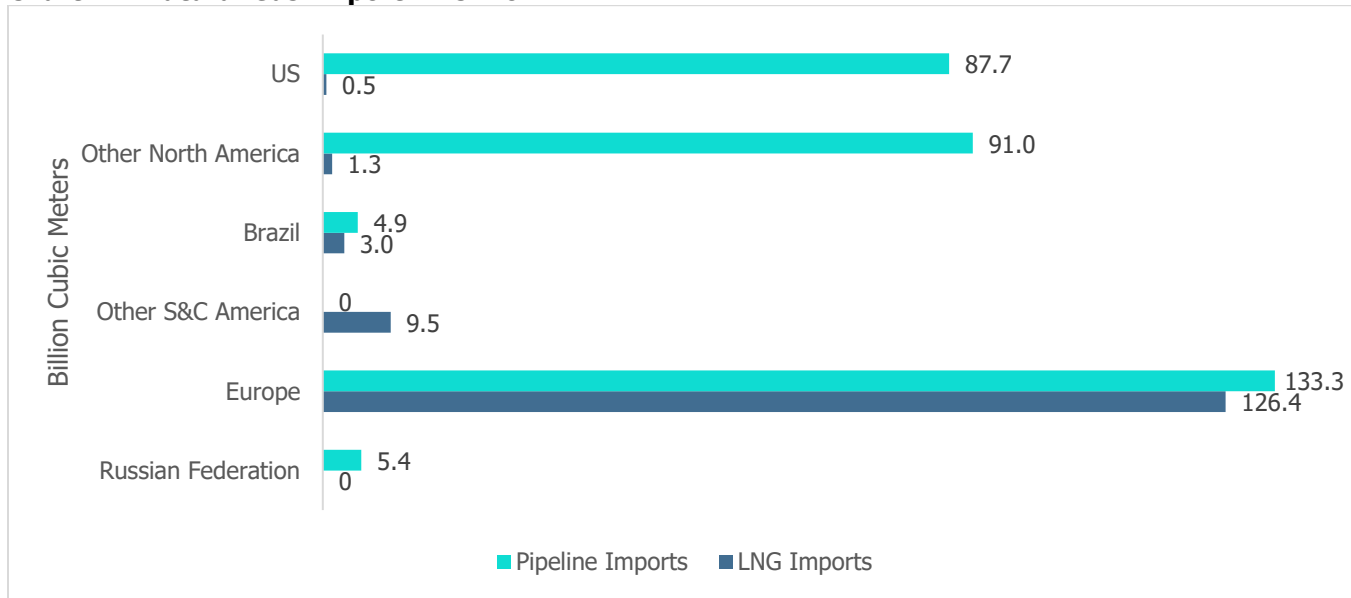
Chart 20: Global Natural gas Consumption Centres (CY2024)



Source: Energy Institute Statistical Review of World Energy 2025, CareEdge Research

In 2024, the United States remains the largest consumer of natural gas globally, with consumption reaching 902.2 billion cubic meters. This high demand is driven by its extensive use in electricity generation, industrial processes, and residential heating. The Russian Federation ranks second, consuming 477 billion cubic meters, largely due to its cold climate and heavy reliance on natural gas for heating and industrial energy needs. China follows closely with 434.4 billion cubic meters, reflecting its rapid industrial growth, urbanization, and efforts to transition to cleaner energy sources by substituting some of its coal with natural gas. Iran's consumption of 245.4 billion cubic meters is supported by its domestic energy requirements and extensive use of natural gas in power generation and petrochemical industries. Canada, consuming 128.5 billion cubic meters, utilizes natural gas primarily for heating and for the purpose of electricity generation with demand influenced by its cold climate and industrial sector.

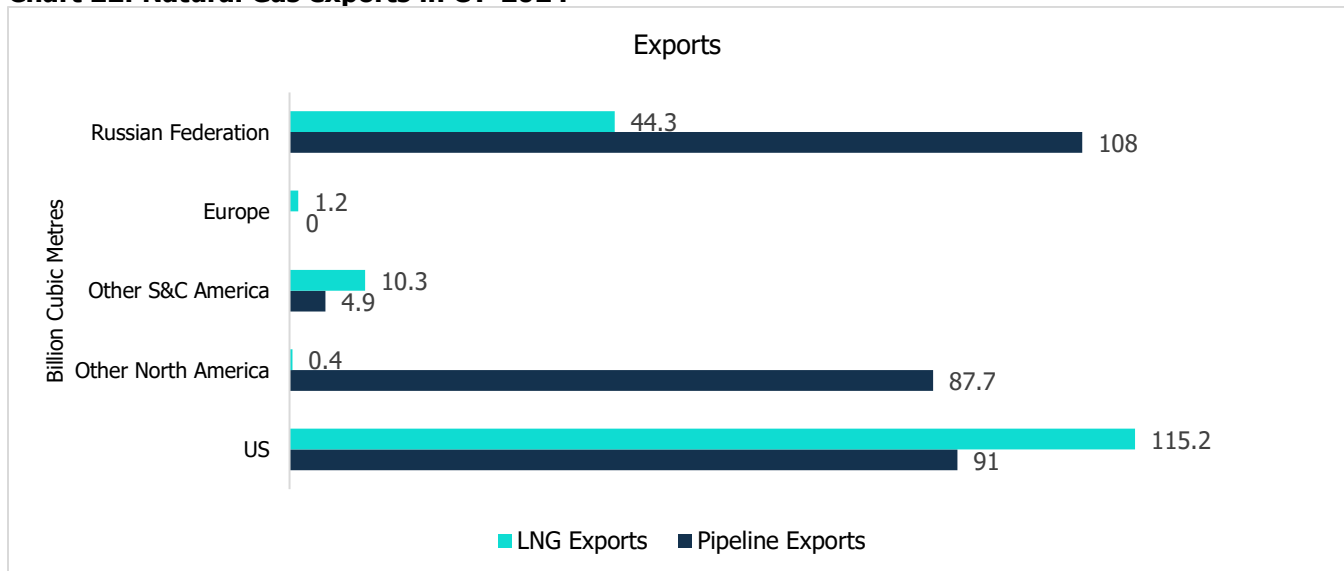
Chart 21: Natural Gas Import In CY2024



Source: Energy Institute Statistical Review of World Energy 2025, CareEdge Research
S&C America – South & Central America

Natural gas import patterns differ across regions depending on infrastructure, supply security, and energy needs. The United States relies almost entirely on pipeline imports from Canada (87.7 bcm) with minimal LNG (0.5 bcm), other North America, primarily Canada, records 91 bcm of pipeline and 1.3 bcm of LNG imports to balance regional demand, Brazil supplements 4.9 bcm of Bolivian pipeline gas with 3 bcm of LNG to ensure supply during periods of lower hydropower output, other South and Central American countries depend solely on LNG (9.5 bcm) in the absence of pipeline connectivity, Europe shows a nearly even split between pipeline imports (133.3 bcm) and LNG (126.4 bcm), reflecting efforts to diversify sources and strengthen energy security, while the Russian Federation records limited pipeline imports (5.4 bcm) from Central Asia and no LNG.

Chart 22: Natural Gas exports in CY-2024



Source: Energy Institute Statistical Review of World Energy 2025, CareEdge Research
S&C America – South & Central America

Natural gas exports vary significantly across regions due to resource availability, infrastructure, and market demand, the United States leads with 91 bcm of pipeline and 115.2 bcm of LNG exports (total 206.2 bcm), serving regional and global markets through extensive pipeline networks and LNG terminals, other North America, primarily Canada, exports 87.7 bcm by pipeline and minimal LNG (0.4 bcm) to meet neighbouring demand, other South and Central American countries export 4.9 bcm via pipelines and 10.3 bcm as LNG, leveraging LNG for distant markets due to limited cross-border connectivity, whereas Europe has negligible pipeline exports and only 1.2 bcm of LNG exports, reflecting its status as a net importer. The Russian Federation exports 108 bcm through pipelines and 44.3 bcm as LNG, supported by a strong pipeline network and LNG infrastructure to reach both regional and global markets.

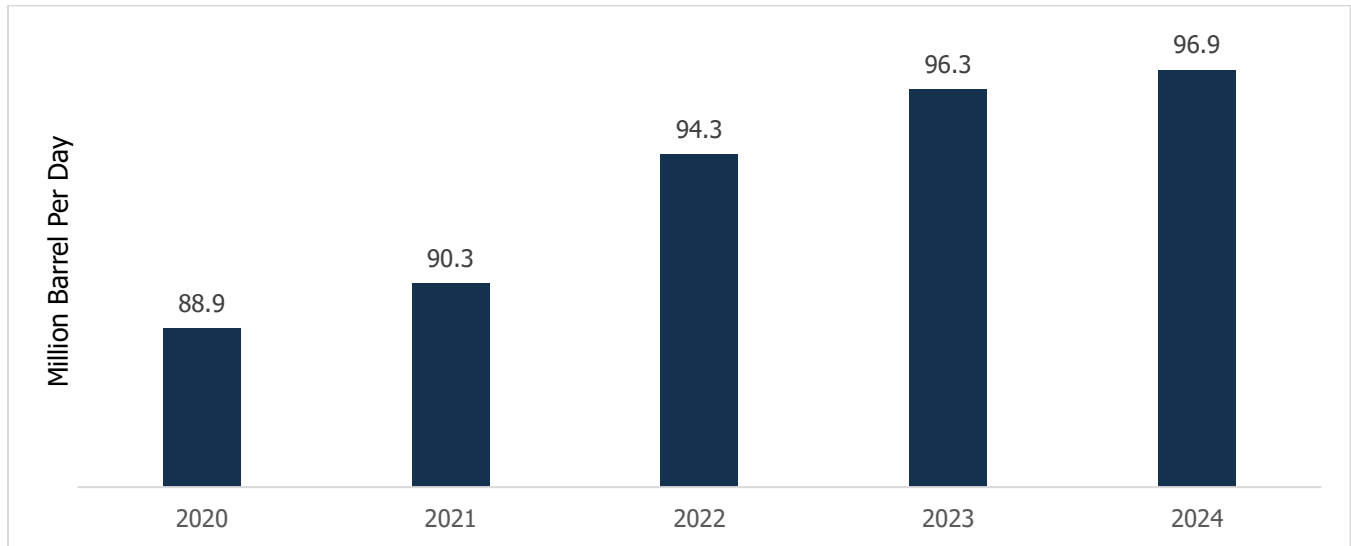
2.4 Global Oils and Petrochemicals Overview

The global oil sector remains a cornerstone of the world’s energy landscape, with crude oil production driven primarily by key players such as OPEC+ members, the United States, Russia, Iran, China, and Canada. Despite growing emphasis on renewable energy, global oil demand continues to grow steadily, supported by industrial use, transportation fuels, and the petrochemical industry. Petrochemicals, which are derived largely from oil and natural gas, are vital feedstocks in the production of plastics, synthetic materials, fertilizers, and other essential products. The industry is expanding rapidly, particularly in emerging markets in Asia-Pacific, due to urbanization, rising incomes, and increased manufacturing activities. However, price volatility, geopolitical uncertainties, and mounting environmental regulations are shaping the sector’s future trajectory, requiring a careful balance between meeting ongoing energy needs and advancing sustainability goals.

Petrochemical production is evolving with technological innovation, improving refining capacities, and diversification of feedstocks to enhance efficiency and reduce environmental impact. While traditional oil remains central, the sector is increasingly adopting cleaner processes and alternative raw materials in response to global climate initiatives. This dual dynamic reflects the industry's role in both supporting global economic development and addressing environmental challenges. In sum, the oils and petrochemicals sectors will continue to be pivotal in the global energy and manufacturing ecosystem, navigating the complexities of supply-demand fluctuations, regulatory frameworks, and the global energy transition.

2.4.1 Global Oil Production Overview- Years in CY

Chart 23: Global Oil Production

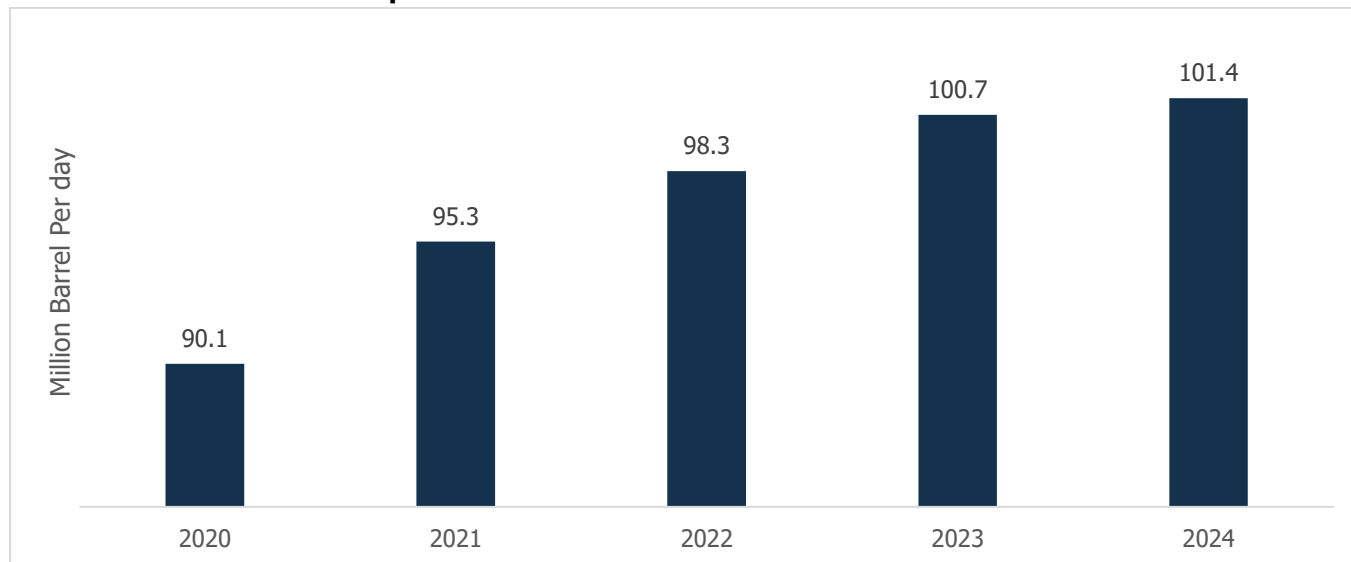


Source: Energy Institute Statistical Review of World Energy 2025, CareEdge Research

Production was 88.9 million barrels per day in 2020, the lowest in recent years. Since then, output has steadily increased as economic activity resumed, supply chains recovered, and energy demand rebounded. By 2024, production reached approximately 96.9 million barrels per day, nearing pre-pandemic levels. This recovery reflects the increased output from key producers like the United States, OPEC+, Russia (though Russia is part of OPEC+ cooperation, it is NOT an OPEC member), and Canada, alongside higher demand from emerging economies. However, growth has been somewhat moderated by energy transition efforts, OPEC+ supply management, and geopolitical factors (e.g., Russia-Ukraine conflict, sanctions). The trend highlights a balancing act between traditional energy reliance and the global shift toward renewable energy sources.

In 2024, global crude oil and condensate production experienced modest growth compared to the previous year. North America remained the leading contributor, with the United States playing a dominant role. Key producers in the Middle East, such as Saudi Arabia, Iran, and Iraq, continued to be significant players, with Iran showing notable production growth. Russia also maintained a strong position in global output. Overall, the data reflects a gradual recovery in global oil production, influenced by market stabilization and shifts in energy strategies.

Chart 24: Global Oil Consumption-Years in CY

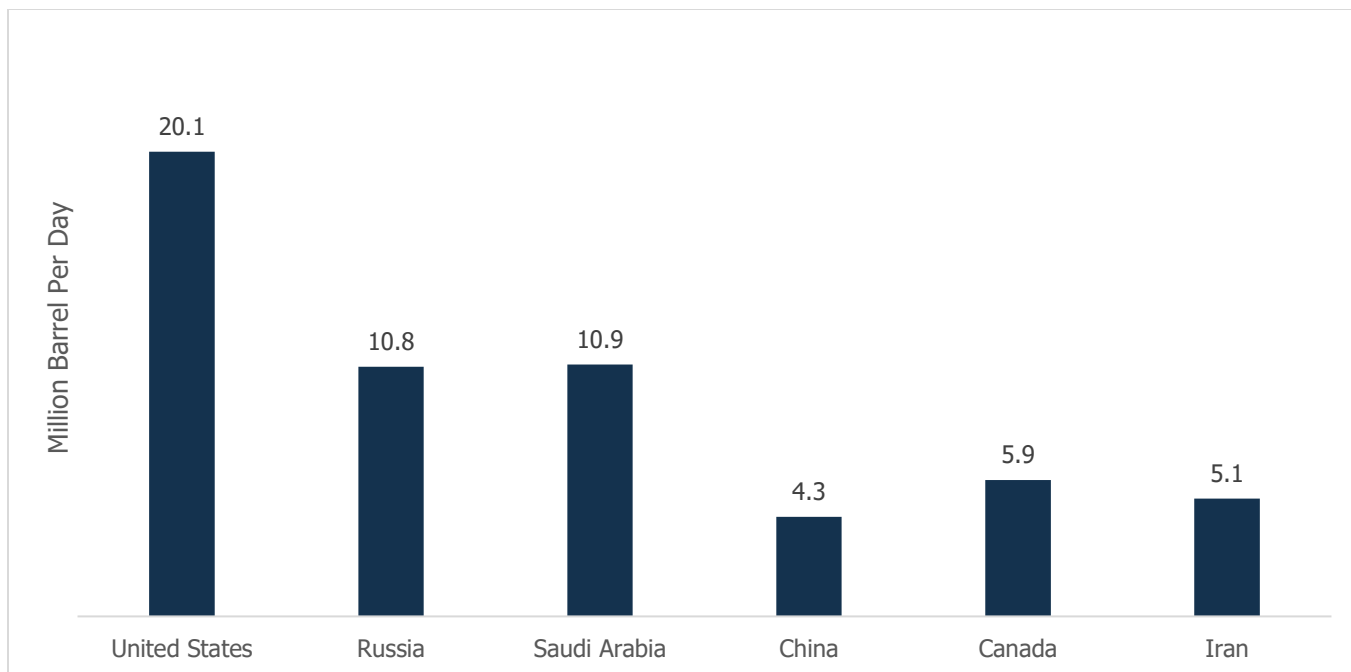


Source: Energy Institute Statistical Review of World Energy 2025, CareEdge Research

Oil consumption in 2021, reaches around 95.3 million barrels per day. The growth continued through 2022 and 2023, with consumption rising to nearly 98.3 million and 100.7 million barrels per day, respectively. By 2024, global oil consumption surpassed pre-pandemic levels, reaching over 101.4 million barrels per day, reflecting renewed demand driven by increased transportation, industrial production, and economic growth across both developed and emerging markets.

The steady growth in oil consumption is supported largely by expanding energy needs in rapidly developing regions, particularly in Asia, where urbanization and rising living standards boost demand for transportation fuels and petrochemicals. Meanwhile, consumption in advanced economies grows more slowly due to efficiency improvements, environmental regulations, and the gradual adoption of alternative energy sources. Despite global efforts to transition to cleaner energy, oil remains a critical pillar of the world's energy system, underpinning key sectors such as transportation, manufacturing, and petrochemicals.

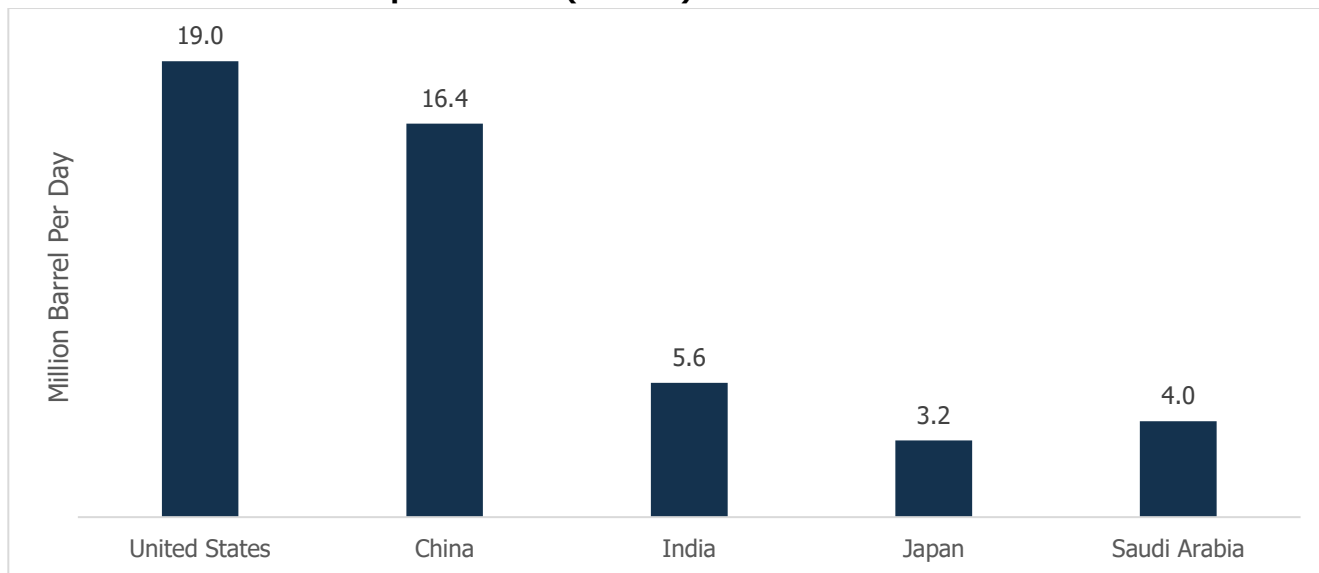
Chart 25: Global OIL Supplier (CY2024)



Source: Energy Institute Statistical Review of World Energy 2025, CareEdge Research

In 2024, the United States leads global oil production due to its advanced extraction technologies and vast shale reserves, enabling high output. Saudi Arabia and Russia closely follow, with Saudi Arabia’s extensive conventional reserves and OPEC leadership driving consistent production, while Russia leverages its vast Siberian and Arctic fields despite geopolitical challenges. Canada’s oil sands contribute significantly, supported by technological improvements that enhance extraction efficiency. Iran, though impacted by sanctions, remains a key producer with large Middle Eastern reserves, and China steadily increases output to meet growing domestic demand and reduce import reliance. Overall, production levels reflect a mix of resource availability, technological capability, geopolitical factors, and economic dependence on oil revenues.

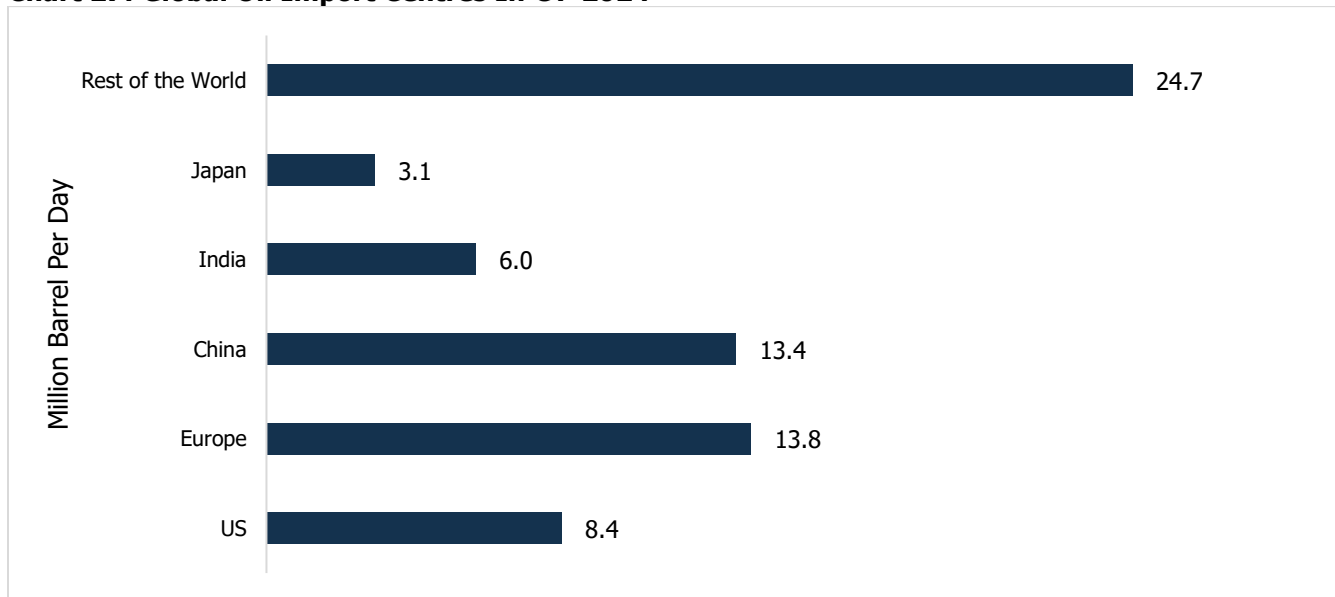
Chart 26: Global OIL Consumption Centre (CY2024)



Source: Energy Institute Statistical Review of World Energy 2025, CareEdge Research

In 2024, the United States leads global oil consumption due to its extensive transportation network, high vehicle ownership, and diverse industrial sectors driving strong energy demand. China follows closely, with rapid economic growth, urbanization, and expanding industries fuelling increased oil use. India’s growing population and industrialization also contribute to its significant oil consumption, reflecting rising transportation and manufacturing needs. Japan, with its advanced industrial economy, maintains high oil demand mainly for manufacturing and transportation despite efforts toward energy diversification. Saudi Arabia, while a top producer, consumes substantial oil domestically to support its growing population, industrial development, and expanding petrochemical sector. Together, these countries represent the major centres of oil consumption, driven by their economic scale, infrastructure, and energy needs.

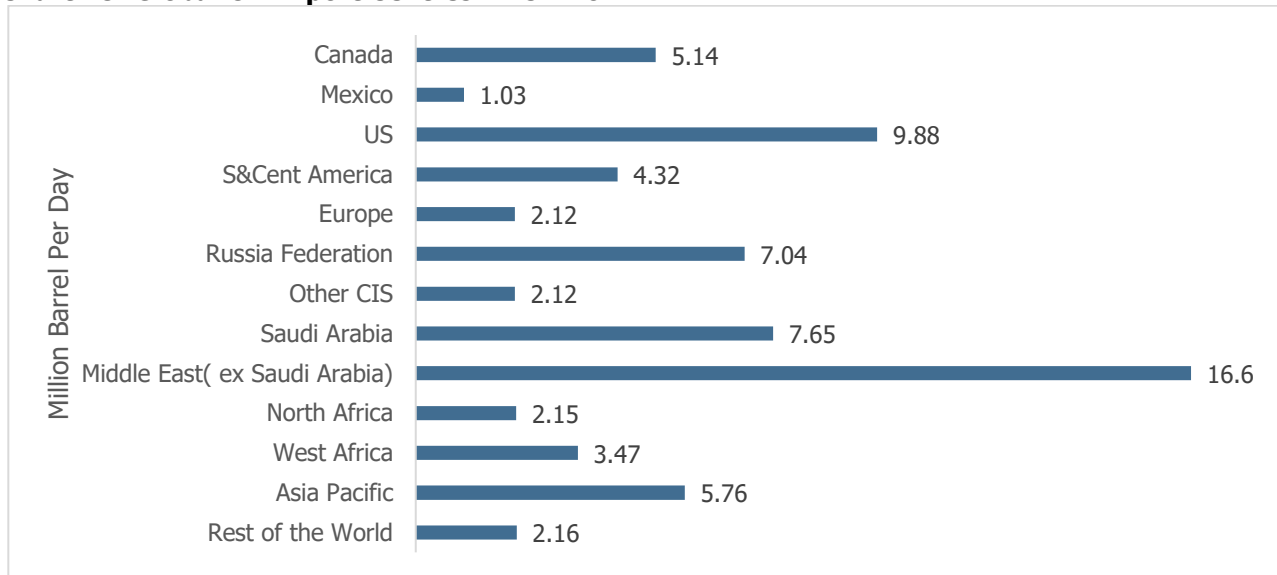
Chart 27: Global Oil Import Centres In CY-2024



Source: Energy Institute Statistical Review of World Energy 2025, CareEdge Research

Global oil imports stood at 69.4 million barrels per day (mb/d) in 2024, reflecting the world’s continued reliance on oil to meet energy and industrial needs. Europe (13.8 mb/d) leads among regions due to high demand and limited domestic production, especially after cutting Russian supplies and diversifying toward the U.S., Middle East, and Africa. China (13.4 mb/d) follows closely, driven by its large industrial base, refining expansion, and transport fuel demand. The U.S. (8.4 mb/d), despite being a leading producer, imports to optimize refinery configurations and maintain supply flexibility. India (6.0 mb/d) depends heavily on imports due to rising consumption in transport and power sectors against low domestic output. Japan (3.1 mb/d) is almost fully import-dependent, though efficiency improvements and a gradual energy transition have kept imports steady. The Rest of the World (24.7 mb/d), covering diverse economies across Asia, Latin America, and Africa, forms the largest collective share, reflecting their growing demand and limited production capacity. Overall, import patterns are shaped by the interplay of economic growth, industrial demand, refining structures, and the pace of energy transition.

Chart 28: Global Oil Export Centres In CY-2024



Source: Energy Institute Statistical Review of World Energy 2025, CareEdge Research
S&CENT America - South and Central America

Global crude oil exports are estimated at around 69.4 million barrels per day (mb/d), with supply spread across a few key producing regions. The Middle East (excluding Saudi Arabia) leads with 16.6 mb/d, reflecting the dominance of countries like Iraq, UAE, and Kuwait, which rely heavily on oil revenues. Saudi Arabia (7.65 mb/d) remains one of the single largest exporters due to its vast reserves and role as a swing producer in OPEC. The United States (9.88 mb/d) has emerged as a top exporter, supported by the shale boom and expanded LNG/crude infrastructure, despite also being a major importer for refining needs. The Russian Federation (7.04 mb/d) continues as a key supplier, particularly to Asia, even amid Western sanctions, while Canada (5.14 mb/d) exports mostly to the U.S. via pipelines. Other notable contributors include West Africa (3.47 mb/d), Asia Pacific (5.76 mb/d), and South & Central America (4.32 mb/d), reflecting the role of Brazil, Nigeria, and others as growing suppliers. Smaller flows from Europe (2.12 mb/d), North Africa (2.15 mb/d), Other CIS (2.12 mb/d), and the Rest of the World (2.16 mb/d) balance the market. Overall, export patterns mirror resource endowments, geopolitical strategies, and the dependence of many economies on oil as their primary revenue source.

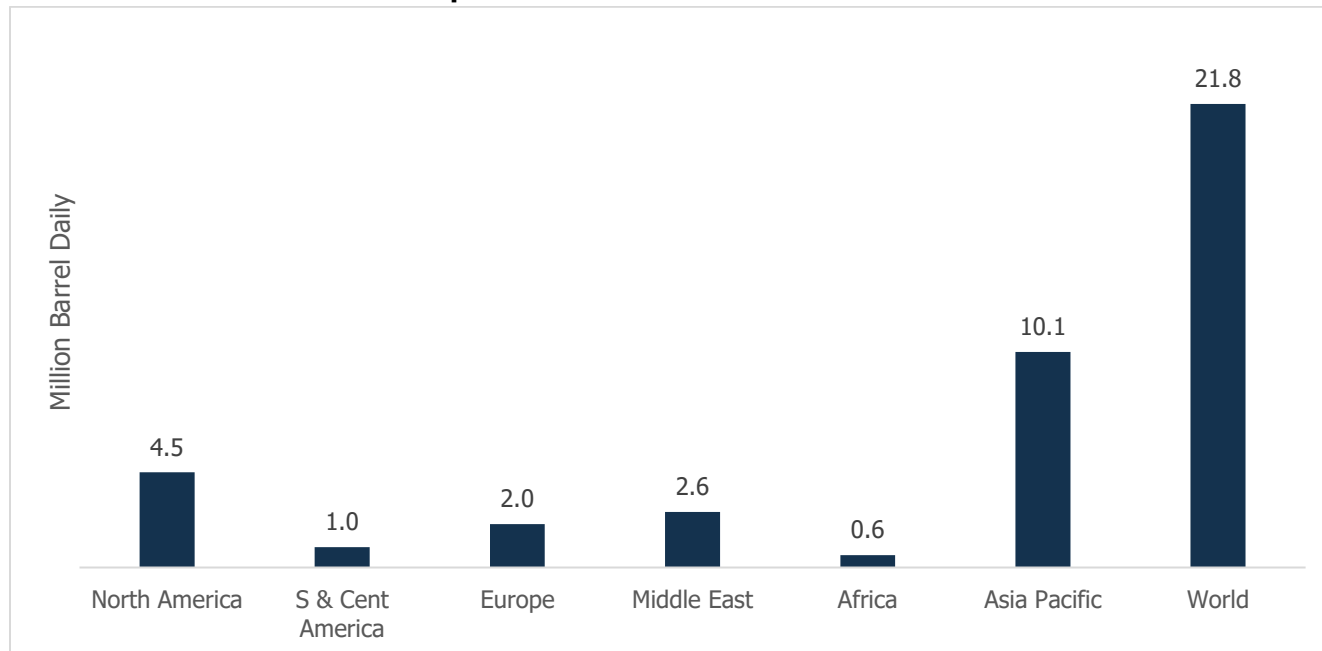
2.4.2 Overview on Petrochemical

Petrochemicals are chemical products derived from petroleum and natural gas. They serve as essential raw materials in the production of a wide range of everyday products, including plastics, synthetic fibres, fertilizers,

detergents, and pharmaceuticals. Unlike fuels such as gasoline and diesel, which are primarily consumed in transportation, petrochemicals are used extensively across various industries, making them a vital part of the global economy.

The demand for petrochemicals remains strong even as the world shifts towards cleaner energy sources and electric vehicles, which reduce the need for traditional fuels. This resilience is because petrochemicals are integral to manufacturing processes and consumer goods, with no direct substitutes currently available. As industrialization and urbanization continue to expand, especially in developing regions, the petrochemical sector is expected to grow steadily, playing a crucial role in supporting economic development and innovation.

Chart 29: Petrochemical Consumption Centre CY2024



Source: Energy Institute Statistical Review of World Energy 2025, CareEdge Research

Global petrochemical feedstock consumption in 2024 was concentrated in the Asia Pacific region, which accounted for 10.1 million barrels per day (mb/d) nearly half of the global total of 21.8 mb/d. Within Asia Pacific, China was the dominant consumer, utilizing 2.15 mb/d of naphtha and 1.96 mb/d of ethane and LPG, driven by its expansive petrochemical and plastics manufacturing base. India followed with 0.22 mb/d of naphtha and 1.20 mb/d of ethane and LPG, reflecting the country’s growing cracker capacity and reliance on gas-based feedstocks. Japan, while a mature market, maintained steady demand at 0.47 mb/d of naphtha and 0.38 mb/d of ethane and LPG, primarily for high-value chemical production. Overall, the Asia Pacific region remains the global hub of petrochemical consumption, led by China’s scale and India’s rising feedstock diversification.

North America ranked second at 4.5 mb/d, dominated by ethane and LPG-based feedstocks supported by abundant shale gas output, while Europe (2.0 mb/d) remained largely dependent on naphtha due to limited natural gas liquids. The Middle East consumed 2.6 mb/d, leveraging ethane-rich resources for competitive petrochemical exports. South and Central America (1.0 mb/d) showed moderate growth led by Brazil’s integrated complexes, and Africa (0.6 mb/d) remained the smallest market but is expanding through new refining and petrochemical projects. Overall, demand continues to gravitate toward Asia, driven by China and India’s growing industrial and downstream capacities.

2.4.3 Global Impact of Renewables and EVs Replacing Diesel and Petrol

The renewables accounted for one-third of the world's electricity generation in 2024, yet they contributed to just over 8% of the total global energy demand. Although, the global impact of renewables and electric vehicles (EVs) is expected to grow steadily, gradually replacing diesel and petrol in transportation sector. However, this transition will take time due to existing infrastructure, technological challenges, and the continued reliance on fossil fuels in many regions. As a result, total dependency on conventional energy sources is unlikely to disappear entirely soon.

1. Transportation Sector: The shift toward electric vehicles is reducing global demand for petrol and diesel in road transport, a sector that historically accounts for a significant share of oil consumption. According to the IEA's Global EV Outlook 2025, electric car sales exceeded 17 million in 2024, an increase of more than 25% year-on-year, and EVs now represent over 20% of new car sales globally. As battery costs decline, purchase incentives remain in many jurisdictions, emission standards tighten, and charging infrastructure expands, EVs are becoming increasingly competitive relative to internal combustion engine vehicles. These trends suggest that not only light duty transport (cars, small vans) but also heavier logistics and long-haul transport may increasingly electrify or use alternative fuels like hydrogen, which furthers the displacement of petrol and diesel in the transport fuel mix.

2. Upstream Oil Exploration & Drilling: Reduced fuel demand from transport could pressure oil companies to limit costly exploration, potentially leading to lower activity and cost-cutting in drilling services. However, the extent of these effects will depend on market developments. Demand for natural gas drilling is likely to persist (or even grow) as gas serves as a transition fuel supporting electricity generation, including for EV recharging and compensating for the intermittency of renewables. In addition, technologies associated with drilling are likely to pivot toward non-oil uses, such as geothermal energy development and carbon capture & storage (CCS) projects, where drilling plays an important role.

3. Power Generation Sector: The rise in EV adoption drives up electricity demand globally, creating strong demand for renewable power sources (solar, wind, hydro, geothermal) and for energy storage systems (batteries, pumped storage, etc.). Power grids will need to become more flexible, resilient, and capable of integrating distributed energy as well as intermittent renewables. Investments will be required in grid modernization, smart charging infrastructure, and demand response programs.

While coal and other fossil-based power sources may decline over time, natural gas is likely to remain relevant as a bridging fuel providing flexibility, balancing, and backup capacity especially in regions where grid infrastructure and storage capacity are still developing.

4. Petrochemical Industry: Although demand for transport fuels declines due to EV uptake, the petrochemical sector remains a significant and growing demand source for oil and gas. Products such as plastics, packaging, fertilizers, pharmaceuticals, and specialty materials depend on petrochemical feedstocks. As industrialization and urbanization continue (particularly in developing countries), demand for these materials is rising.

This structural demand helps provide a base level of oil & gas drilling and production, even in scenarios of reduced petrol & diesel usage. In effect, petrochemicals act as a cushion against steeper declines in crude demand from fuel usage.

The replacement of diesel and petrol by EVs and renewables is driving a long-term rebalancing of global energy demand. While there will be challenges for upstream oil and drilling industries, especially in high-cost or frontier regions, there are offsetting opportunities in natural gas for power generation, in petrochemicals, and in clean energy technologies like geothermal and CCS. The emerging energy system is more electrified, diversified, and sustainable; success in this environment will likely favor those producers and service providers who strategically adapt, innovate, and pivot into the emerging clean energy sectors.

2.4.4 Robust Demand for Petrochemical to counter slowdown in diesel and Petrol Demand

Global energy transition trends are eroding long-term demand for petrol and diesel, but natural gas and petrochemicals continue to provide strong opportunities for drilling activity. In 2024, global natural gas demand rose by 2.8% with most growth coming from Asia’s emerging economies. The IEA expects gas demand to accelerate again in 2026 as new LNG supply enters the market, reinforcing the need for upstream drilling and infrastructure projects. Similarly, natural gas liquids (NGLs) and LPG used as petrochemical feedstocks are projected to grow by 1.3 million barrels per day by 2030, particularly in China, India, and other Asian markets. These trends ensure near-term utilization for drilling rigs, service providers, and equipment manufacturers even as frontier oil exploration loses momentum.

Petrochemicals are emerging as one of the fastest-growing segments within the oil and gas industry, gaining importance as global demand for traditional fuels such as diesel and petrol continues to slow. They are critical in the production of plastics, synthetic fibres, packaging, fertilizers, pharmaceuticals, and numerous consumer and industrial goods that underpin modern economic activity.

This relatively inelastic and robust demand positions petrochemicals as a stabilizing factor for oil and gas markets, offsetting the decline in transport fuels. Key sectors such as construction, automotive, and electronics increasingly depend on lightweight, durable, and versatile petrochemical-derived materials, while the packaging industry continues to expand rapidly due to growth in e-commerce and food delivery services worldwide. Given the limited availability of scalable alternatives to petrochemical feedstocks, their role in sustaining hydrocarbon consumption will become increasingly significant. Consequently, petrochemicals provide oil producers and refiners with a long-term growth pathway, ensuring a durable foundation for demand even as the global energy system transitions toward lower-carbon alternatives.

2.5 Global Refinery Infrastructure: Current and Upcoming Projects (CY23–CY28)

Country	Refinery Operator (Site Location)	Estimated Crude Distillation Unit Capacity	Estimated Startup Year	Capacity Type
China	Yolong	400000	2025	New
China	Nangbo Daxie	120000	2025	Expansion
China	Sinopec Zhenhai	250000	2026	Expansion
China	Huajin Aremco	300000	2027	New
China	Sinopec Yueyang	40000	2027	New
India	Indian Oil (Gujarat)	86000	2025	Expansion
India	Indian Oil (Barauni)	60000	2024	Expansion
India	Indian Oil (Bongaigon)	37000	2028	Expansion
India	Indian Oil (Guwahati)	4000	2024	Expansion
India	Indian Oil (Panipat)	200000	2027	Expansion
India	Hindustan Petroleum (Visakhapatnam)	150000	2024	Expansion
India	Hindustan Petroleum (Barmer)	180000	2026	New
India	Chennai Petroleum (Nagapattinam)	180000	2027	New
India	Numaligarh Refinery Ltd(Assam)	120000	2027	Expansion
India	Indian Oil (Paradip)	200000	2027	Expansion
India	Ratnagiri Refinery and Petrochemicals	1200000	2028	New
Bahrain	Bahrain Petroleum	110000	2025	Expansion
Iran	National Iranian Oil Refining and Distribution Company (Bandar Abbas)	120000	2025	Expansion
Iran	National Iranian Oil Refining and Distribution Company (South Adish, Siraf)	60000	2025	New
Iraq	Iraqi Ministry of Oil	20000	2024	Expansion
Jordan	Jordan Petroleum Refinery Company	50000	2027	Expansion
Oman	Oman Oil Company, Kuwait Petroleum International	17000	2024	Expansion

Country	Refinery Operator (Site Location)	Estimated Crude Distillation Unit Capacity	Estimated Startup Year	Capacity Type
Saudi Arabia	Saudi Armco Total Refining and Petroleum Company	40000	2026	Expansion
Nigeria	Dangote Group	650000	2024	New
Mexico	Pemex Oimeca Refinery (Dos Bocas)	340000	2025	New

Source: Energy Institute Statistical Review of World Energy 2025, CareEdge Research

China: Strategic Expansion Towards Petrochemical Integration: China is expected to add 0.8–1.1 million barrels per day (b/d) of refining capacity between 2023 and 2028, supported by five key refinery projects. These developments aim to shift production focus toward petrochemical feedstocks such as naphtha and LPG, in response to softening transportation fuel demand. The Yulong refinery (400,000 b/d) is a flagship project, equipped with hydrocracking technology to enable flexible output between diesel and petrochemicals. This reflects China's broader strategy to optimize complex refineries and phase out inefficient, smaller units.

India: Capacity Growth to Support Rising Domestic Demand: India is poised to commission up to 11 refinery projects by 2028, with an estimated 0.5–2.4 million b/d of additional capacity. This includes the major Ratnagiri refinery project (1.2 million b/d). The expansion is driven by strong projected domestic fuel consumption growth of 4–5% annually through 2037. Government-backed refiners, including Indian Oil and HPCL, are spearheading these investments to ensure self-sufficiency and reduce import dependency.

Middle East: Maintaining Export Leadership and Throughput Flexibility: The region is targeting approximately 1.3 million b/d in total expansion (0.4 million b/d from new crude units and 0.9 million b/d from secondary processing units) through 2028. Projects include the 230,000 b/d Duqm refinery in Oman and the 615,000 b/d Al Zour refinery in Kuwait. These upgrades aim to enhance product flexibility, support export growth, and compensate for OPEC+ crude production limits. The UAE's Ruwais refinery upgrades further enable processing of heavier crude, reflecting an emphasis on refining adaptability.

Iraq: Overcoming Delays to Unlock Refining Potential: Iraq recently operationalized expansions at the Basrah, North (Shamal), and Karbala refineries. After years of delays, the Basrah CDU (70,000 b/d) was finally completed in 2024. These efforts aim to improve domestic supply security and reduce reliance on petroleum product imports.

Atlantic Basin: Modest Growth Amid Demand Headwinds: Refining expansion in the Atlantic Basin (Americas, Europe, and Africa) is expected to be subdued, with only 0.6 million b/d of added capacity by 2028. This slower pace is linked to declining fuel demand in mature markets such as the U.S. and Western Europe, where the energy transition and electrification of transport are gaining momentum.

Mexico and Nigeria: Emerging Investment Hotspots: Notably, Mexico's Dos Bocas refinery (340,000 b/d) and Nigeria's Dangote refinery (650,000 b/d) are among the largest greenfield projects globally. These projects are part of broader national strategies to enhance fuel security, reduce imports, and promote domestic value addition.

Table 5: World Crude Oil Production (million barrels per day)

Million Barrel per day			
Crude oil production	CY24	CY25	CY26
Total Production of crude oil	76.59	78.39	78.9
OPEC+ total*	36.03	36.57	37.05
United States	13.23	13.44	13.3
Non-OPEC+ excluding United States	27.33	28.38	28.55

Source: eia.gov, CareEdge Research

Total* includes Azerbaijan, Bahrain, Brunei, Kazakhstan, Malaysia, Mexico, Oman, Russia, South Sudan, and Sudan.

The global crude oil production forecast from 2024 to 2026 shows a moderate and steady increase, rising from 76.59 million barrels per day (b/d) in 2024 to 78.90 million b/d in 2026, reflecting a cautious recovery aligned with global demand and energy transition pressures. OPEC production is expected to remain relatively stable, increasing slightly from 27.09 to 27.80 million b/d, driven primarily by steady output from major producers like Saudi Arabia and Iraq, while smaller producers face geopolitical and operational challenges. Non-OPEC+ countries (excluding the U.S.) maintain a consistent supply around 28.3–28.6 million b/d, supported by offshore developments in regions like Latin America and West Africa. U.S. production sees a mild rise, peaking at 13.51 million b/d in early 2025 before stabilizing around 13.30 million b/d in 2026, as capital discipline and regulatory factors limit rapid growth. Meanwhile, OPEC+ (including Russia and other non-OPEC members) collectively increase output from 36.03 to 37.05 million b/d, signaling continued coordination to manage market stability despite geopolitical constraints. Overall, the production trend reflects strategic supply management, the impact of global energy policies, and evolving investment dynamics in the oil sector.

2.6 Major oil and gas producing economies

Oil continued to be the largest single energy source in 2024, supplying approximately 34% of global demand, demand rose by 0.6%, pushing total consumption past the 101 million barrels per day mark record high. The United States led global oil production in 2024, producing about one-fifth of all oil worldwide, a volume roughly equal to the combined output of Saudi Arabia and Russia.

After an initial post-COVID rebound, oil demand in many regions showed signs of slowing or flattening in 2024. Demand in OECD countries remained largely unchanged, while non-OECD regions saw only modest growth. Africa and the Middle East posted the fastest increases, growing by about 2.5% and 1.7%, respectively.

- China displayed signs of oil demand peaking in 2023, registering a 1.7% drop in demand in 2024. Consumption of fuel oil and diesel/gasoil dropped (by roughly 2% and 0.5%), influenced in part by China's shift towards LNG-powered transport.

Globally, the demand rose for other products such as jet/kerosene, ethane & LPG, and gasoline where each by about 0.3–0.4 million barrels per day. Oil prices eased somewhat from their 2023 highs, falling around 3%, though they still stood significantly above pre-COVID 2019 levels (by about 27%).

Global natural gas production rose to 4,124 billion cubic meters (bcm) in 2024, driven primarily by strong output from the United States, Russia, Iran, and China, which together accounted for 53% of global supply. This growth can be attributed to sustained investment in extraction technologies, expanding infrastructure, and strategic national energy policies aimed at boosting self-reliance and energy security. China, notably, advanced from the sixth to the fourth-largest producer over the past decade due to aggressive domestic development and resource exploitation, now meeting 56% of its own gas demand. On the demand side, global natural gas consumption rebounded in 2024, rising by 101 bcm (2.5%), fueled by economic recovery, a shift toward cleaner-burning fuels amid decarbonization efforts, and growing energy needs in emerging markets. Natural gas's share reached 29% of global fossil fuel use and met one-quarter of total global energy demand. Regional demand growth, excluding Africa, was led by Asia Pacific (up 42 bcm), largely driven by China's industrial and power sector expansion. The CIS and North America saw increases of 22 bcm and 15 bcm, respectively, due to rising domestic consumption and export opportunities, while Europe's modest 6 bcm growth reflected improved energy efficiency and a cautious approach following prior energy supply shocks.

2.7 Global oil and gas reserves

Global oil and gas reserves refer to the quantities of crude oil and natural gas that have been discovered and are commercially recoverable with existing technology and under current economic conditions. Proven oil reserves worldwide are estimated to be around 1,760 billion barrels, with the largest reserves concentrated in a few key countries. Venezuela holds the world's largest proven oil reserves, followed closely by Saudi Arabia, Canada, Iran, and Iraq. These countries play a crucial role in the global oil supply due to their significant resource base.

Similarly, proven natural gas reserves are estimated at approximately 7,500 trillion cubic feet globally. The countries with the largest natural gas reserves include Russia, which holds the largest share, followed by Iran, Qatar, the United States, and Turkmenistan. These reserves are essential to meet the steadily growing demand for natural gas, which is increasingly viewed as a transitional fuel toward cleaner energy due to its lower carbon emissions compared to coal and oil.

The distribution of oil and gas reserves is highly uneven, making certain regions strategically important in the global energy landscape. This concentration influences geopolitical relations and trade dynamics, as countries with abundant reserves often wield considerable influence over global energy prices and supply security. Moreover, ongoing technological advancements in exploration and extraction, along with evolving environmental policies and shifts toward renewable energy, will continue to impact how these reserves are developed and utilized in the future. Maintaining a balance between energy security, economic growth, and environmental sustainability remains a key challenge for the global energy sector.

Brent crude oil prices are expected to decline sharply from \$80.56 per barrel in 2024 to \$51.43 by 2026, driven by slowing demand amid the global shift to cleaner energy and rising production, particularly from non-OPEC countries. This signals a potential weakening in global oil market fundamentals and a trend toward oversupply. Geopolitical tensions significantly impact crude oil markets by creating supply uncertainties and driving price volatility. Conflicts or political instability in major oil-producing regions, such as the Middle East or parts of Africa, can disrupt production and threaten critical transportation routes like pipelines and shipping lanes. These disruptions often lead to temporary spikes in oil prices as markets react to potential shortages and increased risks. Moreover, geopolitical risks can heighten market anxiety, causing fluctuations even if physical supply is not immediately affected. Such instability not only affects global energy security but also complicates planning and investment decisions within the oil industry, influencing both short-term market dynamics and long-term supply strategies.

3. Overview of Oil & Gas sector in India

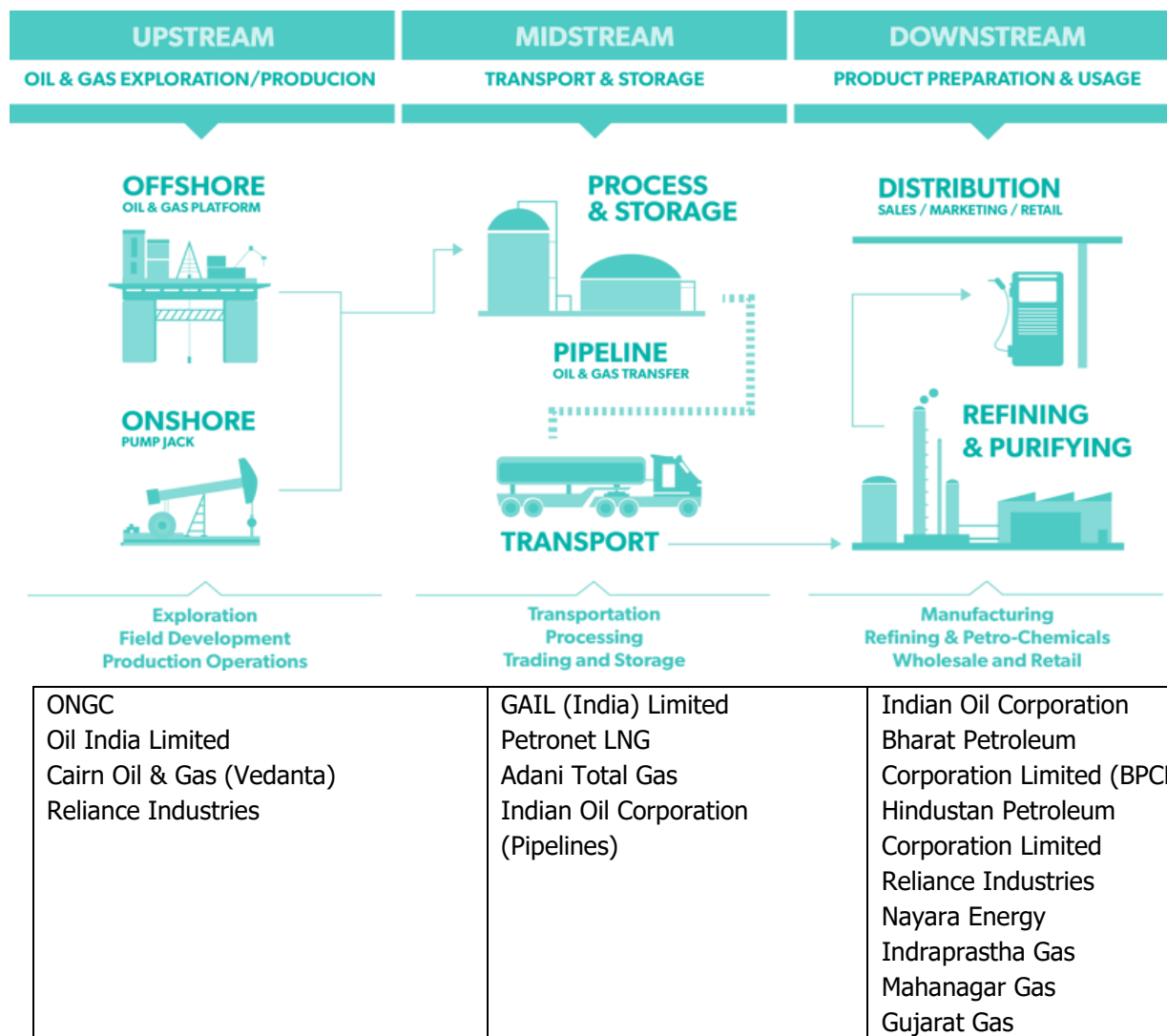
3.1. Evolution of Oil & Gas industry and its structure in India

The evolution of the oil and gas sector in India reflects the country's transition from being a modest energy consumer in the early 20th century to becoming one of the largest energy markets in the world today. The story begins in the late nineteenth century with the discovery of oil at Digboi in Assam, which catalyzed the first commercial extraction activities 1889. For several decades thereafter, oil production was confined largely to the northeastern region and remained relatively small in scale. The sector during this period was dominated by a few private players and remained largely underdeveloped, with limited exploration activity and minimal downstream infrastructure.



3.1.1. Structure and Value Chain Oil and Gas sector

The **upstream segment** covers exploration and production of crude oil and natural gas. It involves geological surveys, seismic studies, drilling, development of oilfields, and extraction of hydrocarbons. This segment is capital-intensive, technologically complex, and highly sensitive to global crude oil prices and domestic policy frameworks. In India, upstream activities are largely led by state-owned enterprises such as Oil and Natural Gas Corporation (ONGC) and Oil India Limited (OIL), which together account for the bulk of domestic production. Private and foreign companies including Reliance Industries, Cairn India (Vedanta), and BP have also emerged as important participants, particularly after the introduction of policies such as the New Exploration Licensing Policy and the Hydrocarbon Exploration and Licensing Policy. The Directorate General of Hydrocarbons (DGH) is the nodal agency responsible for monitoring upstream operations and ensuring compliance with contractual and regulatory requirements.



The **midstream segment** is focused on the transportation, storage, and processing of hydrocarbons. It forms the critical link between upstream production and downstream consumption. In India, this segment is heavily reliant on an expanding network of crude oil and natural gas pipelines, as well as liquefied natural gas (LNG) import

terminals. The Petroleum and Natural Gas Regulatory Board (PNGRB) oversees the development and regulation of pipelines and city gas distribution networks. Public sector companies such as GAIL, Indian Oil Corporation, and Oil and Natural Gas Corporation dominate pipeline infrastructure, while private companies like Reliance Industries and Adani Group are expanding their footprint in LNG import and gas distribution. With India's push towards becoming a gas-based economy, midstream infrastructure development has become a policy priority, with significant investment directed toward expanding the natural gas grid and creating storage facilities.

The downstream segment encompasses refining, petrochemicals, and the marketing and distribution of petroleum products to end consumers. India has one of the largest refining capacities in Asia, with a mix of state-owned enterprises such as Indian Oil Corporation, Bharat Petroleum Corporation Limited, and Hindustan Petroleum Corporation Limited, alongside private players like Reliance Industries and Nayara Energy. The downstream sector not only meets domestic demand but also positions India as a major exporter of refined petroleum products. Marketing and retail distribution of fuels are undertaken by both public and private companies, with retail outlets spread across the country to ensure accessibility. In addition to fuels, downstream operations also extend into the petrochemical sector, which supplies raw materials for plastics, textiles, and fertilizers. The Ministry of Petroleum and Natural Gas (MoPNG) provides policy direction for the downstream segment, while PNGRB regulates marketing and distribution activities to ensure fair competition and consumer protection.

Together, these three segments form an integrated value chain that supports India's economic growth, energy security, and transition towards a more sustainable energy mix. While the upstream sector continues to face challenges of resource constraints and declining domestic production, the midstream and downstream segments are witnessing rapid capacity expansion, infrastructure development, and policy reforms to meet the rising energy demand of a growing economy.

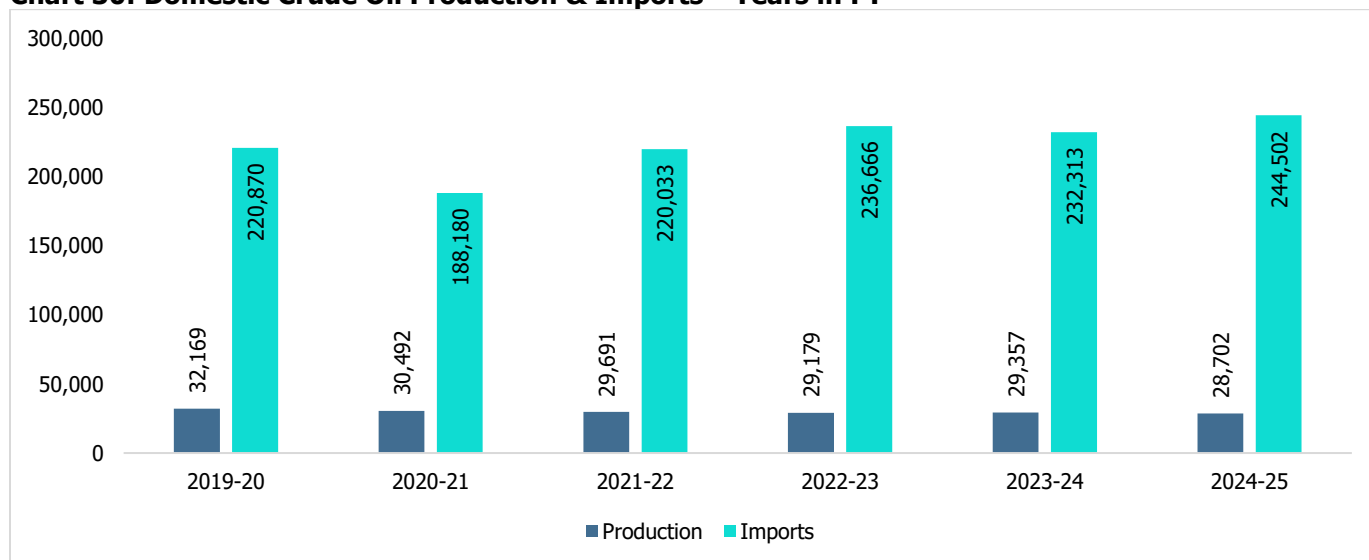
3.2. India Crude Oil, Natural Gas reserves and Production

3.2.1. Domestic oil & gas production and demand levels

India's domestic production of oil and gas has historically been lagging its rising energy requirements, creating a widening gap between production and demand. Crude oil production in the country has remained largely stagnant over the past decade, with limited additions from new discoveries and a natural decline in mature fields. Most of the domestic production is concentrated in onshore fields in states like Assam and Gujarat, and offshore fields in the western and eastern coasts. Despite these efforts, domestic crude oil production meets only a fraction of the total demand, resulting in heavy reliance on imports to secure the country's energy needs.

Crude oil production continues to face structural challenges, with output in FY25 slipping to 28.7 million metric tonnes (MMT), including condensate. Despite producing 29.3 MMT of petroleum products from domestic crude, the country's total consumption stood at 239.5 MMT in FY25, keeping self-sufficiency levels at a modest 12.3%. Offshore fields contributed the majority share at 53%, while onshore accounted for 47%. Within regions, the Western Offshore basin dominated with about 43% of national output, followed by Gujarat (17%), Assam (16%), and Rajasthan (12%). The persistent decline underscores India's increasing dependence on imports to meet rising energy demand.

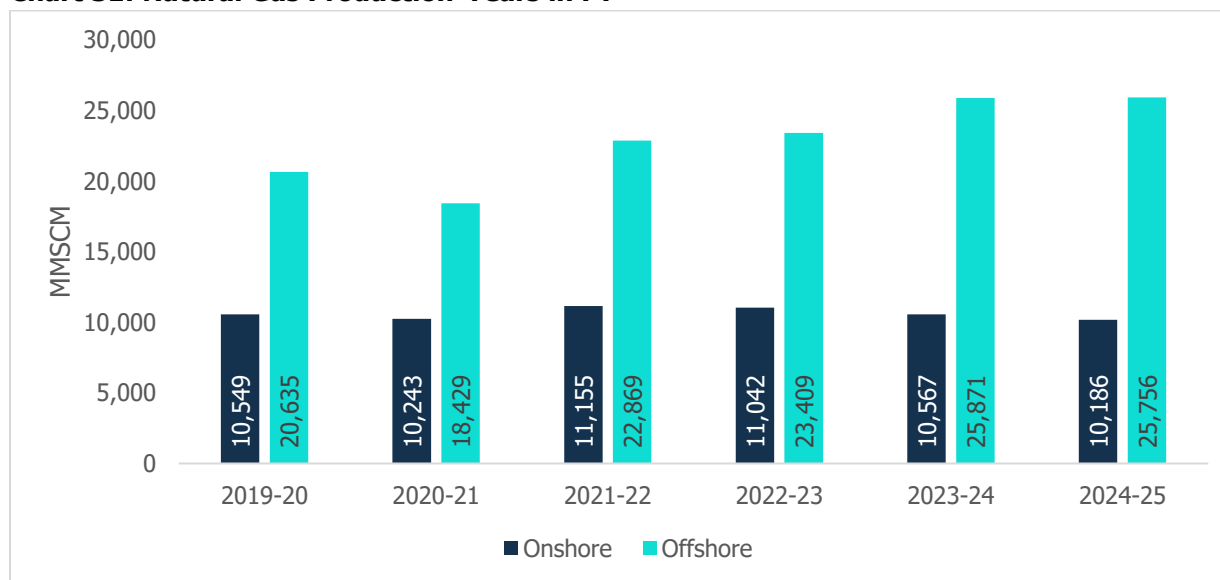
Chart 30: Domestic Crude Oil Production & Imports --Years in FY



Source: PPAC

In FY25, onshore production declined by 3.60% to 10,186 MMSCM, compared to 10,567 MMSCM in FY24. This decrease is possibly due to factors such as natural field depletion and operational inefficiencies. Conversely, offshore production increased marginally, rising from 25,871 MMSCM in FY24 to 25,756 MMSCM in FY25, likely driven by enhanced recovery techniques, new field developments, or operational improvements. The diverging trends suggest a growing reliance on offshore production to sustain overall output, as onshore fields face structural challenges limiting growth.

Chart 31: Natural Gas Production--Years in FY



Source: PPAC

Note: Million standard cubic meters (MMSCM)

Domestic natural gas production in FY25 declined slightly by about to 35,594 million standard cubic metres (MMSCM) from 35,717 MMSCM in FY24, while in FY25 net production (after internal consumption and flaring) stood at 30,047 MMSCM. Despite falling domestic output, total natural gas consumption grew, reaching 71,314 MMSCM when LNG imports and internal use were combined, underlining India's increasing dependence on imported LNG. LNG imports in FY25 rose ~12.3% to 35,720 MMSCM, reflecting demand pressures from sectors such as city gas distribution, fertilizers, refineries, and power. The import dependency based on consumption increased to ~50.1% from ~46.8% in the previous year, highlighting the gap between domestic supply and growing demand. Going forward, strategies to enhance domestic production while expanding LNG import and regasification capacity will be critical to meet India's rising gas demand.

Table 6: Natural Gas Consumption in India

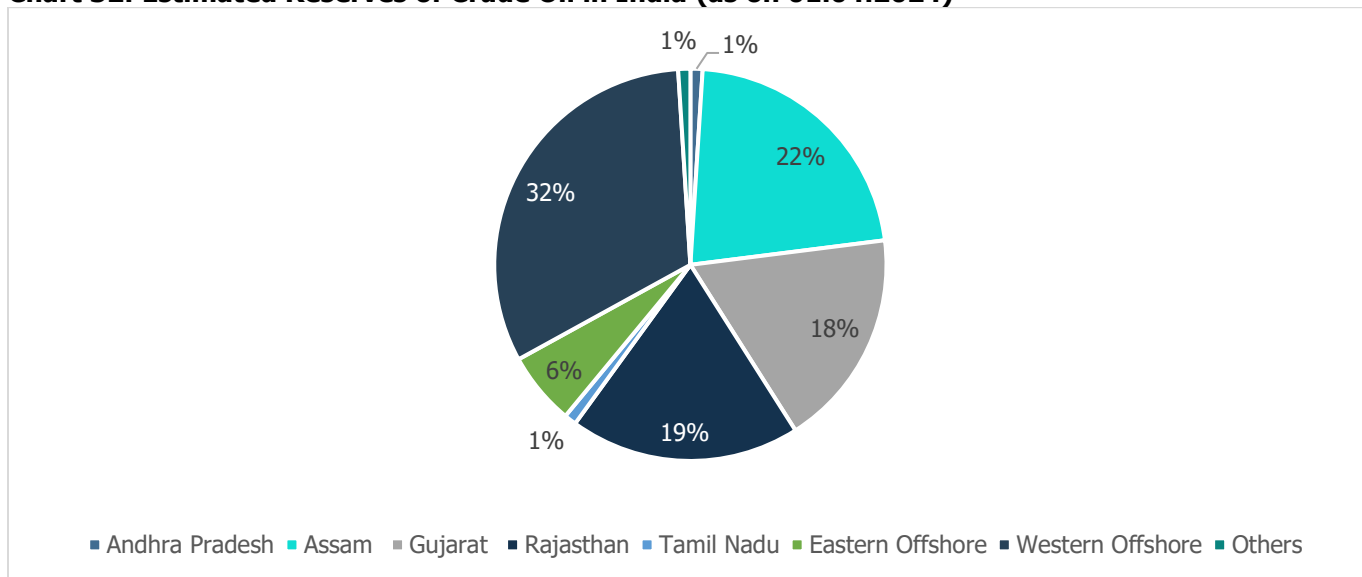
Financial Year	(Figure in)	FY20	FY21	FY22	FY23	FY24	FY25
Net Production	MMSCM	30,257	27,784	33,131	33,664	35,717	35,594
<i>(as % of Total Consumption)</i>	%	48%	46%	52%	56%	53%	50%
LNG import	MMSCM	32,352	33,198	31,028	26,304	31,795	35,720
<i>(as % of Total Consumption)</i>	%	52%	54%	48%	44%	47%	50%
Total Consumption (Net Production + LNG import)	MMSCM	62,609	60,982	64,159	59,968	67,512	71,314

Source: PPAC, CMIE

3.2.2 Oil & gas reserves in India

India's oil and gas reserves form a crucial part of the country's energy security framework, yet they remain modest compared to its growing consumption needs. As of the latest estimates, India holds around 651.8 million metric tons of recoverable crude oil reserves and approximately 1,138.6 billion cubic meters of recoverable natural gas reserves spread across its 26 sedimentary basins. These basins are geographically distributed across onshore and offshore regions, with significant reserves located in the western offshore (Mumbai High), eastern offshore (Krishna-Godavari basin), and onshore areas in Assam, Rajasthan, and Gujarat. In terms of global ranking, India, with around 4.9 billion barrels of oil reserves, India is positioned among the top 25 countries.

Chart 32: Estimated Reserves of Crude Oil in India (as on 01.04.2024)

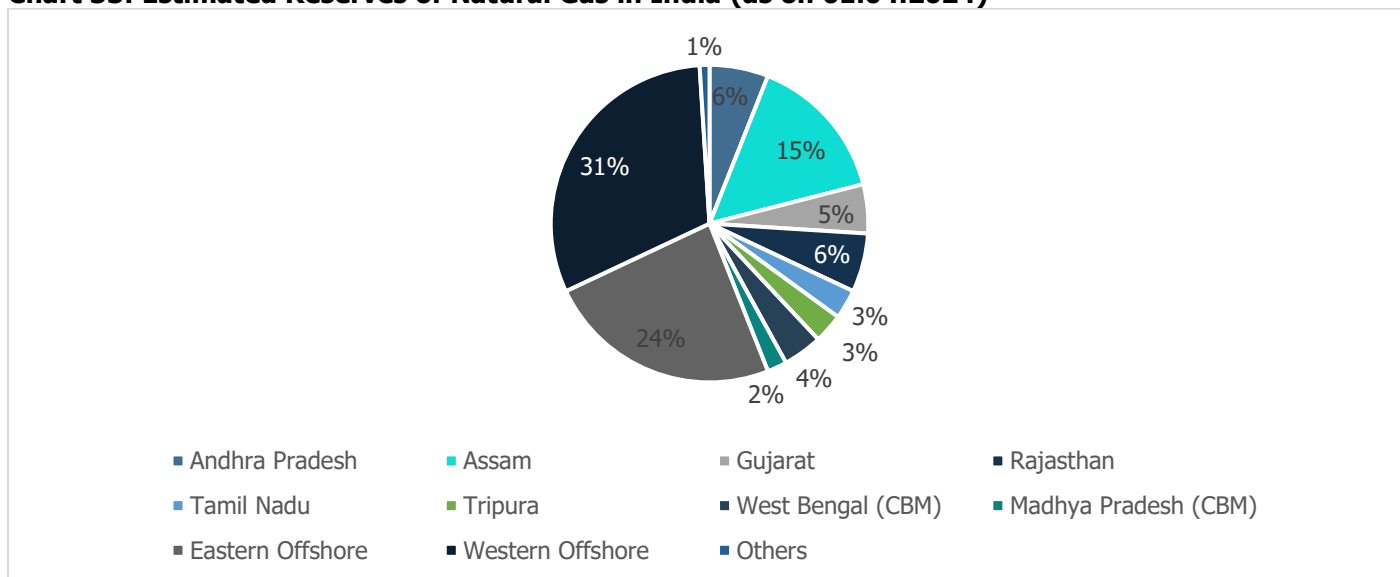


Source: Reserves and Potential for Generation – MOSPI

Note: Others include Arunachal Pradesh (0.43%), Nagaland (0.35%), Tripura (0.01%), West Bengal (0.01%)

The largest reserves of natural gas in India are in the Western Offshore region, which holds approximately 32% of the total natural gas reserves. This is followed by the Assam, which accounts for 22% of the reserves. India’s natural gas reserves play an increasingly important role in the country’s energy transition strategy. The government has set an ambitious target of raising the share of natural gas in the primary energy mix from the current 6.3% to 15 % by 2030.

Chart 33: Estimated Reserves of Natural Gas in India (as on 01.04.2024)



Source: Reserves and Potential for Generation – MOSPI

Note: Others include Arunachal Pradesh (0.67%), Jharkhand (CBM) (0.44%), Nagaland (0.009%)

3.2.3 Overview of Indian refineries

India has one of the largest refining capacities in Asia and plays a pivotal role as both a consumer and exporter of petroleum products. The country’s refining sector has grown significantly over the past decades, transforming India into a global refining hub. As of now, the country’s total installed refining capacity stands at around 258.16 million metric tonnes per annum (MMTPA), spread across more than 20 refineries. These refineries are strategically located along the western and eastern coasts, as well as inland regions, enabling efficient crude imports and product distribution. The Indian refining sector is a mix of public sector undertakings and private operators. Public refineries are managed by companies under the Ministry of Petroleum and Natural Gas, while large private players have established mega refining complexes that contribute a substantial share of the total capacity. Together, they ensure India not only meets its domestic demand but also maintains a surplus for exports, making the country a net exporter of refined petroleum products.

Table 7: Refineries Installed Capacity

(Figures in MMTPA) As on April, 2025	
Refinery	Installed Capacity
IOCL	70.3
RIL	68.2
BPCL	35.3
HPCL	24.5
NEL- Vadinar	20
MRPL, Mangalore	15
HMEL, GGSR	11.3
CPCL	10.5
NRL, Numaligarh	3
ONGC	0.07
All India	258.17

Source: PPAC

Note: MMTPA stands for Million Metric Tons per Annum.

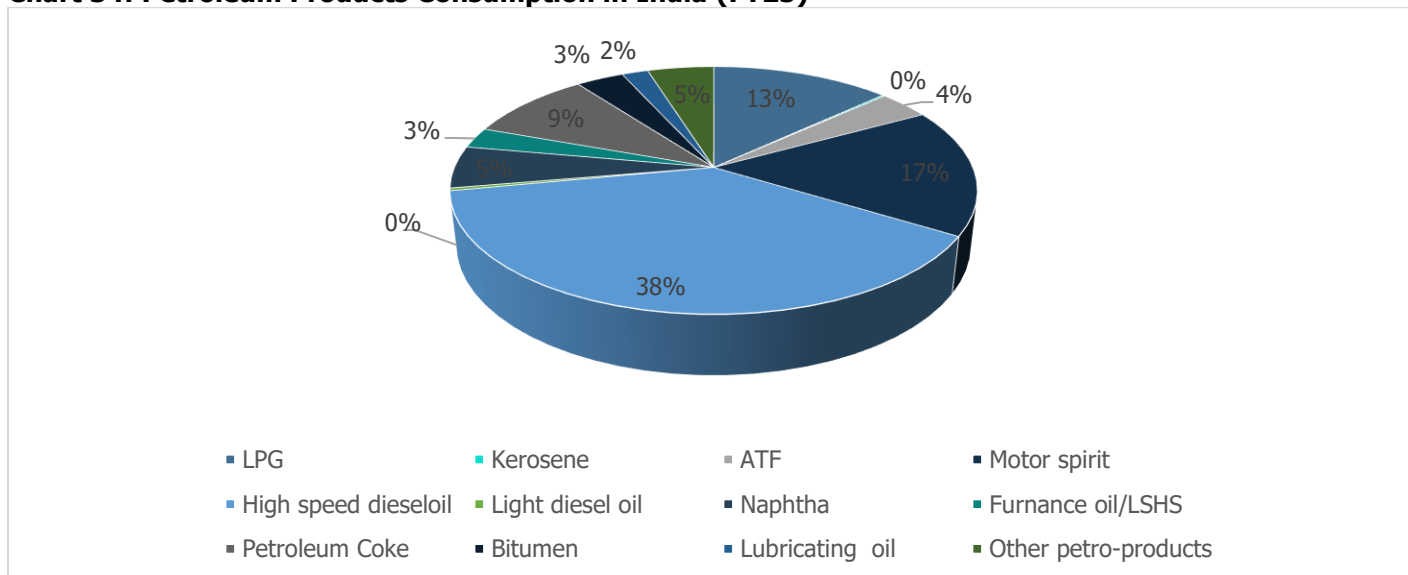
Total do not match due to rounding off at individual levels.

Looking ahead, several upcoming refinery projects are expected to further strengthen capacity and efficiency. The most prominent among these is the planned West Coast Refinery and Petrochemical Project (Ratnagiri Refinery and Petrochemicals Ltd.), a joint venture of Indian public sector oil companies with international partners. With a proposed capacity of 60 MMTPA, this project is expected to be one of the largest integrated refining and petrochemical complexes globally. Other expansions include the ongoing capacity enhancement projects at existing refineries in Panipat, Paradip, and Numaligarh. The Numaligarh Refinery expansion is particularly important for meeting energy demand in the Northeast, as it will increase capacity from 3 to 9 MMTPA.

3.2.4. Overview of petroleum products, including demand and key growth drivers

India’s petroleum product portfolio is diverse and caters to multiple sectors of the economy, ranging from transport and power generation to petrochemicals and household consumption. The major petroleum products include liquefied petroleum gas (LPG), naphtha, motor spirit (petrol/gasoline), high-speed diesel, aviation turbine fuel (ATF), kerosene, fuel oil, bitumen, and petrochemical feedstocks. Among these, diesel has traditionally accounted for the largest share of total consumption, followed by petrol and LPG. The refining sector ensures a steady supply of these fuels to meet the needs of a rapidly urbanizing and industrializing economy.

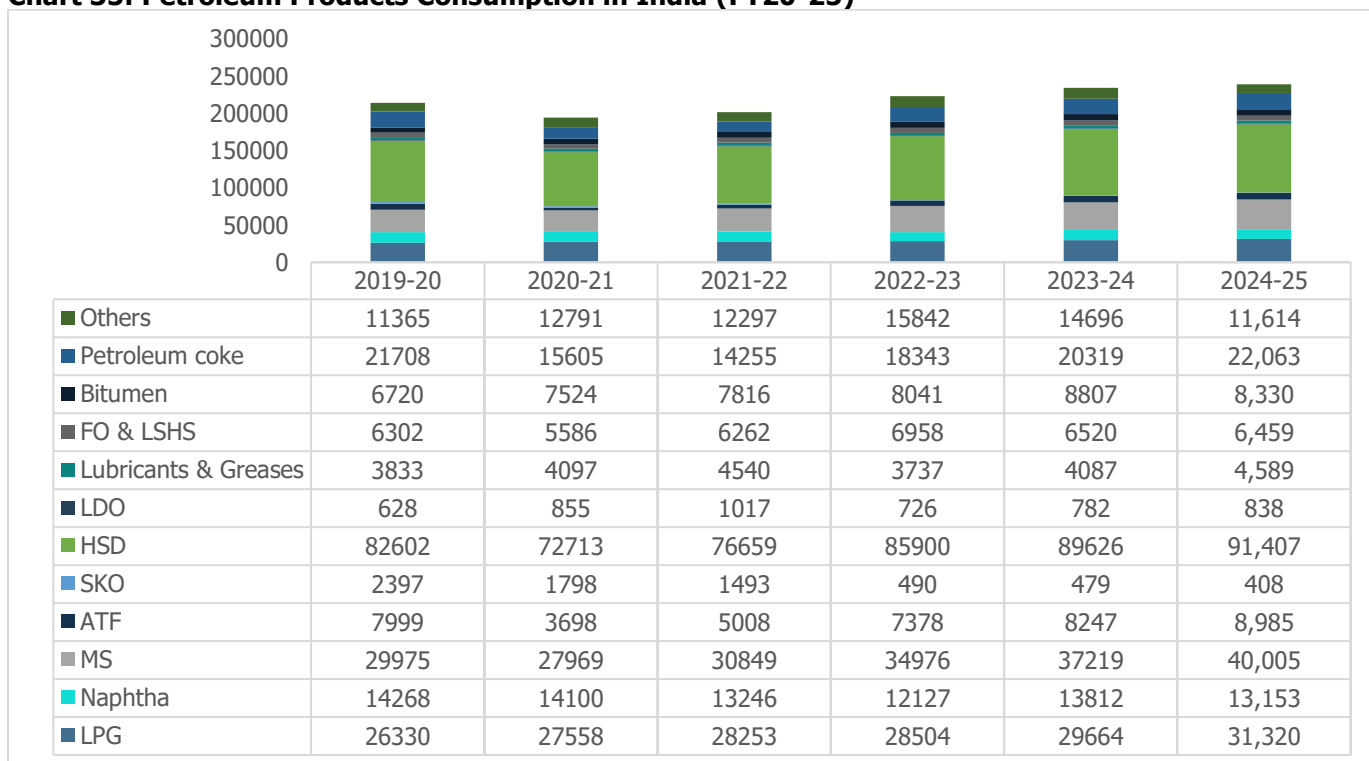
Chart 34: Petroleum Products Consumption in India (FY25)



Source: Petroleum and Natural Gas Regulatory Board (PNGRB)

The consumption of petroleum products reported a growth of 2.2% with a volume of 239.5 MMT during FY25, compared to the volume of 234.3 MMT during the same period of the previous year. Oil demand rises from late February as heating needs persist, industrial activity picks up, and transportation fuel consumption increases with warming temperatures. Furthermore, imports grew by 4.2% in FY25 compared to FY24. During the same period, exports surged by 3.4%.

Chart 35: Petroleum Products Consumption in India (FY20-25)



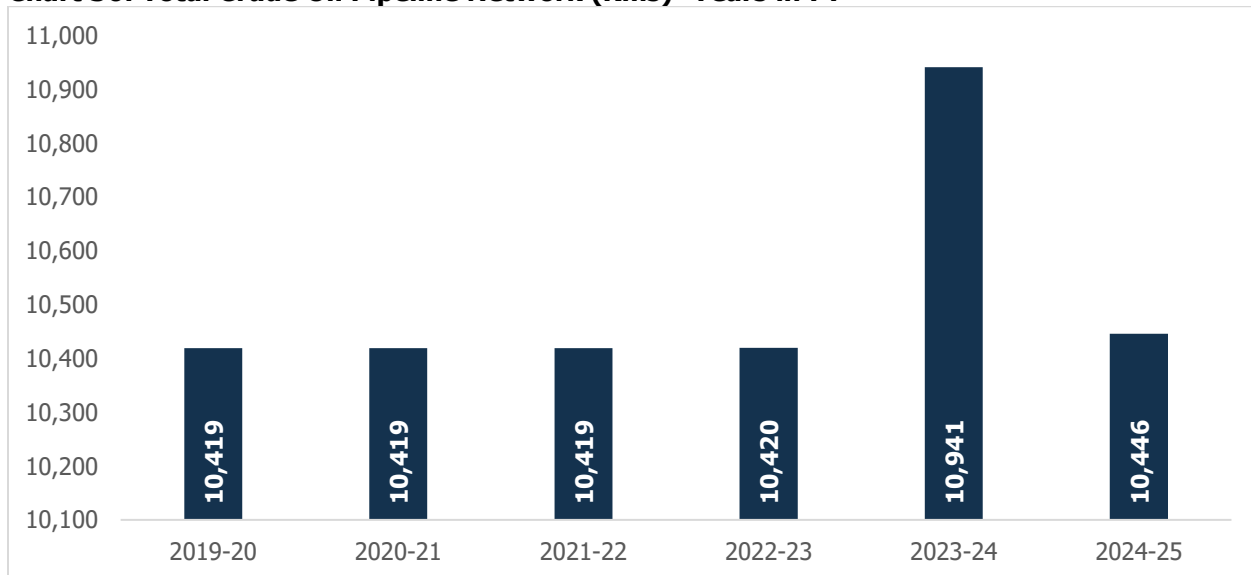
Source: Petroleum and Natural Gas Regulatory Board (PNGRB)

India's total demand for petroleum products is projected to grow at a CAGR of 5.37% from 2025 to 2030. Key growth drivers for petroleum products in India are closely tied to economic expansion and government policy. The ongoing growth in personal and commercial vehicle sales sustains demand for petrol and diesel, although the gradual adoption of electric mobility is expected to temper long-term growth. LPG demand is being driven by rural penetration and the push toward cleaner cooking fuels, while urbanization and rising middle-class incomes are boosting consumption of transport fuels and petrochemical feedstocks. Aviation sector growth, supported by regional connectivity schemes, continues to accelerate ATF demand. Infrastructure development and construction activity also generate demand for products like bitumen and fuel oil. While the penetration of electric vehicles and renewable energy is expected to reduce the share of transport fuels in the long run, petrochemical demand is projected to remain robust, driven by plastics, polymers, and chemical intermediates. This structural shift underscores the importance of refining-petrochemical integration as a strategy for sustaining growth in the sector.

3.2.5. Overview of oil & gas pipeline network

India has developed an extensive oil and gas pipeline network that plays a critical role in ensuring the efficient transportation and distribution of petroleum products and natural gas across the country. The network is vital for energy security, cost efficiency, and reducing logistics bottlenecks, particularly given the country's high dependence on imported crude oil and LNG. The total length of crude pipelines in India is over 10,000 km, with major routes connecting ports like Jamnagar, Mumbai, and Paradip to inland refineries. This reduces the reliance on road and rail transport, lowering costs and improving supply reliability. Refined petroleum products such as petrol, diesel, ATF, and LPG are transported through product pipelines. Spanning more than 17,000 km, these pipelines connect refineries to consumption centres, depots, and terminals. They are crucial for meeting the growing demand in industrial, transport, and household sectors, while also ensuring faster and safer delivery compared to traditional modes.

Chart 36: Total Crude Oil Pipeline Network (Kms) -Years in FY



Source: Petroleum and Natural Gas Regulatory Board (PNGRB)

The length of operational Natural Gas Pipeline in the country has increased from 15,340 Km in 2014 to 25,429 Kms as of Mar'25. Further, development of about 10,459 Kms Natural Gas Pipeline is under execution. With the completion of these pipelines authorized by PNGRB, the national gas grid would be completed and would connect all

major demand and supply centre in India. This would ensure easy availability of natural gas across all regions and help to achieve uniform economic and social progress.

The country's authorized NGPL network stood at over 34,200 km, of which the bulk close to 95% falls under the common carrier category. This illustrates the regulator's emphasis on creating an open-access infrastructure that enables equitable transportation of gas across users and regions.

India has an active construction pipeline of more than 10,400 km. Here again, common carrier projects dominate with close to ninety percent of the length, reflecting the regulatory preference for shared infrastructure. Notable progress has also been made in tie-in and STPL segments, which are critical for linking new fields and under-served regions such as the North-East and hinterland industrial belts. The under-construction capacity points to an imminent step-up in connectivity, particularly in regions currently dependent on expensive alternatives like liquid fuels.

Table 8: Natural Gas Pipelines Network

NATURAL GAS PIPELINES (NGPL): MARCH'2025			
DESCRIPTION		LENGTH (KM)	TOTAL LENGTH (KM)
Authorized NGPL	Common Carrier	32,661 (95.41%)	34,233
	Tie-in Connectivity	792 (2.31%)	
	Dedicated	780 (2.28%)	
Operational NGPL	Common Carrier	24,009 (94%)	25,429
	Tie-in Connectivity	202 (1%)	
	Dedicated	653 (3%)	
	STPL	565 (2%)	
Under Construction NGPL	Common Carrier	9,194 (88%)	10,459
	Tie-in Connectivity	593 (6%)	
	Dedicated	122 (1%)	
	STPL	550 (5%)	

Source: Petroleum and Natural Gas Regulatory Board (PNGRB)

3.3. Investment Trends in the Industry

India's upstream investment landscape is being driven by a national push for energy security, revived exploration activity under open acreage licensing, and increasing interest in deepwater and unconventional resources. The Directorate General of Hydrocarbons (DGH) has been actively opening frontier acreage through OALP rounds, including recent rounds with a large proportion of offshore and ultra-deepwater blocks, which is increasing the upstream project pipeline.

Future upstream capex will depend on three interlinked factors: (1) operator investment plans (public and private), (2) pace of work under OALP and awarded blocks, and (3) offshore redevelopment and deepwater project execution. Recent strategic partnerships and technical service agreements for legacy offshore fields (notably the technical services arrangement to boost production in the Mumbai High area) are a strong signal that offshore redevelopment will absorb material capex in the near term.

Project-wise CapEx summary for the Indian Crude Oil & Natural Gas sector, showing the flow of investments over six years (2019–20 to 2024–25) is shown in the below table:

Table 9: Investments flow in Oil & Gas Industry

	During the Year				At the End of Year			
	New Projects Announced		Projects Completed		Projects Under Implementation		Projects Outstanding	
Year	Cost (Rs. Million)	Count	Cost (Rs. Million)	Count	Cost (Rs. Million)	Count	Cost (Rs. Million)	Count
2019-20	74,143.20	9	2,72,246.80	9	31,10,048.60	128	39,39,129.60	167
2020-21	44,477.20	4	28,530.80	3	31,80,735.20	128	38,65,114.00	164
2021-22	3,500.00	2	35,960.00	1	32,44,554.40	130	39,09,266.60	159
2022-23	22,362.00	7	97,850.10	6	28,22,252.70	117	36,43,828.50	153
2023-24	79,623.40	3	4,11,400.00	2	23,21,132.30	111	30,41,618.20	143
2024-25	9,107.20	1	-	-	23,13,113.80	96	29,74,084.20	136

Source: CMIE

3.4. Investments from public / private Players

Investments in India’s oil and gas sector are supported by both public and private entities, each playing a distinct role in driving exploration and production activity. Public sector investment continues to dominate the landscape, with a strong focus on large-scale field development, offshore redevelopment, and the expansion of existing assets. These investments are often long-term, backed by government funding and policy priorities, and provide the foundation for sustaining domestic production levels. On the other hand, private sector participation has been steadily rising, particularly in onshore drilling and unconventional resources. Private players typically invest through rig procurement, hiring of advanced drilling equipment, and development of awarded exploration blocks, often emphasizing cost-efficiency and quicker project execution. In recent years, collaboration between public and private entities has also gained momentum, with private contractors and service providers complementing public sector investments through technology deployment and specialized drilling services. Together, this dual investment approach not only enhances India’s domestic hydrocarbon output but also diversifies funding sources, reduces project risks, and supports the long-term goal of strengthening energy security.

Table 10: Completion of Projects in Crude Oil & Natural Gas Industry

Company Name	Project Name	Status	Type
Reliance Industries Ltd.	KG-D6 Gas Development Project (R-Series)	Completed	Subs. Expn.
Oil & Natural Gas Corpn. Ltd.	KG-DWN-98/2 (NDA Cluster-II) Oil Exploration Project	Under Implementation	New Unit
Great Eastern Energy Corpn. Ltd.	Raniganj CBM Expansion Project	Under Implementation	Subs. Expn.
Oil & Natural Gas Corpn. Ltd.	Mumbai High (North) Development Project Phase 4	Under Implementation	Ren./Mod.
Oil & Natural Gas Corpn. Ltd.	Mumbai High (South) Development Project Phase 4	Completed	Subs. Expn.
Oil & Natural Gas Corpn. Ltd.	Mumbai High & Heera Fields Life Extension of Wall Platforms Project	Under Implementation	Ren./Mod.
Oil & Natural Gas Corpn. Ltd.	Cluster-8 Marginal Field Development Project	Completed	New Unit
Oil & Natural Gas Corpn. Ltd.	Conversion of Sagar Samrat Rig to MOPU Project	Completed	Ren./Mod.
Oil & Natural Gas Corpn. Ltd.	Santhal Field Redevelopment Project	Under Implementation	New Unit
Oil & Natural Gas Corpn. Ltd.	KG-ONN-2003/1 Block Exploration Project	Completed	New Unit
Oil & Natural Gas Corpn. Ltd.	Jharia CBM Block Project	Completed	New Unit
Oil & Natural Gas Corpn. Ltd.	Revamping of SV Stations, Gas Terminal \& Kribhco Terminal Project	Under Implementation	Ren./Mod.
Oil & Natural Gas Corpn. Ltd.	Golaghat Oil & Gas Project	Under Implementation	New Unit
Oil & Natural Gas Corpn. Ltd.	CY-ONN-2002/2 Onland Block (Madanam field) Project	Under Implementation	New Unit
Oil & Natural Gas Corpn. Ltd.	Nandasan Surface Facility Redevelopment Project	Completed	Ren./Mod.
Hindustan Oil Exploration Co. Ltd.	MB/OSDSF/B80/2016 Project	Completed	New Unit
Oil & Natural Gas Corpn. Ltd.	RJ/ONDSF/Chinnewala/2018 Project	Completed	New Unit
Oilmax Energy Pvt. Ltd.	Tiphuk Oil & Gas Field Project	Announced	New Unit
Oil India Ltd.	RJ/ONDSF/BAKHRITIBBA/2021 Block Project	Completed	New Unit

Table 11: Completion of Projects in Crude Oil & Natural Gas Industry-Years in FY

Company Name	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28
Reliance Industries Ltd.		4,00,000.00				
Oil & Natural Gas Corpn. Ltd.					3,40,120.00	
Great Eastern Energy Corpn. Ltd.					1,50,000.00	
Oil & Natural Gas Corpn. Ltd.					39,766.70	
Oil & Natural Gas Corpn. Ltd.	37,400.50					
Oil & Natural Gas Corpn. Ltd.						33,759.00
Oil & Natural Gas Corpn. Ltd.	22,924.60					
Oil & Natural Gas Corpn. Ltd.	20,013.40					
Oil & Natural Gas Corpn. Ltd.					11,625.60	
Oil & Natural Gas Corpn. Ltd.		11,400.00				
Oil & Natural Gas Corpn. Ltd.	11,360.00					
Oil & Natural Gas Corpn. Ltd.					8,373.40	
Oil & Natural Gas Corpn. Ltd.					6,250.00	
Oil & Natural Gas Corpn. Ltd.				6,243.50		
Oil & Natural Gas Corpn. Ltd.	3,360.00					
Hindustan Oil Exploration Co. Ltd.	2,791.60					
Oil & Natural Gas Corpn. Ltd.						
Oilmax Energy Pvt. Ltd.						
Oil India Ltd.						
TOTAL	97,850.10	4,11,400.00		6,243.50	5,56,135.70	33,759.00

Source : Projects Today

3.5. Government policies and environmental regulations

Government policies and environmental regulations have a defining influence on India's oil and gas midstream sector. Over the years, regulatory interventions have sought to balance the dual objectives of ensuring energy security and aligning with sustainability commitments. The Petroleum and Natural Gas Regulatory Board (PNGRB) has been central to establishing transparent frameworks for pipeline authorizations, tariff rationalization, and open-access regulations, thereby fostering competition and efficiency in midstream infrastructure.

PNGRB (Registration for Establishing and Operating LNG Terminals) Regulations, 2025

In May 2025, the Petroleum and Natural Gas Regulatory Board (PNGRB) introduced the Registration for Establishing and Operating LNG Terminals Regulations to streamline and standardize the development of new and expanded LNG terminals across India. Under this regulation, all entities proposing to establish or expand LNG terminals are required to register with PNGRB prior to making final investment decisions. Developers must submit a comprehensive project and evacuation plan and furnish a performance bank guarantee equivalent to 1% of the project cost or INR 250 million, whichever is lower. The regulation also mandates periodic reporting, disclosure of change in control, and compliance with a civil penalty enforcement mechanism. This initiative aims to ensure transparent infrastructure development, prevent project delays, and promote investor confidence in India's growing LNG market.

The Petroleum and Natural Gas Rules, 1959

Formulated under the powers granted by the Oilfields (Regulation and Development) Act, 1948, these rules provide a comprehensive framework for granting exploration licenses and mining leases for petroleum operations in India. They detail the rights, duties, and obligations of licensees, including work commitments, data reporting, and revenue payments to the government. Together with the Petroleum Act, 1934, these rules regulate the sale, storage, and distribution of petroleum and petroleum products. They also ensure that licensees maintain safety, prevent wastage, and adhere to environmental protection norms. The 1959 Rules serve as the operational backbone for the upstream exploration and production (E&P) segment, facilitating systematic development of hydrocarbon resources.

The Oilfields (Regulation and Development) Act, 1948

This Act forms the foundational legal framework for the exploration and production of petroleum and natural gas in India. It empowers the central government to make rules related to licensing, leasing, and development of oilfields, thereby regulating both public and private sector participation in upstream activities. The Act, along with the Petroleum and Natural Gas Rules, 1959, governs the grant of exploration and mining leases, royalty payments, and operational guidelines. It gives the government broad authority over technical, safety, and fiscal matters concerning oilfield operations. The law has evolved alongside newer policies such as the New Exploration Licensing Policy (NELP) and Hydrocarbon Exploration and Licensing Policy (HELP), ensuring a structured and accountable framework for hydrocarbon development while encouraging investment and technology adoption.

3.6. Key Policies to support the sector

The Hydrocarbon Vision 2025, launched by the Government of India, laid out a long-term strategic roadmap for the oil and gas sector with the twin objectives of ensuring energy security and promoting sustainable development. It emphasized intensifying exploration in both proven and frontier basins, building adequate refining capacity to meet domestic demand, expanding oil and gas transportation networks, and creating a conducive fiscal and regulatory environment to attract investments. The policy also stressed diversification of energy sources, efficiency

in energy use, and the development of strategic petroleum reserves to safeguard the country from supply disruptions.

As India accelerates its energy transition agenda, these policy enablers are reshaping midstream infrastructure in fundamental ways. The traditional midstream network, historically designed around crude oil transportation and refining linkages, is being re-oriented to accommodate natural gas as a transition fuel and, over time, cleaner alternatives. Expansion of cross-country natural gas pipelines liquefied natural gas import terminals, and city gas distribution networks has become central to policy implementation. Simultaneously, the midstream sector is adapting to future requirements such as hydrogen blending into pipelines, carbon capture and storage integration, and enhanced storage facilities for crude and petroleum products to address volatility risks.

In effect, Hydrocarbon Vision 2025 and subsequent policy frameworks have established the foundation for a balanced midstream ecosystem that not only supports India's current hydrocarbon-driven economy but also creates flexibility to integrate cleaner fuels. This dual approach ensures that the sector remains resilient during the ongoing energy transition while strengthening the infrastructure backbone necessary to meet India's long-term energy security and sustainability goals.

The Government of India has made significant financial commitments toward the development of the oil and gas sector through multiple policy-led initiatives that align with the objectives of Hydrocarbon Vision 2025 and subsequent frameworks. In the Union Budget 2025–26, the government allocated ₹19,326 crore to the Ministry of Petroleum and Natural Gas (MoPNG) to strengthen exploration, midstream infrastructure, and energy security mechanisms. Of this, ₹5,876 crore has been earmarked for the Phase II expansion of the Strategic Petroleum Reserves (ISPRL), which includes the development of underground crude storage facilities at Chandikhol (Odisha) and Padur (Karnataka). These reserves are vital for insulating India from global crude supply shocks and ensuring long-term energy security.

Additionally, ₹592 crore has been sanctioned for Mission Anveshan, an initiative aimed at appraising India's sedimentary basins through advanced seismic surveys, geochemical studies, and drilling of parametric wells to boost domestic hydrocarbon discoveries. To promote equitable gas infrastructure development, ₹1,200 crore has been allocated under the Northeast Gas Subsidy Scheme to encourage natural gas usage and infrastructure growth in the region. Further, under Hydrocarbon Vision 2030 for the North-Eastern region an extension of the Hydrocarbon Vision roadmap projects worth approximately ₹1 lakh crore have been approved, spanning upstream exploration, pipeline expansion, refinery augmentation, and city gas distribution networks.

3.7. OALP scheme and types of land provided in the scheme for drilling

The Open Acreage Licensing Policy (OALP) was introduced by the Government of India in 2016 as part of the Hydrocarbon Exploration and Licensing Policy (HELP). Its aim is to accelerate exploration in India, especially in the unexplored or under-explored sedimentary basins, by allowing companies to propose blocks for exploration on their own initiative rather than waiting for government-specified bid rounds. Under OALP:

- Companies can submit Expressions of Interest for any area of interest that is not currently under licence or production.
- Once sufficient interest in an area is pooled (EoIs accumulate), that area is put up for competitive bidding.
- The policy incorporates a single uniform licence for all types of hydrocarbons (conventional and unconventional) under revenue sharing contracts rather than cost recovery.

- It provides more flexibility in terms of acreage selection, speeds up approvals, and aims to reduce bureaucratic delays.
- There is emphasis on building a National Data Repository which provides geological and geophysical data for basins so that companies can make informed bids.

OALP allows companies to submit Expressions of Interest (EoIs) for any exploration block throughout the year, using data made available through the National Data Repository (NDR). Based on these EoIs, the Directorate General of Hydrocarbons (DGH) groups prospective blocks into formal bid rounds for competitive bidding.

Since its inception, the programme has been rolled out in multiple phases OALP Rounds I to X each offering a mix of onshore, offshore, shallow-water, and ultra-deepwater blocks across India's 26 sedimentary basins. The first round was launched in January 2018, offering 55 blocks covering around 59,000 sq. km, followed by subsequent rounds that expanded both the area and basin diversity. Later rounds, such as OALP Round VI (2021) and OALP Round IX (2024), saw increased emphasis on frontier basins and inclusion of previously "no-go" areas. The most recent, OALP Round X (2025), offered the largest acreage yet around 192,000 sq. km across 25 blocks and 13 basins demonstrating the policy's expanding scope.

In terms of frequency, the OALP operates on a continuous submission model, with three EoI windows per year April to July, August to November, and December to March allowing companies to propose areas of interest at multiple intervals annually. This flexibility accelerates exploration activity and aligns with the government's objective of reducing import dependency by encouraging timely project execution. Over time, the OALP framework has evolved to include more liberal fiscal terms, revenue-sharing models, marketing freedom for produced hydrocarbons, and reduced royalties in challenging basins making it a key pillar in India's upstream exploration and energy security strategy.

Under OALP, the land available for exploration includes:

On-land Sedimentary Areas

- Areas within sedimentary basins onshore where previous exploration might be limited or where existing prospects are not yet fully developed.
- These can be terrestrial basins or those partially covered by shallow cover, etc.

Shallow Offshore Areas

- Offshore zones up to a specified water depth (typically up to 400 meters) where marine platforms or shallow submersible rigs can operate.
- These include continental shelf areas with relatively lower technical complexity compared to deep or ultra-deep water.

Deep-water Offshore Areas

- Areas beyond shallow water depth thresholds (i.e., >400 m).
- These require more advanced technology, higher investment and more conducive regulatory and fiscal terms to attract investment due to technical, logistical and geological challenges.

Sedimentary Basins in India

India has an estimated sedimentary area of 3.36 million sq. km., comprising 26 sedimentary basins. Of this, 1.63 million sq. km. lies onshore, 0.41 million sq. km. falls under shallow offshore areas up to the 400m isobath, and 1.32 million sq. km. is categorized as deep-water beyond the 400m isobath, as per the renewed classification of sedimentary basins.

Some of the basins in India which are relatively underexplored and lie in Category III (i.e. contingent or prospective resources rather than proven producing reserves) include:

Table 12: Sedimentary basin yet to be explored (Sq. Km)

Basin Name	Area Onland	Area Shallowwater	Area Deepwater	Area Total
Kerala-Konkan		90,380	4,89,620	5,80,000
Bengal-Purnea	42,414	33,465	46,035	1,21,914
Ganga Punjab	3,04,000			3,04,000
Pranhita Godavari	30,000			30,000
Satpura-S.Rewa-Damodar	57,180			57,180
Himalyan Foreland	30,110			30,110
Chhattisgarh	32,000			32,000
Narmada	95,215			95,215
Spiti Zanskar	32,000			32,000
Deccan Syncline	2,37,500			2,37,500
Cuddapah	40,100			40,100
Karewa	6,671			6,671
Bhima Kaladgi	14,100			14,100
Bastar	5,360			5,360

Source: Directorate General of Hydrocarbons (DGH)

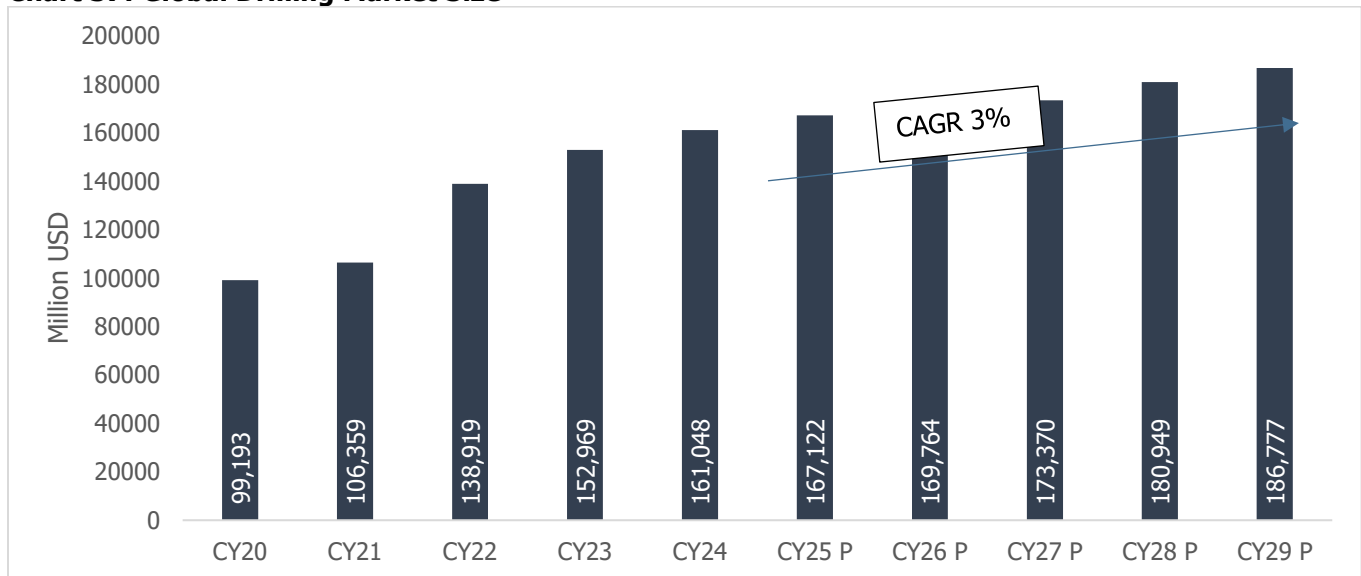
4 Global Drilling Industry

4.1 Overview of Global Drilling Industry

The global drilling industry is a vital component of the energy and natural resources sector, supporting the exploration and extraction of oil, gas, minerals, and geothermal energy. It encompasses a wide range of activities including onshore and offshore drilling, directional drilling, and well-servicing operations. Demand for drilling services is largely influenced by global energy needs, commodity prices, and investment in infrastructure and exploration projects. Technological advancements such as automation, horizontal drilling, and real-time data analytics have significantly improved efficiency, safety, and precision in drilling operations.

In recent years, industry has also faced increasing pressure to align with environmental, social, and governance (ESG) standards. This includes reducing carbon emissions, minimizing environmental impact, and adopting more sustainable drilling practices. Geopolitical developments, fluctuating crude oil prices, and regional regulatory changes continue to shape market trends and investment strategies. As the world transitions toward cleaner energy sources, the drilling industry is evolving to support not only fossil fuel production but also geothermal and other alternative energy projects.

Chart 37: Global Drilling Market Size



Source: Maia Research, CareEdge Research

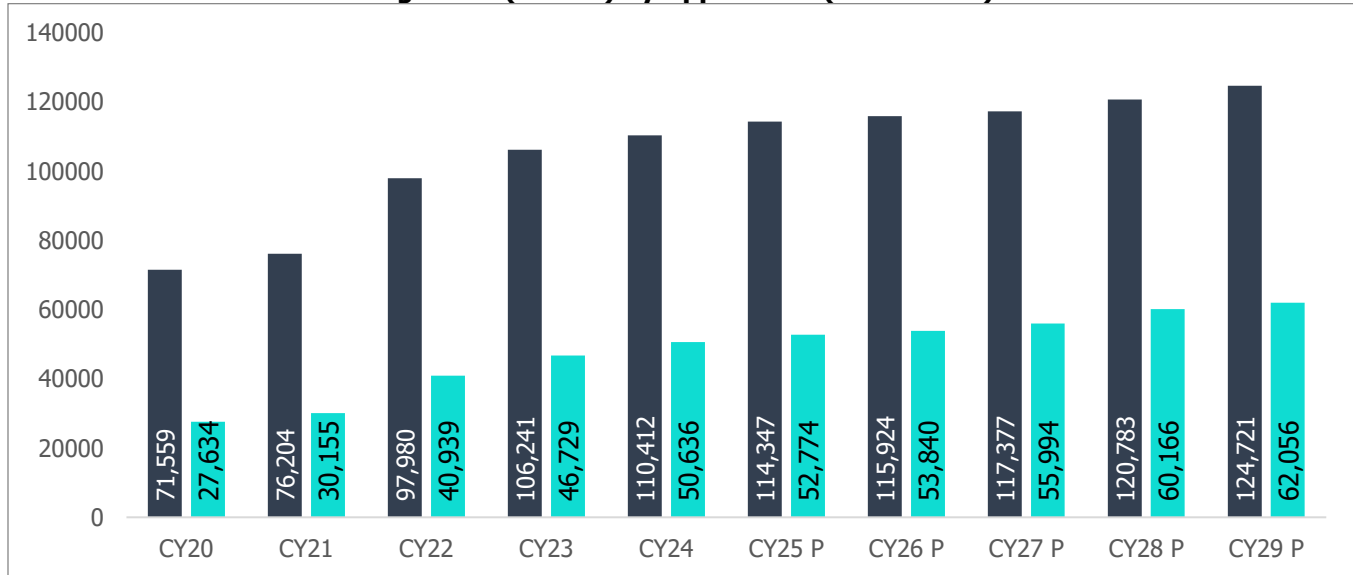
The global drilling market was valued at approximately USD 99.2 billion in 2020 and experienced strong growth in the following years, particularly a sharp 30.6% increase in 2022 from 2021. This surge was largely driven by the recovery of global energy demand following the COVID-19 pandemic, which had caused significant disruptions in drilling activities and oil prices. As industries and transportation resumed operations worldwide, oil demand rebounded, encouraging oil and gas companies to ramp up exploration and drilling investments. This period also saw advances in drilling technology, which improved efficiency and reduced operational costs, further supporting market expansion.

From 2023 onwards, the global oil and gas drilling market is projected to grow at a steadier pace, reaching close to USD 192 billion by 2030. This trajectory is underpinned by the sustained increase in natural gas demand—particularly as a transition fuel and the expanding petrochemical sector, which continues to drive consumption worldwide. While energy transition policies and environmental regulations are shaping investment strategies,

hydrocarbons remain critical to meeting industrial, transportation, and feedstock needs. Importantly, rising petrochemical capacity in Asia and the Middle East, coupled with ongoing demand for gas-fired power generation, is expected to provide strong support to drilling activity. As a result, the industry outlook remains broadly positive, with steady opportunities for growth and innovation despite a more balanced pace compared to the immediate post-pandemic rebound.

4.2 Segmentation into onshore and offshore drilling Market

Chart 38: Table Global Drilling Value (M USD) by Application (2020-2030)



Source: Maia Research, CareEdge Research

The global drilling market has demonstrated steady growth between 2020 and 2030 across both onshore and offshore sectors. In 2020, the onshore drilling segment accounted for the larger portion of the market at around USD 71.6 billion, compared to USD 27.6 billion for offshore drilling. By 2030, onshore drilling is expected to reach approximately USD 127.1 billion, showing consistent and stable growth driven by easier access to reserves, lower operational costs, and continued exploration in mature and emerging oil fields. Onshore drilling remains the dominant segment due to these cost efficiencies and the large number of accessible resource sites worldwide.

Offshore drilling, while starting from a smaller base, is projected to nearly double from USD 27.6 billion in 2020 to about USD 64.7 billion in 2030. This faster growth rate is attributed to increased investments in deepwater and ultra-deepwater exploration, fueled by advancements in drilling technology and rising demand for untapped offshore reserves. Despite being more capital-intensive, offshore drilling benefits from innovation in floating rigs, automation, and safety improvements, which make exploration in challenging environments more viable.

Both sectors contribute to the total global drilling market nearly doubling in value from USD 99.2 billion in 2020 to USD 191.8 billion by 2030, reflecting sustained energy demand and ongoing exploration activities.

4.3 Global Onshore and Offshore Drilling Resource

Onshore

Onshore drilling has a well-established history with mature technologies, mainly focused on major basins and oil-rich regions such as the Middle East, North America, Russia, and Central Asia. These areas benefit from developed infrastructure, established supply chains, and comparatively low extraction costs. The exploitation of unconventional

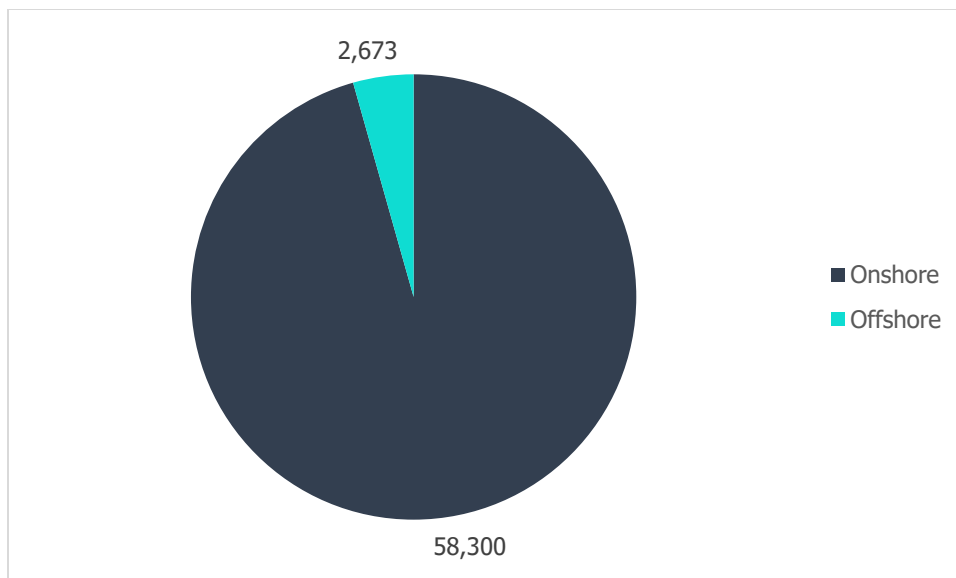
resources like shale oil and shale gas, particularly in the United States, has significantly boosted recoverable onshore reserves. Nevertheless, many traditional oil fields have been producing for decades and are now experiencing natural declines, while the discovery of large new conventional fields is becoming increasingly rare. Exploration is progressively shifting toward deeper, more geologically complex formations and remote, challenging environments like the Arctic, which increase technical difficulties and operational expenses.

Offshore

Offshore drilling is seen as the next major frontier in global oil and gas exploration, holding substantial resource potential especially in deepwater and ultra-deepwater zones. Offshore reserves tend to be highly concentrated, with key production hubs including Brazil’s pre-salt basins, the Gulf of Guinea in West Africa, the US Gulf of Mexico, and the North Sea. Recent significant finds in the Eastern Mediterranean and the Guyana-Suriname Basin have further underscored the vast opportunities offshore. Compared to onshore, offshore drilling requires overcoming much higher technical challenges, involving costly drilling rigs such as drillships and semi-submersibles, intricate subsea production infrastructure, and large-scale capital investments that often span several decades. Operations must contend with the demanding marine environment, including high underwater pressures and frigid temperatures, which elevate risks substantially above those faced onshore. However, offshore wells frequently yield higher production volumes, and the chance of discovering giant oil fields is greater. Ongoing advancements in deepwater technologies continue to lower break-even costs, enhancing the economic viability of many offshore resources.

4.4 Global No of wells in Onshore and Offshore

Chart 39: Total No of wells in Onshore and Offshore CY24



Source: Maia Research, CareEdge Research

In 2024, the total number of wells drilled globally shows a significant disparity between onshore and offshore operations. Onshore drilling accounts for approximately 58,300 wells, while offshore drilling involves only about 2,673 wells. This large difference reflects the relative accessibility, cost, and complexity associated with each environment.

Onshore drilling remains the dominant activity due to its lower operational costs, easier access to resources, and well-established infrastructure in many oil- and gas-rich regions. The higher number of wells drilled onshore is driven by the presence of numerous mature fields, ongoing exploration of unconventional resources like shale

formations, and the ability to drill multiple wells in proximity. Additionally, onshore drilling benefits from faster setup times and less logistical complexity, allowing for a greater volume of wells to be drilled annually.

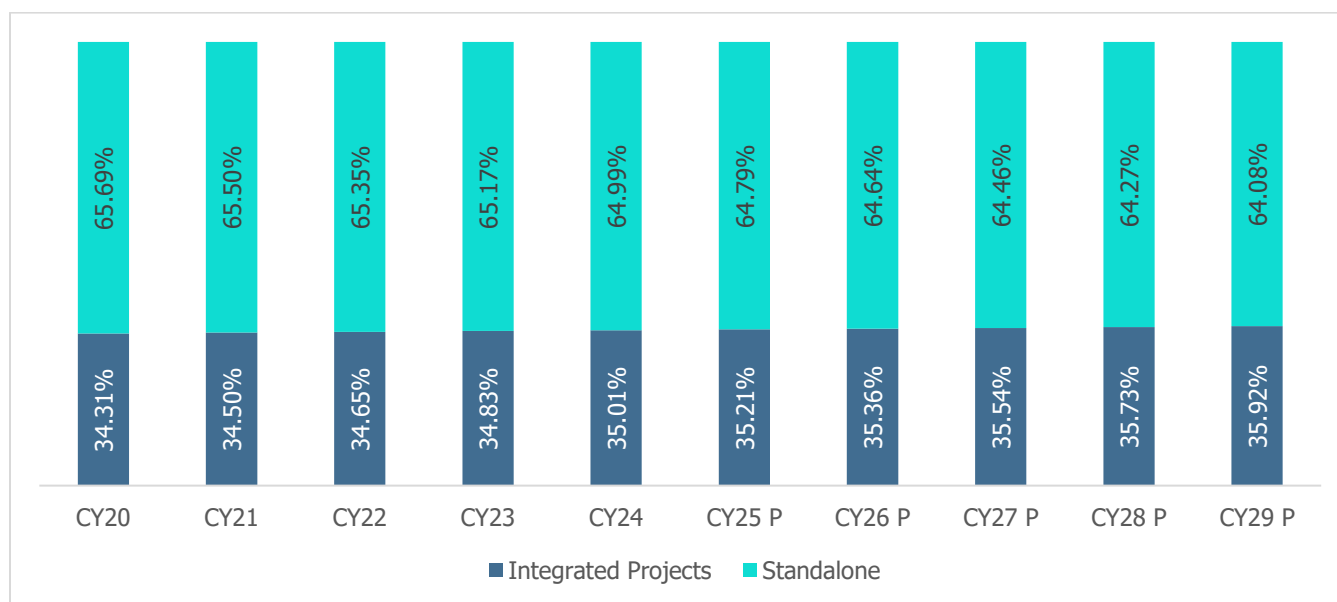
In contrast, offshore drilling is far more capital-intensive and technically challenging. The smaller number of wells around 2,673 reflects the substantial investments required for offshore rigs, subsea equipment, and extended project timelines. Offshore wells are typically fewer but often deeper and more complex, with each well requiring more resources and time to complete. Despite the lower number of wells, offshore drilling remains a critical component of the global energy supply due to the large reserves available, particularly in deepwater and ultra-deepwater fields. The limited number of offshore wells is also influenced by stringent environmental regulations and the operational risks posed by harsh marine conditions.

4.5 Segment-wise bifurcation of drilling services and integrated drilling services

The global drilling services industry is gradually transitioning from a predominantly standalone service model to a more integrated approach. In 2020, standalone drilling services accounted for nearly two-thirds of the global market, while integrated drilling projects represented about one-third. Standalone services typically involve contracting individual drilling activities such as rig operation, directional drilling, or logging, where the operator manages multiple service providers independently. However, as the complexity of drilling operations has increased, particularly in deepwater, ultra-deepwater, and unconventional reservoirs, the limitations of this fragmented model have become more apparent.

Integrated drilling projects, by contrast, bring together a comprehensive set of services under a single contract, covering well planning, rig operations, drilling fluids, completions, and in some cases production testing. This approach provides significant benefits in terms of operational efficiency, reduced project delays, streamlined vendor management, and improved risk allocation between operators and service providers. As a result, integrated projects have seen a steady rise in adoption, moving from 34.3% of the market in 2020 to more than 35% by 2024, and are projected to exceed 36% by 2030.

Chart 40: Percentage of contracts for standalone and integrated projects within the Global drilling industry (Onshore)- -Years in CY



Source: Maia Research, CareEdge Research

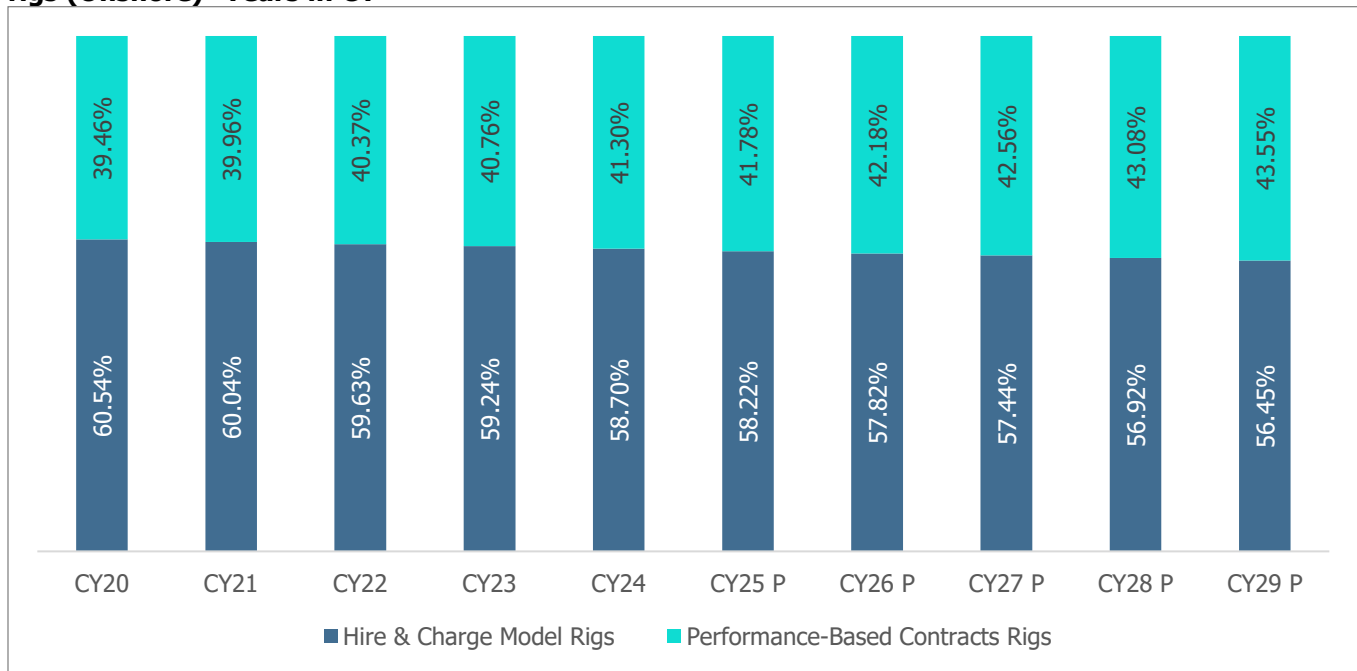
4.6 Segmentation of contracts based on hire-and-charge models versus performance-based rigs

The contracting landscape in the global drilling industry is witnessing a gradual but clear shift from traditional hire-and-charge models toward performance-based contracts. Historically, hire-and-charge models dominated the market, accounting for over 60% of drilling contracts in 2020. In this model, operators hire rigs and associated services at a fixed daily or hourly rate, with the contractor’s revenue primarily tied to equipment usage rather than project outcomes. While this approach provides predictability in terms of cost structure, it often leads to inefficiencies, as contractors have little incentive to accelerate project timelines or optimize performance beyond baseline requirements.

In contrast, performance-based contracting has steadily gained ground, rising from 39.5% of the market in 2020 to over 41% by 2024, with projections indicating that it will account for nearly 44% of global contracts by 2030. Under this model, contractor payments are directly linked to key performance indicators such as rate of penetration (ROP), non-productive time (NPT) reduction, drilling efficiency, safety compliance, and overall well delivery outcomes. This alignment of incentives encourages service providers to adopt advanced drilling technologies, predictive maintenance, and digital monitoring tools to maximize efficiency and minimize delays.

The growing preference for performance-based rigs is driven by the increasing complexity of drilling operations, particularly in deepwater, ultra-deepwater, and unconventional resource plays, where project costs are high and delays can severely impact returns.

Chart 41: Percentage Insights on the Hire & Charge model rigs and performance-based contracts rigs (Onshore)- Years in CY



Source: Maia Research, CareEdge Research

4.7 Global Drilling Metrics

1> Drilling Activity Scale Metrics:-These metrics serve as fundamental indicators of the scale and intensity of drilling operations at a global or regional level. They offer insights into the overall health of the energy exploration and development sector. A key indicator is the active rig count, differentiated by type such as onshore units or offshore platforms (including jack-up rigs, semisubmersibles, and drillships). Variations in rig numbers provide a

direct measure of market demand for drilling services; for instance, a steady increase in rig activity in a particular region generally reflects heightened exploration and production efforts.

- Total well count is another crucial metric, segmented by location (onshore/offshore) and purpose (exploratory, production, or injection). This data indicates the actual volume of drilling operations and allows for comparative analysis across time periods and geographies, helping identify shifts in exploration priorities. For example, a growing share of development wells might signal a transition from initial exploration to full-scale production in each area.
- Additionally, drilling depth and well configuration indicators such as average well depth and the proportion of horizontal or directional wells, offer a glimpse into the complexity of drilling environments and the technological evolution of the industry. An increase in average depth often indicates depletion of shallow reserves and a move toward deeper formations, while a rising share of horizontal or directional wells suggests the industry's growing reliance on advanced, high-efficiency extraction techniques.

2> Drilling Efficiency Indicators: These indicators focus on the operational speed, technological capability, and overall performance efficiency during drilling. Rate of Penetration (ROP) measuring the length of wellbore drilled per unit of time is a core metric that reflects the effectiveness of drilling practices. A higher ROP implies faster well completion, lower time-related expenses, and improved utilization of drilling technology and optimization techniques (such as bit design and drilling fluid management).

- The **drilling cycle**, or the total time required to complete a single well (including subsequent steps like cementing and logging), serves as a comprehensive indicator of process efficiency. Shorter cycles suggest effective planning, upgraded technologies, and streamlined workflows, while prolonged durations may point to equipment issues, complex formations, or managerial inefficiencies.
- **Rig utilization rate**, which compares the number of rigs in operation to the total available fleet, assesses the saturation or underutilization of equipment. A high utilization rate implies strong demand and tight supply conditions that can drive up service costs. Conversely, low utilization reflects weak market activity and could lead to increased competition among service providers.

3> Cost and Economic Performance Indicators:-These indicators are crucial for evaluating the financial viability of drilling projects and guiding investment decisions.

- **Cost per well** which includes equipment rental, labor, consumables (e.g., drill bits, fluids), and technical services (e.g., logging, casing, and transportation), varies widely between onshore and offshore operations. Offshore drilling, for instance, typically entails much higher costs. Monitoring these figures helps companies gauge project profitability and make informed strategic choices.
- The **cost structure breakdown** reveals the percentage contribution of each cost component to the overall budget. Identifying dominant cost drivers enables companies to focus on targeted savings—e.g., negotiating long-term equipment rental deals or investing in automation to reduce labor dependence. A rising share of labor costs may encourage a shift toward digital and autonomous drilling technologies for greater efficiency.

4> Safety and Environmental Performance Indicators: -These indicators assess operational safety standards and environmental stewardship in drilling activities, reflecting industry compliance and commitment to sustainability.

- **Incident rates**, including equipment malfunctions and blowouts resulting in injuries or asset loss, are typically measured per thousand wells or per million work hours. Low incident rates indicate strong safety protocols, reduced operational risk, and enhanced workforce protection.

- **Environmental compliance** metrics cover the management and disposal of drilling waste, including wastewater, exhaust gases, and solid materials such as cuttings. In addition, **greenhouse gas emissions**, notably methane, are tracked to evaluate a project's environmental footprint. High compliance rates and reduced emissions are increasingly important as industry aligns with global climate goals and regulatory requirements. They also foster the adoption of green technologies, such as biodegradable drilling fluids and carbon capture systems, which enhance both environmental performance and corporate reputation.

5> Resource Potential and Output Efficiency Indicators:-These metrics link drilling operations with the practical outcomes of energy production, helping quantify the real-world value generated by exploration efforts.

- The exploration well success rate, defined as the proportion of wells that identify commercially viable reserves, is a primary indicator of geological potential. Higher success rates signal favorable exploration conditions and can attract further investment to the region.
- The **production efficiency rate** of development wells measures the ratio of actual output (e.g., daily oil or gas flow) against the designed production capacity. A high compliance rate shows that the well design and technology choices are effectively aligned with the resource characteristics, supporting consistent energy supply. Lower-than-expected output may prompt reevaluation of drilling parameters or reservoir modeling.
- The **reservoir penetration rate** assesses the extent to which drilling successfully intersects targeted oil- or gas-bearing formations. This is expressed as the actual penetration achieved versus the planned design. High penetration rates reflect strong geosteering, accurate seismic data interpretation, and precise drilling control, reducing wasted efforts and maximizing resource extraction.

4.8 Drilling Revenue to Costing

In 2024, the drilling industry reported an average Revenue to Costing (R/C) ratio of 1.38, indicating that for every USD 1 spent on drilling operations, the industry generated USD 1.38 in revenue. This healthy margin suggests overall operational efficiency and profitability in the sector. An R/C ratio above 1.0 typically reflects a financially sustainable model where revenues not only cover operating costs but also contribute to margins, reinvestment, and debt servicing.

Several factors likely contributed to this favorable ratio. These include rising global energy demand, improved oil and gas prices, and enhanced operational efficiencies through the use of advanced drilling technologies such as horizontal drilling, automation, and real-time data monitoring. Additionally, optimized resource allocation, better project planning, and cost control measures helped maintain a balanced cost structure. In certain regions, favorable government policies and increased exploration activity may have also contributed to higher returns relative to expenses.

4.9 Aspects of Drilling Industry

The global drilling sector is a vital part of oil and gas exploration and development, directly mirroring the health and technological progress of the broader energy industry. Having navigated various market fluctuations, the industry is now moving towards greater efficiency, intelligence, and sustainability, resulting in a complex and diversified environment.

Onshore Drilling Focus: Onshore drilling continues to be the backbone of the global oil and gas supply, shifting its focus from expanding volume to enhancing quality and operational efficiency. The rise of unconventional resources like shale oil and gas has transformed onshore drilling, with horizontal drilling and multi-stage fracturing becoming widespread methods that greatly boost single-well production.

Technological Enhancements in Onshore Drilling: Service providers and drilling contractors prioritize technological improvements, such as advanced drill bit designs, enhanced drilling fluids, and automation to increase drilling speed (ROP), reduce cycle times, and cut costs. Activities remain concentrated in resource-rich regions including North America, the Middle East, and Russia, with the industry adopting more disciplined capital management and emphasizing asset value over rig count expansion.

Offshore Drilling Landscape: Offshore drilling is considered the technological frontier and holds significant future potential, characterized by large-scale, long-term, and technically demanding projects. There is a clear divide between shallow-water projects, which focus on cost efficiency and standardized equipment, and deepwater/ultra-deepwater operations, which drive innovation with cutting-edge technologies.

Advanced Offshore Technologies: Modern drillships and semi-submersibles feature advanced dynamic positioning, enhanced drilling tools, and improved safety systems to handle harsher conditions and complex geology. Key offshore drilling areas include Latin America's pre-salt basins, West Africa, the North Sea, and the Gulf of Mexico, where major discoveries continue to attract investment.

Strategic Importance of Offshore Drilling: Offshore drilling's strategic importance lies in its capacity to develop large reservoirs and ensure long-term energy supply, though it faces challenges in managing costs and technical risks.

Digital Transformation in Drilling: Automation, big data, and AI are revolutionizing drilling operations by enhancing precision and efficiency. Real-time data transfer and remote monitoring enable expert teams to support multiple sites globally. Intelligent drilling systems automatically adapt parameters based on downhole conditions, optimizing the drilling path, improving safety, and minimizing downtime.

Environmental and Sustainability Focus: Environmental, social, and governance (ESG) concerns are steering the industry toward greener technologies, focusing on methane emission reductions, better waste handling, and lowering carbon footprints. These advancements not only boost operational performance and safety but also help transition the industry toward sustainability.

Supply Chain Stability: Reliable supply chains and skilled workforce development are essential for ongoing industry growth. Drilling requires specialized equipment and services, so supply chain stability significantly affects costs and efficiency. Recent trends emphasize building resilient, localized supply chains to reduce geopolitical and market risks.

Talent Development Challenges: There is a shortage of experienced drilling professionals, making recruitment, training, and retention critical challenges. Companies are investing heavily in workforce development, knowledge management, and digital tools to lessen dependence on individual expertise and ensure knowledge continuity.

4.10 Capex in Drilling Industry

In 2024, the drilling industry is projected to record a capital expenditure (Capex) of approximately USD 3,48,100 million, highlighting the sector's continued commitment to expansion and modernization.

The high level of Capex is being driven by several factors. A large share of investment is flowing into onshore drilling operations, where growing demand for natural gas, petrochemicals, and industrial feedstock is spurring new exploration and well development. Companies are prioritizing technological advancements in automation, digital monitoring, and advanced rig design to improve efficiency, reduce downtime, and enhance well productivity. The development of unconventional onshore resources, including shale oil and gas, is also attracting significant funding, supported by the need for diversified and secure energy supply. At the same time, investments are increasingly

directed towards sustainability initiatives, such as low-emission drilling equipment, water management systems, and methane reduction technologies, aligning operations with global energy transition goals. Additionally, geopolitical dynamics and the rising emphasis on domestic energy security are reinforcing the focus on onshore exploration and production.

Overall, this sizeable Capex reflects a strategic shift toward strengthening onshore capabilities, improving technological resilience, and meeting global energy demand through cleaner, more efficient drilling practices.

4.11 Global Demand and Supply for Drilling Industry

1> Demand Side: The global demand for drilling is primarily influenced by factors such as energy consumption patterns, fluctuations in oil prices, energy security strategies, and the advancement rate of alternative energy sources. At its core, overall energy demand, which drives drilling activity, hinges on the pace of global economic recovery and the intensity of economic growth.

- Despite accelerated efforts toward energy transition, oil and natural gas still remain the dominant energy sources worldwide, especially in sectors like industrial manufacturing and transportation. Heightened concerns over energy security have pushed many nations to prioritize boosting domestic oil and gas output, which directly stimulates drilling demand.
- A notable trend is that while drilling demand in developed economies has grown modestly, rapidly expanding developing countries, fueled by their robust economic growth and surging energy needs, have emerged as the main engines of demand expansion.
- Regional demand patterns differ as North America predominantly focuses on unconventional oil and gas extraction, whereas the Middle East continues to emphasize large-scale conventional oil and gas developments.
- Demand for deepwater and ultra-deepwater drilling has also seen a strong resurgence recently, driven largely by cost efficiencies achieved through technological advancements and approvals of several major deepwater projects.

2> Supply Side: The drilling industry's supply capabilities are mainly reflected in three aspects, the availability of drilling rigs, skilled professionals, and technical services. The global rig count has shifted from an oversupply situation toward a more balanced state. According to Baker Hughes' 2023 data, the number of active rigs worldwide has rebounded sharply from pandemic lows but still falls short of historical highs, indicating a more measured and rational supply environment.

- There are clear structural disparities in rig availability such as new-generation, high-spec rigs especially deepwater drillships and ultra-deepwater semisubmersibles which remain scarce, pushing day rates higher. Meanwhile, aging rigs are gradually being retired.
- On the talent front, the industry faces a generational gap, with a growing shortage of seasoned drilling engineers, geologists, and technicians, which somewhat limits the pace at which drilling operations can expand.
- In terms of technical services, the top oilfield service giants such as Schlumberger, Halliburton, and Baker Hughes, continue to dominate the premium market segment, but specialized firms are gaining traction in niche regional markets and specific technical fields.
- Supply chain challenges also pose significant hurdles; longer lead times and rising prices for critical equipment and materials, such as drill bits, drilling fluids, and downhole tools, are impacting drilling efficiency and project timelines.

3> Supply-Demand Balance and Market Dynamics: The current drilling market is characterized by a simultaneous recovery in demand and a cautious, constrained supply response. While drilling demand continues to rebound, suppliers have adopted a prudent approach, focusing less on fleet expansion and more on optimizing the utilization and productivity of existing rigs. This measured supply strategy has maintained a relatively tight balance between supply and demand, supporting steady upward pressure on day rates and service fees.

- Regionally, market dynamics show notable variation. Drilling activity remains particularly robust in Latin American deepwater projects, Middle Eastern onshore operations, and North American shale plays, creating tight supply–demand conditions. In contrast, several other regions have experienced a more gradual recovery.
- The ongoing global energy transition is influencing industry investment decisions, with investors increasingly prioritizing project economics and carbon footprint considerations. This shift is prompting drilling firms to accelerate technological innovation and enhance operational efficiency to lower costs and reduce environmental impacts.

Overall, this dynamic interplay between demand and supply will continue to shape profitability and strategic investment directions within the drilling sector.

4.10 Key Trends in Global Drilling Industry

1> Deep Integration of Automation and Digital Technologies: Smart drilling systems are increasingly becoming the industry norm. By combining sensor networks with real-time data analytics platforms, these systems enable automated fine-tuning and adjustment of drilling parameters. The precision of Measurement While Drilling (MWD) and Logging While Drilling (LWD) technologies continues to advance, offering more accurate subsurface data that enhances geosteering and wellbore trajectory control. The growing implementation of automated drilling rig systems significantly lowers manual intervention requirements while boosting operational safety and productivity. Digital twin technology is now being introduced across drilling stages, creating virtual models to optimize planning and forecast potential risks. Additionally, drilling software platforms are broadening their functionalities, facilitating the integration and collaborative analysis of diverse geological and engineering data sets. Together, these technological innovations are driving a shift toward intelligent, precise, and efficient drilling operations.

2> Shift Toward Deepwater, Ultra-Deepwater, and Unconventional Resource Exploration: Offshore drilling is progressively advancing into greater depths, with drilling equipment and techniques continuously pushing operational limits. The engineering complexity of deepwater drilling systems has grown substantially, increasing demands on subsea wellhead devices and blowout preventers. Technologies for developing unconventional oil and gas resources have matured, with long-horizontal well drilling and multi-stage fracturing becoming standard practice. The geological environments encountered are growing more challenging, creating higher demand for drilling technologies capable of operating in high-temperature, high-pressure formations. Efforts to boost production and exploit mature fields are intensifying, leading to widespread use of sidetracking and precision infill drilling methods. Though extreme environment drilling technology is evolving, commercial-scale application still faces significant obstacles. This trend is steering drilling technology toward greater specialization and refinement.

3> Emergence of Specialized Collaboration Models in Industry Operations: Oil and gas firms are increasingly concentrating on their core competencies, outsourcing drilling activities to specialized service companies. Drilling contractors are evolving into integrated turnkey service providers, expanding their scope from basic drilling to delivering comprehensive solutions. Collaborative supply chain management has become critical, with drilling contractors forming close technical alliances with equipment manufacturers. Workforce development is undergoing structural shifts, with digital literacy and cross-disciplinary knowledge becoming essential for drilling

professionals. Health, safety, and environmental (HSE) standards are being elevated, prompting drilling companies to invest more heavily in safety system enhancements and employee training programs. These innovations in collaborative industry models have notably enhanced operational efficiency.

4> Green Transformation Driven by Sustainability Requirements: Environmental standards for drilling operations are becoming increasingly stringent, particularly concerning waste disposal and emission controls. The deployment of low-carbon technologies, such as electric-powered drilling rigs, is gradually increasing, effectively reducing the environmental impact of drilling activities. Advances in water management have significantly boosted the recycling rates of drilling fluids. Noise mitigation technologies are more widely adopted, minimizing disturbances to surrounding ecosystems. Environmental monitoring systems have improved, allowing for quantitative evaluation of ecological impacts throughout drilling processes. Social responsibility considerations are now integral to drilling projects, with ongoing improvements in community engagement and benefit-sharing frameworks. These developments are pushing the drilling sector toward a more sustainable and eco-friendly future.

5> Evolving Market Structure with Distinctive Features: Regional demand patterns within the global drilling market are becoming increasingly pronounced, with activity levels varying widely between areas. The upgrade pace for drilling equipment is accelerating, with high-end, advanced rigs capturing a growing share of the market. The competitive landscape of drilling services is shifting, favoring firms with proprietary technologies and specialized expertise. Pricing strategies for day rates are becoming more flexible and diverse, emphasizing the importance of long-term strategic partnerships. Supply chains are becoming more localized, with an increased focus on regional procurement and support services. Workforce allocation models are being optimized continuously, and remote technical support centers are playing an increasingly vital role. These structural changes are reshaping competition within the drilling industry.

6> Diversification of Development Paths Amid Energy Transition: While traditional oil and gas drilling remains foundational, it faces continuous pressure to enhance efficiency and reduce costs. Emerging sectors, such as geothermal drilling, are opening new growth opportunities and broadening the applications of drilling technology. Carbon capture and storage (CCS) drilling is gaining traction, offering a fresh avenue for industry transformation. Integration and innovation across drilling and other energy technologies are accelerating, leading to novel technical solutions. Investment decisions are evolving, with lifecycle carbon emissions becoming a critical factor. The focus of technological innovation is gradually shifting toward low-carbon solutions and improved energy efficiency. This diversified trajectory presents both new challenges and opportunities for the future of the drilling industry.

4.11 Growth Drivers

1> Sustained Increase in Energy Demand: The ongoing rise in global energy demand serves as the primary catalyst for the expansion of the drilling industry. As the world's population grows and economies develop especially with the rapid industrialization of emerging nations—the appetite for energy intensifies. Despite the rapid advancement of renewable energy, fossil fuels such as oil and natural gas remain the cornerstone of the global energy supply. According to the International Energy Agency, fossil fuels will continue to dominate energy consumption worldwide for many years ahead. This enduring energy demand underpins the sustained relevance of the drilling sector.

- Regionally, Asia particularly fast-growing economies like China and India is spearheading global energy consumption growth. These countries are experiencing swift urbanization and industrialization, which drives demand for energy to support infrastructure expansion, manufacturing growth, and improved living standards. While energy consumption growth in developed nations has slowed, their large economies ensure their absolute demand remains significant. This global surge in energy requirements directly fuels investment in oil and gas exploration and development, thereby propelling the drilling industry forward.

- Energy security concerns also play a crucial role in stimulating drilling activity. Many nations prioritize energy self-sufficiency as a vital element of national security, prompting them to invest heavily in the exploration and production of domestic oil and gas resources. Even when economic factors are unfavorable, governments often back drilling initiatives through supportive policies or financial incentives, ensuring steady activity levels even during market downturns.

2> Rapid Industrialization and Urban Expansion in Emerging Markets: Countries like China, India, and Brazil have witnessed accelerated industrial growth and urbanization recently, which has not only boosted their economies but also generated substantial energy demand. This expansion creates a significant market opportunity for the global drilling industry. For instance, China's rapid industrial transformation over the past decades has positioned it as one of the leading manufacturing powerhouses globally. This growth has substantially increased energy consumption, especially for oil and natural gas in chemical and energy sectors. Urbanization further intensifies energy demand through infrastructure projects, housing development, and increased urban living needs like heating, electricity, and transportation.

- Similarly, India's ongoing industrial and urban growth, driven by its large population and government initiatives promoting infrastructure and manufacturing, is rapidly expanding its energy requirements. This creates fresh prospects for drilling companies to meet rising oil and gas demands.
- Brazil's vast natural resources combined with its expanding economy have prioritized oil and gas exploration, particularly in deepwater reserves, which demand advanced drilling technology and equipment.
- The pace of industrialization and urbanization in these markets also boosts the construction of essential energy infrastructure pipelines, refineries, and related facilities all requiring extensive drilling operations. These investments fuel the drilling sector's expansion by opening new avenues for growth.

3> Focus on Deepwater and Unconventional Hydrocarbon Resources: As conventional onshore oil and gas fields face depletion, attention has shifted to deepwater and unconventional resources, unlocking fresh growth prospects for the drilling sector. Deepwater reserves are abundant but pose significant technical hurdles such as high pressure, cold temperatures, and challenging seabed geology. Extracting these resources demands highly advanced platforms capable of withstanding harsh marine conditions, as well as sophisticated drilling and monitoring technologies. Continuous innovation has lowered costs and enhanced efficiency, making deepwater projects more viable and stimulating growth within this segment of the industry.

Unconventional sources like shale gas, coalbed methane, and oil sands have also gained momentum. The U.S. shale gas revolution exemplifies the success of specialized techniques such as horizontal drilling and hydraulic fracturing, which have unlocked previously inaccessible reserves. These challenging resources require superior technology and skilled expertise, prompting drilling companies to enhance their technical capabilities and service quality to meet these demands effectively.

4> Government Prioritization of Energy Security: Considering global energy market volatility and geopolitical tensions, governments worldwide are increasingly prioritizing energy security as a strategic imperative. This focus positively impacts drilling activity by encouraging exploration and development efforts. Governments are implementing policies to promote domestic oil and gas exploration, offering incentives and support to industry players. Simultaneously, investments in energy infrastructure such as pipelines and distribution networks are being accelerated to ensure reliable energy delivery, thereby boosting demand for drilling services.

- Energy diversification is also a key governmental strategy. While renewable energy development is encouraged, fossil fuel exploration continues to receive attention to maintain energy stability. For example, European nations are advancing wind and solar projects while simultaneously developing oil and gas resources in the North Sea, creating sustained opportunities for drilling companies.

- At the same time, regulatory frameworks emphasize environmental protection and operational safety. Strict standards require drilling companies to adopt eco-friendly practices, such as utilizing sustainable drilling fluids and improving waste management, while enhancing safety protocols and equipment maintenance. These requirements drive investment in advanced technologies and support the industry's move towards sustainable and safer operations.
- Government focus on energy security will continue to shape the drilling industry's trajectory. Policy backing, diversification efforts, and stringent environmental and safety regulations will create both challenges and opportunities. To remain competitive, drilling companies must stay attuned to policy shifts, adapt to evolving market needs, and consistently upgrade their technological and service capabilities.

4.12 Market Challenges in the Drilling Industry

1> Stringent Environmental Regulations and Ecological Limitations: Tightening environmental policies worldwide has become a major hurdle for the drilling industry's expansion. As climate change concerns intensify and public environmental awareness grows, governments have implemented more rigorous standards regarding environmental permits, pollutant discharge limits, and ecosystem restoration requirements for drilling operations. These regulations have notably increased project costs, extended approval timelines, and in some cases, forced the suspension of promising projects due to environmental risks.

- The offshore drilling segment faces particularly stringent ecological restrictions. Regulatory bodies have set comprehensive rules on managing drilling fluid discharge, handling drill cuttings, and treating oily wastewater. For instance, during the approval of China's Kenli 6-1 oilfield project, authorities mandated that oily drilling fluids and cuttings be transported onshore for proper treatment; oily produced water must be reinjected after meeting standards; domestic sewage must be treated before discharge; and discharge rates must be limited during critical fish spawning seasons. Compliance with these mandates requires significant investments in environmental control technologies, waste management infrastructure, and dedicated monitoring teams, which imposes a substantial financial burden on smaller and mid-sized drilling firms.
- Restrictions on operations in ecologically sensitive zones further limit growth opportunities. Regions like the Arctic, deep oceans, and tropical rainforests are rich in hydrocarbon resources but are also vital ecological preserves. To protect biodiversity, many countries have banned or severely restricted drilling activities in these fragile environments. For example, the European Union prohibits new oil exploration in Arctic waters, and the U.S. enforces drilling bans in protected areas of Alaska. Even outside these zones, extensive environmental impact assessments—often spanning several years—are mandatory before project approval, slowing down industry responsiveness to market dynamics and limiting short-term expansion prospects.
- Legal liabilities related to environmental risks are also escalating, adding pressure on the industry to adhere to stricter environmental stewardship.

2> Technical Challenges in Complex Formations: With conventional onshore oil and gas reserves declining, the drilling industry is increasingly moving into challenging environments such as deepwater, ultra-deep wells, and unconventional formations. However, these areas present substantial technical obstacles that constrain industry growth. Complex geological conditions—characterized by extreme pressure, high temperatures, high sulfur content, and fractured rock—pose difficulties for traditional drilling technologies. These challenges result in reduced drilling efficiency, elevated operational risks, and the potential for severe accidents.

- One of the most critical technical issues is lost circulation, where drilling fluids leak into the formation without returning to the surface. Effective solutions remain elusive, and current treatments depend heavily

on engineering judgment. Identifying the precise leaking zones is difficult, and plugging materials must balance contradictory properties—fluidity to enter fractures smoothly and rapid solidification to seal leaks posing significant material science and engineering challenges. When these leak zones coincide with high-pressure gas formations or unstable sections, maintaining an optimal drilling fluid pressure—referred to as the "narrow safe density window" is extremely complex. Excessive pressure risks fluid loss, while insufficient pressure can cause blowouts or formation collapse, complicating well control.

- Additionally, maintaining casing integrity and precise wellbore trajectory control in deep and ultra-deep wells is a major concern. Increasing temperature and pressure weaken traditional casing materials, making them susceptible to deformation and cracks that can cause well failure. Directional and horizontal drilling in complicated formations requires exceptional precision; any deviation may lead to missed reservoirs, wellbore collapse, or stuck pipe incidents. Although advanced technologies like the Very Deflection-Free Fast Drilling System (VDS) and Narrow Safe Density Window (NDS) drilling systems have been developed, their high costs and unproven reliability under extreme conditions limit widespread adoption.
- These technical barriers significantly increase drilling costs in difficult formations. Companies must heavily invest in R&D for new equipment, materials, and operational methods, alongside comprehensive staff training. This financial burden disproportionately affects small and medium enterprises. Moreover, extended drilling durations and operational delays inflate project costs and reduce returns, making some resources economically unfeasible to develop and restricting overall industry growth.

3> Geopolitical Risks and Regional Instability: The global drilling sector is deeply influenced by the geographical distribution of oil and gas reserves, many of which lie in politically unstable or geopolitically sensitive regions. Such instability significantly hampers industry growth by threatening operational safety, regulatory compliance, and economic viability. Geopolitical risks include interstate conflicts, abrupt policy shifts, civil unrest, and international sanctions all of which introduce operational uncertainties and financial risks.

- Several resource-rich regions face persistent political turbulence and social unrest, jeopardizing the safety of personnel and infrastructure. For example, ongoing conflicts and terrorist activities in the Middle East and North Africa have forced temporary shutdowns of drilling operations, equipment damage, and even loss of life. Even periods of calm can be fragile, requiring companies to invest heavily in security measures like private protection services and explosion-proof installations, thereby driving up operational expenses. Additionally, conflict-induced disruptions in supply chains delay equipment delivery and reduce efficiency.
- Sudden changes in governmental policies and regulations pose further risks. Resource-endowed countries may unexpectedly revise mining laws, taxation, foreign exchange controls, or impose local content requirements, dramatically impacting project profitability. Bureaucratic inefficiencies and corruption in some jurisdictions add delays and complexity to project approvals, causing companies to miss optimal development windows.
- International sanctions also impact drilling projects spanning borders. Sanctioned nations may lose access to financial services, advanced technology, and global markets, stalling development. Sanctions can further disrupt export channels, resulting in oversupply and reduced investment incentives.

5. Indian Drilling Industry

The drilling industry in India forms a critical backbone of the country's exploration and production (E&P) activities. It spans across oil and gas, coal, minerals, and groundwater, though the largest contribution comes from the hydrocarbon sector. Drilling services involve exploration, appraisal, development, and production drilling operations. It primarily includes onshore and offshore drilling services.

The industry is characterized by three layers of players:

- **Exploration and Production (E&P) Operators** – These are largely government-controlled and private upstream energy producers who own and operate exploration blocks. They typically outsource drilling work to service providers under long-term or project-specific contracts.
- **Domestic Service Providers** – A cluster of Indian companies provide onshore drilling rigs, manpower, and integrated well services. These firms often specialize in contract drilling, workover rigs, and allied services like directional drilling, mud logging, and cementing.
- **International Technology Leaders** – A few global players participate in the Indian market, bringing advanced technologies such as deepwater rigs, high-pressure high-temperature (HPHT) drilling, and digital solutions for rig management.

The demand for drilling services is cyclical and capital-intensive, closely linked to crude oil and natural gas prices, exploration policies, and government initiatives. Periods of high oil prices usually result in increased drilling activity, while downturns lead to delays in exploration campaigns and rig mobilization. Government policies such as the Hydrocarbon Exploration and Licensing Policy (HELP) and the Open Acreage Licensing Policy (OALP) have encouraged private and foreign investment in upstream exploration, directly boosting the need for drilling services. Furthermore, India's stated goal of reducing import dependence on crude oil and natural gas has placed additional emphasis on drilling activities in unexplored and frontier basins.

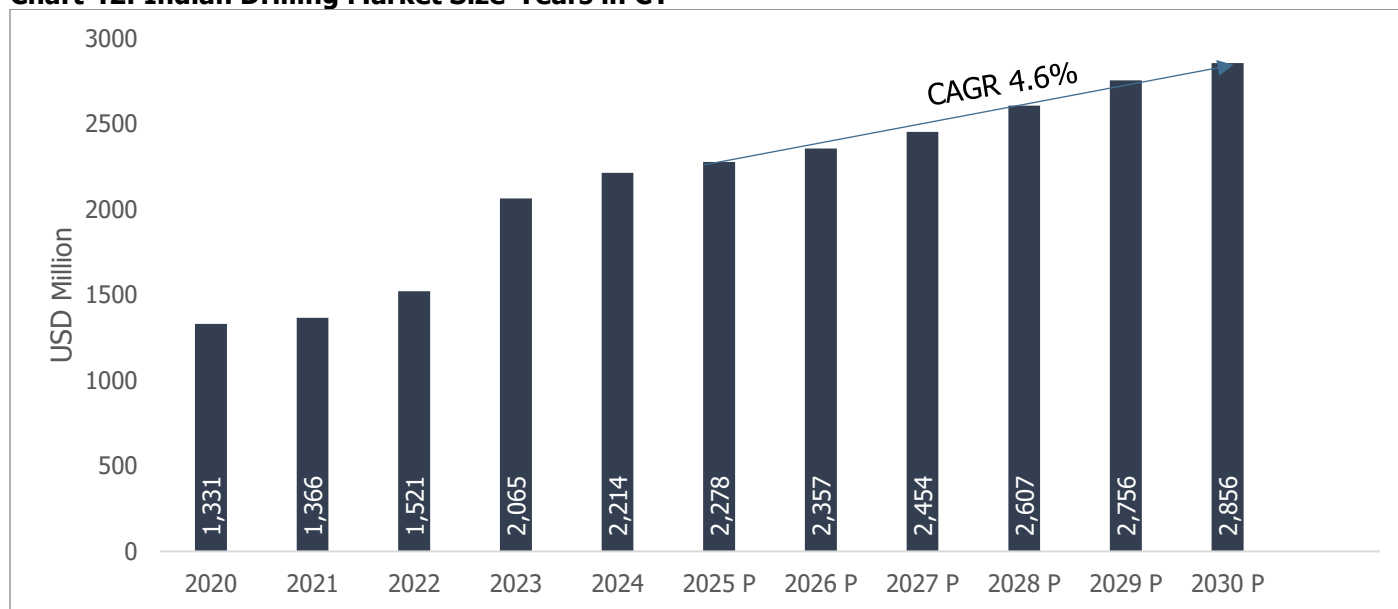
Technological advancements are also reshaping the industry. The adoption of directional and horizontal drilling, automated rigs, and advanced well control systems is enhancing operational efficiency and reducing downtime. Moreover, the integration of digital monitoring and predictive maintenance is expected to increase rig utilization rates and improve safety standards. However, the industry faces challenges in the form of volatile global energy prices, high operating costs, and regulatory delays. In addition, the majority of India's drilling fleet is aging, which creates pressure for modernization and technology adoption.

5.1. Indian Drilling Market Size

The Indian drilling services market has witnessed significant fluctuations over the past decade, reflecting the cyclical nature of the energy sector. The market size expanded from USD M 1,331 in 2020 to USD M 2,214 in 2024, representing a compound annual growth rate (CAGR) of 13.5% during this period.

The sharp increase in 2023 was mainly due to the rebound in exploration activity post-pandemic, coupled with a favourable crude oil price environment and renewed government auction of exploration blocks. Looking ahead, the market is projected to grow steadily to USD M 2,856 by 2030, at a CAGR of 4.6% between 2025-2030.

Chart 42: Indian Drilling Market Size-Years in CY



Source: Maia Research, CareEdge Research

5.2 Segmentation into onshore and offshore drilling market

The Indian drilling industry can broadly be segmented into onshore drilling and offshore drilling, each with distinct characteristics, investment requirements, and operational challenges. Onshore drilling accounts for the largest share of India's drilling activity, both in terms of the number of wells drilled and the volume of rigs deployed. The majority of India's sedimentary basins lie onshore, spread across regions such as Assam-Arakan, Cambay, Krishna-Godavari (onshore part), and Rajasthan.

Key characteristics of the onshore segment include:

- Lower capital intensity compared to offshore drilling, making it more accessible for domestic service providers.
- Faster turnaround times for exploration and production activities, with relatively lower drilling and operational costs.
- Strong focus on development drilling in producing basins, alongside new exploration activity under the OALP rounds.
- Onshore drilling also supports unconventional resources such as coal bed methane (CBM) and shale gas, which are gaining importance in India's energy diversification plans.

Despite its dominance, onshore drilling often faces land acquisition hurdles, environmental clearances, and socio-economic challenges in resource-rich states, which can delay project timelines.

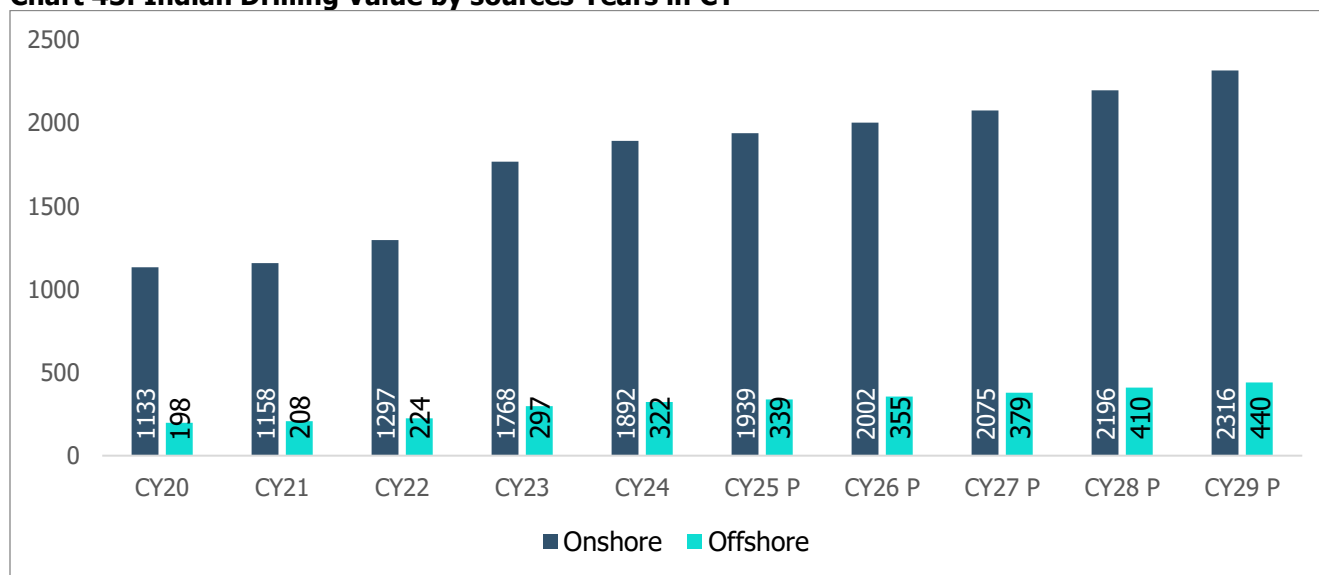
Offshore drilling, while smaller in terms of the number of rigs compared to onshore, contributes significantly to India's crude oil and natural gas output, especially from the Mumbai High basin and the Krishna-Godavari deepwater blocks. This segment involves shallow water, deepwater, and ultra-deepwater drilling, with deepwater exploration gaining strategic importance as onshore basins mature.

Key characteristics of the offshore segment include:

- High capital intensity and technological requirements, making it largely dependent on advanced rigs and international expertise.
- Longer project timelines but larger reserve potential per well compared to onshore.
- A major driver of offshore drilling is the growing demand for natural gas, which is abundant in offshore deepwater blocks.
- Offshore drilling has become a focus area for strategic energy security, as deeper reserves are increasingly being tapped to offset import dependence.

Challenges in offshore drilling include high operating costs, logistical complexities, and safety risks, particularly in deepwater environments. Nevertheless, it remains an essential growth frontier for India’s hydrocarbon production.

Chart 43: Indian Drilling Value by sources Years in CY



Source: Maia Research, CareEdge Research

India’s drilling market continues to be dominated by onshore operations, which accounted for over 85% of total market size in 2020 and is projected to maintain a strong lead through 2030. This growth is supported by sustained activity in mature producing basins, enhanced recovery techniques, and new exploration rounds under the Open Acreage Licensing Policy. In comparison, offshore drilling, while smaller in size, plays a critical role in India’s hydrocarbon production strategy. Offshore drilling will expand gradually, particularly in deepwater and ultra-deepwater segments, as technological capabilities improve and capital investments increase.

5.3 Onshore and Offshore drilling resource

Items	Descriptions
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<p>Onshore</p>	<p>India has a wide distribution of onshore sedimentary basins, with major oil and gas-bearing basins including the Cambay Basin, the Assam Basin, the onshore portion of the Krishna-Godavari Basin, and the Baramur Basin in Rajasthan. These basins have complex geological structures and diverse reservoir types, ranging from simple anticline structures to complex fault block reservoirs. Onshore oil and gas fields have a long history of development, and many older fields have entered the high-water-cut development stage, making it challenging to increase and stabilize production. Unconventional oil and gas resources hold significant potential, particularly tight gas and shale gas, which are found in multiple basins, but development progress has been relatively slow. Onshore drilling operations face numerous challenges, including complex surface conditions, strict environmental protection requirements, and community relations. Drilling technology requirements primarily focus on improving recovery and reducing operating costs, with horizontal well drilling and side-tracking techniques becoming increasingly popular. Onshore infrastructure is relatively well-developed, with a comprehensive pipeline network and oilfield service facilities, contributing to lower development costs.</p>
<p>Offshore</p>	<p>India's offshore oil and gas resources are primarily concentrated in the Bombay High Basin in western waters and the Krishna-Godavari and Cauvery Basins in eastern waters, as well as in the Bay of Bengal. These areas, with depths ranging from shallow to ultra-deepwater, offer enormous resource potential but present significant development challenges. The Bombay High Basin is India's most important offshore oil producing region, but after decades of development, production from its main oil fields has declined significantly, requiring new development technologies and production-enhancing measures to maintain output. Deepwater exploration and development activities have been active in recent years, with many international energy companies participating in deepwater exploration. However, these activities present significant technical challenges and investment risks. Offshore drilling operations face challenges such as complex marine environments, high technical requirements, and large investments,</p>

	<p>requiring advanced drilling platforms and specialized technical support. Government policies encourage deepwater development, offering fiscal and tax incentives, but project economics remain subject to oil price fluctuations and the ability to control costs. Offshore natural gas resource development is gaining increasing attention, particularly the development of deepwater natural gas fields, which are crucial for meeting domestic energy needs.</p>
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**5.4 Segment-wise bifurcation of standalone drilling services and integrated drilling services
Standalone vs Integrated Projects in the Drilling Industry**

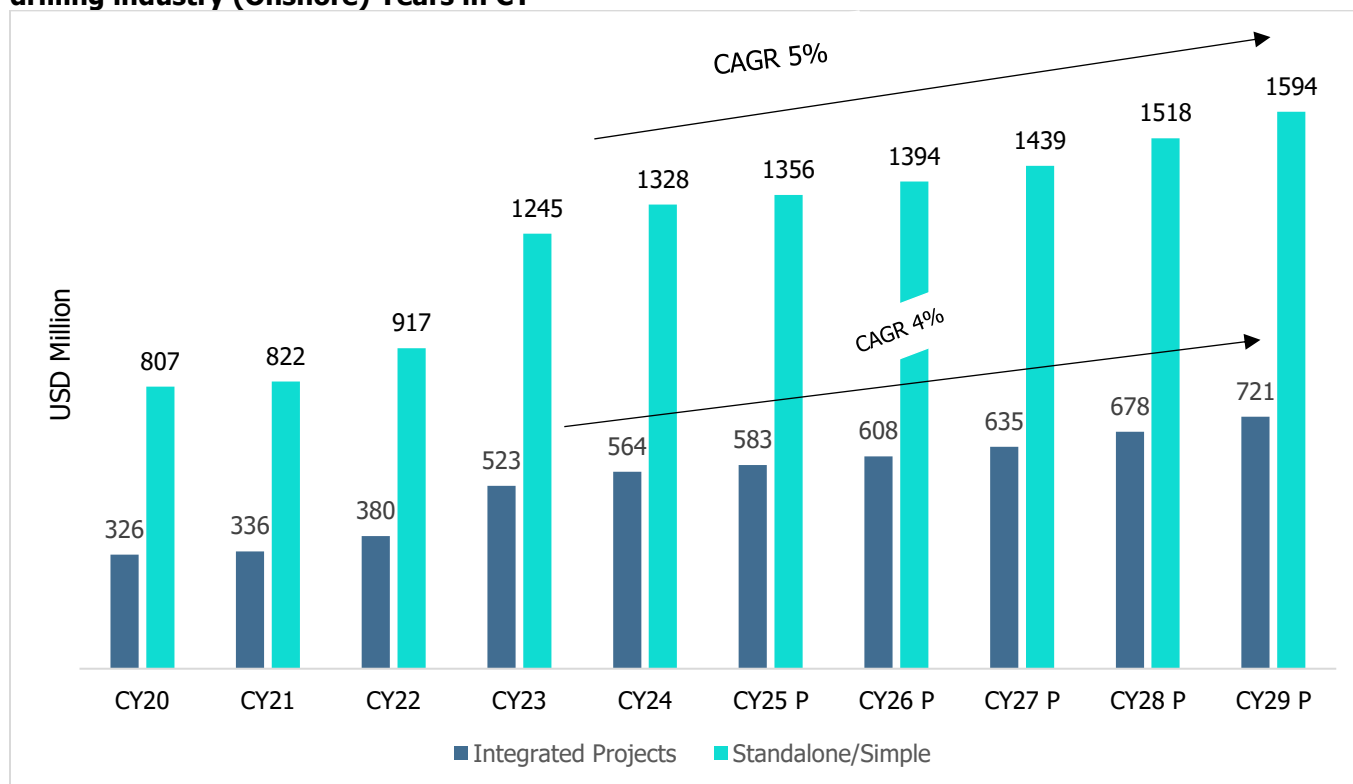
Standalone Projects: Standalone projects are executed as independent, self-contained activities. In this approach, each project phase—such as drilling, operations & maintenance (O&M), or logistics—is managed separately and often by different contractors. Each contractor is responsible for their specific scope, and coordination between phases is handled by the project owner or operator.

Integrated Projects: Integrated projects consolidate multiple related activities—such as exploration, drilling, and O&M—under a single contractor or management framework. The integrated approach ensures seamless coordination across all phases of the project lifecycle.

Comparison of Benefits – Standalone Projects vs Integrated Projects

Category	Benefits of Standalone Projects	Benefits of Integrated Projects
Flexibility	High flexibility to select different contractors for each project phase	Lower flexibility as activities are bundled under one contractor
Specialization	Allows engagement of highly specialized service providers for specific tasks	Integrated contractor ensures consistent expertise across the entire project lifecycle
Cost Control	Costs can be controlled and monitored for each activity separately	Overall cost reductions through economies of scale and unified resource use
Project Customization	Customizable scope for individual phases without affecting others	Seamless alignment of all phases for optimized workflows
Risk Distribution	Risks are distributed among multiple contractors	Single point of accountability enhances risk management efficiency
Operational Efficiency	Efficiency depends on coordination between multiple parties	High operational efficiency due to coordinated planning and execution
Performance Monitoring	Easier benchmarking of contractors for cost, quality, and timeliness	Integrated analytics improve overall performance, uptime, and reliability
Contract Management	Multiple contracts require more oversight from the operator	Reduced administrative burden with a single, comprehensive contract
Technology Adoption	Technology varies by contractor; integration can be challenging	Streamlined adoption of digital tools (predictive maintenance, remote monitoring, etc.) across all phases
Responsiveness	Slower response due to fragmented responsibilities	Faster decision-making and issue resolution through centralized control
Resource Utilization	Each contractor manages its own resources independently	Shared resources across project phases reduce redundancy and cost
Long-Term Lifecycle Value	Limited lifecycle optimization as phases are treated separately	Strong lifecycle value from integrated planning, maintenance, and upgrades

Chart 44: Revenue wise contracts for integrated projects and standalone projects within the India drilling industry (Onshore) Years in CY



Source: Maia Research, CareEdge Research

Integrated drilling revenues in India’s onshore segment have grown strongly from about USD 326 million in 2020 to a projected USD 721 million by 2030, underscoring a decisive shift toward large-scale, turnkey project execution. This strong rise is primarily driven by greater adoption of Integrated Project Management (IPM) models by major operators which prefer single-contract solutions covering drilling, completion, and production services. These integrated contracts enable better cost optimization, reduced coordination delays, and stronger performance accountability, as all key operations are handled by a single service provider rather than multiple fragmented contractors.

In contrast, standalone or simple well drilling contracts which have increased from USD 807 million to about USD 1,594 million during the same period reflect slower and more organic growth, as these contracts are typically limited to specific, smaller-scope services such as individual well drilling or maintenance. Their expansion is mainly supported by continued demand for routine and low-complexity projects in mature onshore fields, but their relative competitiveness has weakened due to limited economies of scale and higher coordination costs.

Overall, the stronger growth in integrated drilling is being fueled by technological advancements, such as real-time data analytics, automated drilling systems, and digital field management tools, which are more efficiently deployed in unified, multi-service project structures. Additionally, policy reforms and tendering preferences, including longer-term, performance-linked contracts have encouraged oilfield service companies to offer bundled solutions. Consequently, the industry is experiencing a structural transformation from fragmented, service-based contracting to holistic, performance-driven models, positioning integrated drilling as the preferred approach for future onshore development in India.

Chart 45: Percentage of contracts for standalone and integrated projects within the Indian drilling industry (Onshore) Years in CY



Source: Maia Research, CareEdge Research

The share of integrated drilling projects within India’s onshore drilling industry has risen steadily from around 28.77% in 2020 to over 31% projected by 2030, reflecting a clear structural shift away from traditional standalone or simple well contracts. While standalone drilling still accounts for a larger absolute value, its relative share is gradually declining as operators increasingly adopt integrated project models that combine drilling, well completion, and production services under unified contracts. This trend is driven by the pursuit of cost efficiency, operational accountability, and faster project turnaround, supported by the growing presence of global service providers offering turnkey solutions. As a result, integrated drilling is progressively taking over the market space once dominated by standalone contracts, signaling a transition toward more collaborative, technology-driven, and performance-linked drilling ecosystems in India.

5.5 Overview of Onshore Drilling Methods and Technologies

The onshore drilling industry utilizes a wide array of technologies tailored to specific geological formations, depths, and project objectives across sectors such as oil and gas exploration, mining, groundwater extraction, and infrastructure development. The most prominent techniques include rotary drilling, percussion drilling, air hammer (Down-The-Hole) drilling, reverse circulation (RC) drilling, auger drilling, sonic drilling, hydraulic fracturing-assisted drilling, and horizontal directional drilling (HDD), among others.

- **Rotary drilling:** It remains the most commonly used method, employing a rotating drill bit to cut through formations while drilling fluid circulates to cool the bit, transport cuttings, and maintain borehole stability. It is ideal for deep wells and widely used in oil, gas, and geothermal projects. Percussion or cable tool drilling, though an older technique, still finds use in shallow wells and hard rock areas, where a heavy tool repeatedly strikes the ground to fracture the rock.
- **Air Hammer Drilling:** It is also known as Down-The-Hole (DTH) drilling, combines rotary motion with a pneumatic percussive hammer located directly behind the bit. Compressed air drives the hammer to deliver high-frequency blows, breaking hard rock formations effectively while simultaneously clearing cuttings from

the borehole. This technology achieves faster penetration rates, cleaner boreholes, and minimal use of drilling fluids, making it highly suitable for hard rock, mining, geothermal, and infrastructure projects like piling, tunneling, and foundation works. Despite its advantages, air hammer drilling requires high-capacity air compressors and is less effective in soft or unconsolidated soils.

- Reverse Circulation (RC) drilling: It is another efficient technique, particularly used in mineral exploration, where dual-walled drill pipes and compressed air lift rock cuttings through the inner tube for faster sampling and reduced contamination. Auger drilling is used for shallow investigations, geotechnical surveys, and environmental monitoring, employing a helical screw to bring cuttings to the surface. Sonic drilling, an emerging technology, uses high-frequency mechanical vibrations to advance the core barrel, providing continuous and undisturbed samples—especially useful for environmental and geotechnical applications.
- Horizontal Directional Drilling (HDD): It is a trenchless technology used in infrastructure projects to install pipelines, cables, and conduits beneath rivers, roads, or urban areas without surface disruption. For unconventional hydrocarbon extraction, hydraulic fracturing-assisted drilling and extended reach drilling (ERD) are applied to access distant or low-permeability reservoirs. Modern onshore drilling also incorporates automation, real-time monitoring, and data-driven systems such as Measurement While Drilling (MWD) and Logging While Drilling (LWD) to optimize drilling performance, safety, and efficiency.

Overall, the evolution of onshore drilling technologies reflects a shift toward precision, speed, and sustainability. Among these, Air Hammer Drilling stands out as a robust and versatile technique, particularly effective in hard rock and infrastructure-related applications, offering superior penetration rates, cleaner boreholes, and operational reliability compared to conventional drilling methods.

5.6 Type of onshore drilling activities

Onshore drilling operations in India are carried out under different contractual and operational models, primarily determined by the nature of the project, risk allocation, and efficiency expectations. The major types of onshore drilling activities include:

Hire-Charter Basis

Under this contract model, a drilling contractor leases its drilling equipment such as drilling rigs, related equipment, and operators to an operator (an oil and gas company) at a fixed rate. The operator pays the lease for an agreed-upon time period typically daily or monthly, without direct consideration for the final drilling results or efficiency. In this arrangement, the operator assumes virtually all operational and subsurface risks. This means the operator must pay the lease based on the time period, regardless of drilling success i.e., oil and gas discovery, drilling progress, or delays due to downhole complications such as stuck pipe, lost circulation, and nonproductive time (NPT). The drilling contractor's primary responsibility is to provide equipment and a technically qualified team that meets the contract specifications and ensures the proper operation of the equipment, but its financial reward is unrelated to drilling performance. This model provides the operator with complete control over drilling operations but also exposes it to the risks of cost overruns and inefficiencies. For the contractor, this offers a low-risk, stable revenue model, but also a relatively fixed profit ceiling.

Performance Basis

A performance-based contract is a model that closely ties the drilling contractor's compensation to final operational performance and efficiency. Under this model, payments to the contractor are no longer based solely on time, but primarily on the degree to which they achieve predetermined key performance indicators (KPIs). These KPIs typically include rate of penetration, well depth, wellbore quality, safety record, and, most importantly, the number of days ahead of or behind schedule. Common variations include a "fee-perfootage" model (payment per meter drilled) or a "turnkey" model, where the contractor commits to drilling a well for a fixed price and a fixed deadline.

Under this model, the drilling contractor bears significant operational performance risk. If they achieve early completion through technological innovation, operational optimization, and excellent management, they receive generous bonuses or higher profits. Conversely, any delays, accidents, or inefficiencies caused by the contractor directly erode profits, or even result in losses. This model shifts risk from the operator to the contractor, providing a strong incentive for the contractor to improve efficiency, reduce nonproductive time, and ensure quality, thus aligning the goals of both parties: completing a well quickly, safely, and economically.

5.7 Benefits of Performance Based Drilling over Charter Hiring of Drilling Rigs

Performance-Based Drilling is an emerging operating model whose core principle is to directly link drilling contractor compensation to pre-agreed key performance indicators, rather than simply paying by time used or footage drilled. This model transforms the contractor from a mere service provider to a solution partner, offering numerous fundamental advantages.

- I. **Risk sharing and interest alignment create a true partnership:** Under the traditional day-rate model, the drilling contractor's financial benefits primarily come from equipment uptime. Regardless of drilling progress or the final results, the contractor receives a stable income as long as the rig is operating. This model leads to misaligned and potentially conflicting interests between the contractor and the operator. The performance-based model radically changes this dynamic. Both parties establish clear goals at the outset of the contract, such as total time to reach the target zone, rate of penetration, wellbore quality, cost control, or final production. The contractor's compensation is determined by the degree to which these goals are achieved. This means that the contractor's success is directly dependent on the operator's success, forming a true strategic alliance with shared risks and benefits. Contractors have a strong internal motivation to optimize every aspect of their operations, proactively applying new technologies, optimizing drilling parameters, and preventing nonproductive time. Any efficiency gains or avoided problems translate directly into their own benefits. This deep alignment of interests transforms adversarial relationships into collaborative ones, which is their greatest advantage.

- II. **The inherent drive for technological innovation and the ultimate pursuit of efficiency:** Performance-based contracts create unprecedented incentives for innovation for drilling contractors. Under the day-rate system, technological innovation is welcome, but the benefits such as time savings primarily accrue to the operator, leaving contractors with little incentive to invest in R&D and assume the risks of new technology adoption. Under the performance-based model, contractors can exceed performance targets through technological innovation, thereby earning excess rewards. This drives contractors to proactively invest in digital technologies, automated equipment, advanced data analytics software, and new drilling tools to enhance their operational capabilities. As a result, the entire operational process shifts from a defensive mindset of avoiding mistakes to an offensive one of proactive optimization, unlocking the maximum potential for drilling efficiency and driving overall technological advancement in the industry.

- III. **Cost Predictability and Maximizing Overall Project Economics:** For operators, performance-based models offer extremely high-cost predictability. Contracts typically employ a lump sum package or "target cost plus incentives/penalties" structure, locking in a maximum development cost budget for a single well or a group of wells, greatly facilitating investment decisions and financial management. While the daily rate may appear higher, it purchases results rather than simply time, and the ultimate unit cost such as per meter drilled is often lower. More importantly, this model strives to maximize overall economic benefits over the entire project lifecycle. Performance indicators can be set not only as drilling related KPIs but can even be linked to the well's initial production rate or long-term recovery rate. This extends the contractor's focus from the short-term drilling phase to the well's long-term production value. Contractors will place

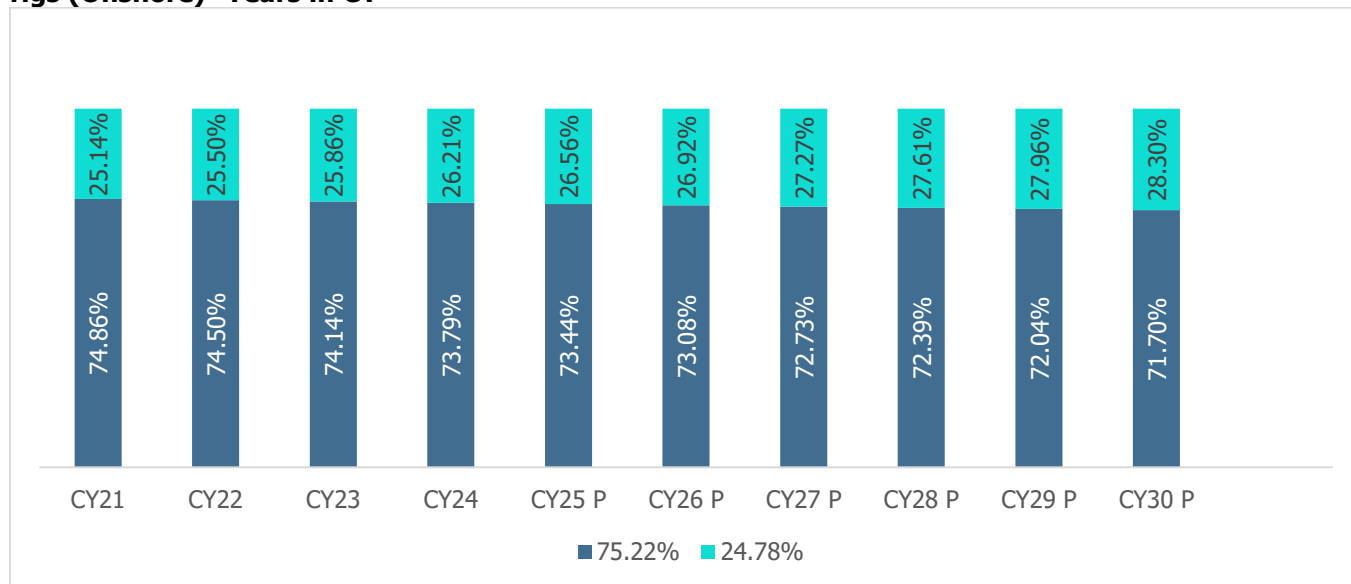
greater emphasis on wellbore quality, reservoir protection such as using higher-quality drilling fluids to minimize formation damage, and completion performance, as these directly impact final oil production and their compensation. This mechanism of accountability for final output ensures that funds are invested where they truly create value.

5.8 Segmentation of contracts based on hire-and-charge models versus performance-based rigs

In the Indian drilling industry, contract structures have historically been dominated by the hire-and-charge model, which remains the prevalent form of engagement between operators and service providers. In 2020, rigs operating under the hire-and-charge model accounted for 75.22% of total contracts, highlighting the industry’s reliance on fixed-rate, day-based rental structures that prioritize predictable costs and straightforward management for operators. However, this dominance has been gradually eroding, with the share declining consistently each year to 71.70% by 2030. This steady reduction reflects the growing adoption of performance-based contracts, which are gaining favour due to their alignment with efficiency, productivity, and cost-optimization objectives.

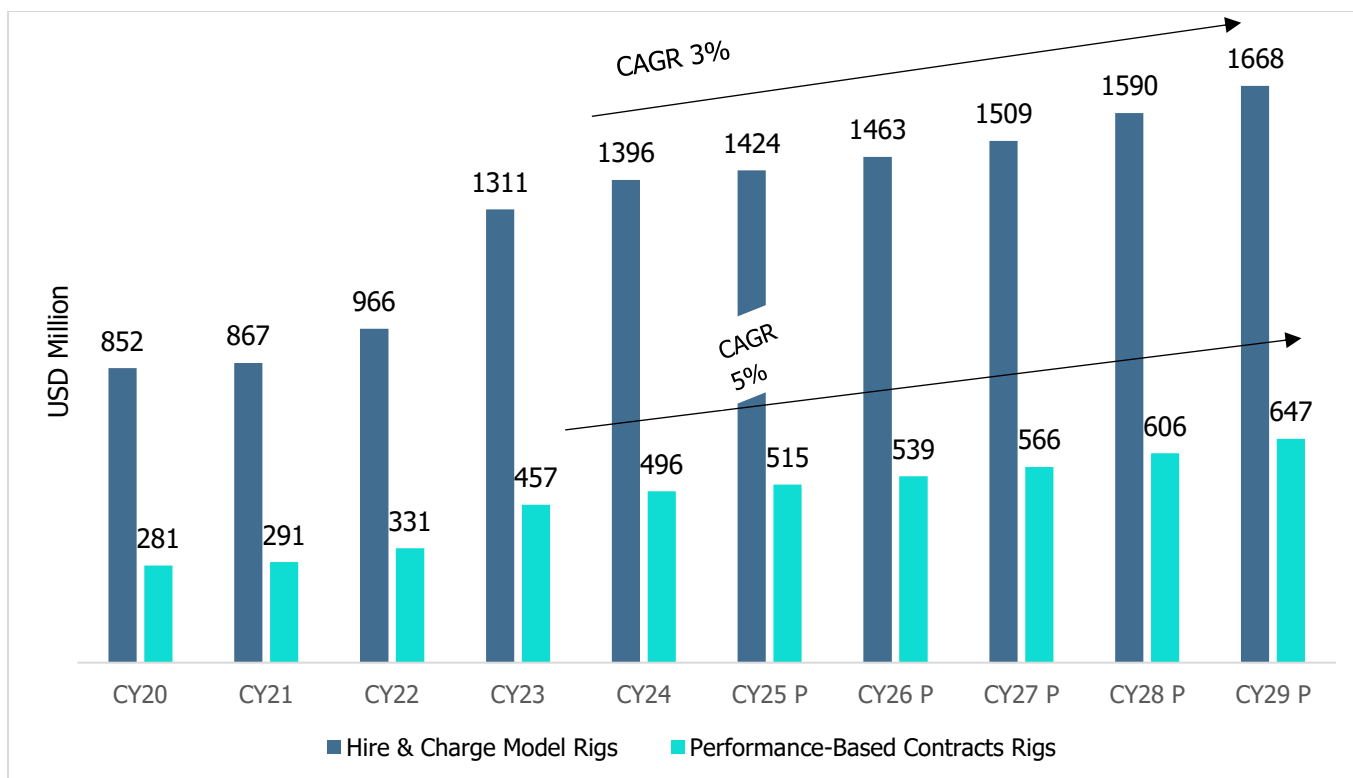
Performance-based rigs, which constituted only 24.78% of contracts in 2020, have steadily increased their share, reaching 28.30% by 2030. This shift is driven by rising pressure on drilling contractors to improve operational efficiency, reduce non-productive time, and deliver outcomes tied to well productivity rather than simply the number of operating days. Additionally, the trend mirrors the global shift in oilfield services where operators are incentivizing service providers through performance-linked models to ensure higher accountability and improved drilling outcomes.

Chart 46: Percentage Insights on the Hire & Charge model rigs and performance-based contracts rigs (Onshore)- Years in CY



Source: Maia Research, CareEdge Research

Chart 47: India Drilling Market Insights on the Hire & Charge model rigs- Years in CY



Source: Maia Research, CareEdge Research

India’s onshore drilling market is gradually shifting from the traditional Hire & Charge rig model toward more performance-linked contractual structures, reflecting a change in how drilling services are valued and managed. The Hire & Charge model, where rigs are rented on a daily or time-based rate, shows moderate growth from USD 852 million in 2020 to USD 1,714 million by 2030, as operators increasingly view it as a legacy system with limited efficiency incentives. This model primarily suits low-risk, shallow-depth, or maintenance drilling where productivity pressures are lower.

Conversely, performance-based rig contracts projected to grow from USD 281 million to USD 677 million over the same period reflect a qualitative evolution in contracting philosophy. Here, payments are linked not to rig utilization but to measurable operational outcomes, such as wells drilled per month, depth achieved per day, or fuel and material efficiency. This format encourages contractors to adopt automation tools, digital well dashboards, predictive maintenance systems, and performance analytics to meet delivery targets. Moreover, the model supports shared accountability, where both operator and service provider benefit from improved productivity and cost control.

This transition represents not just a pricing shift but a redefinition of operational discipline in India’s drilling ecosystem. While the hire model will remain relevant for short-term or small-scale programs, performance-based contracting is emerging as the preferred structure for technically challenging and efficiency-sensitive projects—signaling a move toward value-linked, outcome-driven, and technologically measured drilling operations across the industry.

5.9 Prospects for Ancillary Equipment Hiring/Renting Activity in India

India’s drilling equipment rental market is experiencing new growth opportunities. As the Indian government promotes energy self-sufficiency and accelerates oil and gas field development, drilling activity is experiencing sustained growth. Domestic oil and gas companies are increasingly adopting equipment leasing to meet operational

needs, effectively reducing capital expenditures and increasing operational flexibility. The leasing market has expanded its service offerings from traditional drilling tools like drill pipe and drill collars to include key equipment such as top drive systems, mud pumps, and blowout preventers, resulting in an increasingly diverse range of services.

This growth in market demand is primarily driven by several factors. The increase in offshore deepwater exploration projects is driving higher demands for high-tech equipment, while onshore unconventional oil and gas resource development requires specialized equipment. The participation of international oil and gas companies in Indian acreage development has led to stricter equipment standards, driving local leasing companies to improve equipment quality and service levels. The equipment leasing model is particularly well-suited to the Indian market, enabling small and medium-sized oil and gas companies to acquire advanced equipment through leasing without incurring high acquisition and maintenance costs.

The market competition landscape is diverse. Internationally renowned oilfield service companies dominate the high-end equipment leasing market, providing comprehensive services including equipment operation and maintenance. Local leasing companies maintain their competitiveness in the mid- and low-end markets thanks to their competitive pricing and localized service networks. Some large oil and gas companies have also begun leasing their own equipment to improve equipment utilization. This multi-tiered competitive landscape provides diverse options for customers with diverse needs.

Technological innovation is transforming the equipment leasing industry. The application of digital equipment management platforms enables leasing companies to monitor equipment status in real time, optimize scheduling, and improve equipment utilization efficiency. Equipment manufacturers are collaborating with leasing companies to develop new equipment more suitable for the leasing market, focusing on durability and maintainability. The application of predictive maintenance technology reduces equipment failure rates and lowers operating costs. These technological advances not only enhance service quality but also increase the attractiveness of the leasing model.

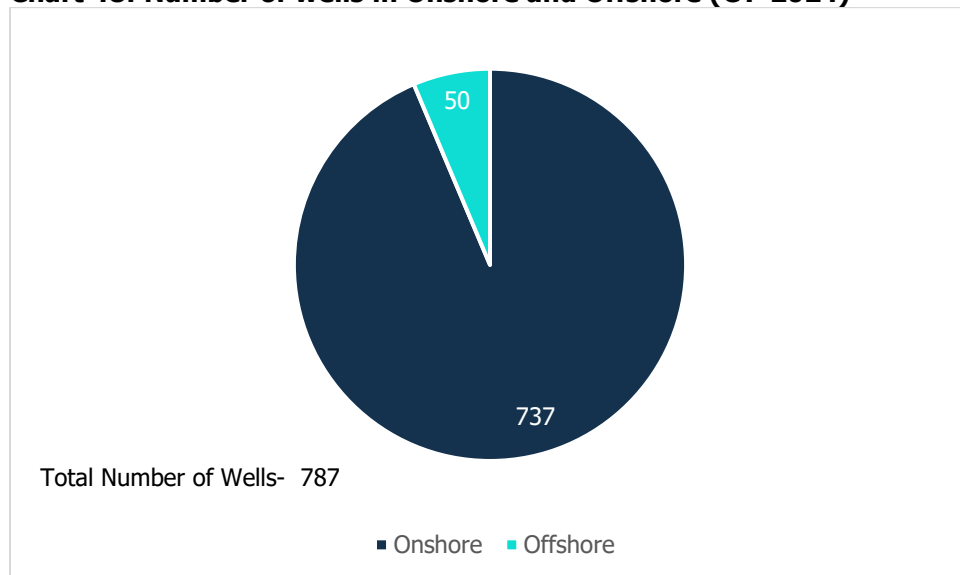
Market development still faces several challenges. Equipment imports tariffs and tax policies affect the leasing cost structure, requiring leasing companies to optimize supply chain management. Inadequate infrastructure in some regions limits the efficiency of equipment transportation and deployment. A shortage of specialized technical personnel hinders improvements in service quality. Increasingly stringent environmental protection requirements are driving equipment upgrades towards low emissions and high efficiency, increasing replacement costs.

Future market development will demonstrate the following trends: The scope of equipment rental will further expand, evolving from single-equipment rentals to complete solutions. The proportion of long-term leases will increase, fostering more stable partnerships between leasing companies and oil and gas companies. Equipment sharing platforms may emerge, increasing the utilization of equipment in specific regions. Demand for environmentally friendly equipment will grow, and electric and intelligent equipment will become new growth drivers in the rental market. These trends will drive the Indian drilling support equipment rental market towards greater professionalism and efficiency.

5.9 Total number of wells in Onshore and Offshore

India's drilling landscape comprised a total of 787 wells, of which 737 wells were located in onshore blocks and 50 wells in offshore basins. The dominance of onshore wells highlights India's continued reliance on mature onshore fields, which remain the backbone of domestic oil and gas production. These wells are concentrated in key producing regions such as Assam, Gujarat, Rajasthan, and Andhra Pradesh.

Chart 48: Number of wells in Onshore and Offshore (CY-2024)



Source: Maia Research, CareEdge Research

On the other hand, offshore wells, though fewer in number, play a strategic role in tapping deeper hydrocarbon reserves, particularly in the Krishna-Godavari Basin and the western offshore region. Offshore drilling remains capital- and technology-intensive, but it is expected to see gradual growth with ongoing exploration in deepwater and ultra-deepwater blocks.

This segmentation reflects India’s dual focus maximizing production from established onshore reservoirs while strategically expanding offshore capacity to meet rising domestic energy demand and reduce import dependence.

5.10 Drilling Metrics
Drilling Depth Indicators

India's drilling depth indicators vary by region and operation type. Onshore, as India prioritizes the development of domestic oil and gas resources, drilling depths are gradually increasing. For example, deeper drilling operations are underway in some onshore fields, such as the Rajah Rajah Munderi field in Andhra Pradesh. Offshore, the Mumbai Basin is a key oil and gas producing region in India. Oil and Natural Gas Corporation (ONGC) has demonstrated its ability to drill at relatively deep depths. For example, some of ONGC's drilling platforms offshore Mumbai have a maximum drilling depth of approximately 25,000 feet. This demonstrates that India has developed a significant deep drilling capability for offshore oil and gas exploration and development, meeting its demand for deepwater oil and gas resources. As India's demand for oil and gas resources continues to grow, drilling depths are likely to increase further, both onshore and offshore, to explore deeper reservoirs.

Drilling Efficiency Indicators

India's drilling efficiency is influenced by a variety of factors. In terms of equipment, India has invested significantly in upgrading and importing drilling equipment in recent years. For example, under the "Make in India" initiative, ONGC has contracted with domestic companies to deliver land drilling rigs and workover rigs, which has helped improve the quality and efficiency of onshore drilling equipment. Offshore, some advanced drilling platforms are also being used, such as some from Shelf Drilling, which serve the Indian market. Their highperformance equipment ensures improved drilling efficiency. Furthermore, the application of technology has also played a significant role in improving drilling efficiency. India has gradually adopted advanced technologies in its drilling operations, such as

directional drilling and multi-layer segmented testing. These technologies can improve single-well identification efficiency, reduce drilling time, and thus enhance overall drilling efficiency. However, drilling efficiency in India also faces challenges. For example, complex geological conditions in some areas may affect drilling speed, and inadequate infrastructure in remote areas may also restrict drilling efficiency.

Wellbore Quality Indicators

Wellbore quality is a key indicator of drilling operations, and India is no exception. Drilling operations in India, both onshore and offshore, place stringent requirements on wellbore quality. Wellbore inclination and its variations are key considerations. In onshore oilfields, such as the PURN-1 exploratory well in the Olpad Formation in the Cambay Basin, wellbore inclination must be strictly controlled to ensure accurate exploration and development of oil and gas resources. Offshore, due to the complex operating environment, wellbore quality requirements are even more stringent. For example, drilling operations in the Mumbai offshore basin require ensuring wellbore stability and accuracy to prevent problems such as wellbore collapse, which could impact drilling safety and subsequent oil and gas production. Indian drilling companies typically utilize advanced inclination measurement technologies and equipment, such as single-point, multi-point, and electrical measurement, to monitor wellbore inclination in real time and adjust drilling parameters promptly to ensure wellbore quality.

Cost Indicators

Drilling costs in the Indian market are influenced by a variety of factors. From a resource perspective, India is a major consumer of oil and natural gas, and its growing demand for oil and gas resources has driven a corresponding increase in demand for domestic drilling operations. To meet demand, drilling companies need to invest more in equipment, personnel training, and operational services, leading to higher costs. From a policy perspective, the Indian government has introduced several policies to encourage the development of domestic oil and gas resources, such as the Oil and Gas Licensing Policy (HELP) and the rolling Open Area Bidding Program (OALP). While these policies have boosted drilling activity to a certain extent, they can also lead to price fluctuations in drilling services due to increased competition, impacting costs. Furthermore, fluctuations in international oil prices can also impact drilling costs in India. When international oil prices rise, drilling companies may increase investment and expand drilling operations, leading to higher costs. Conversely, when prices fall, drilling companies may cut budgets, impacting drilling activities and cost control.

Environmental Indicators

With the global emphasis on environmental protection, India is also placing increasing emphasis on environmental indicators in its drilling operations. Drilling operations in India must comply with strict environmental regulations to minimize impacts on the surrounding environment. For example, waste disposal during drilling is a key environmental indicator. Drilling companies must implement effective measures to dispose of waste such as drilling mud and cuttings to prevent soil and water pollution. Fuel consumption and emissions are also important components of environmental indicators. Indian drilling companies are gradually adopting more environmentally friendly fuels and technologies to reduce greenhouse gas emissions and other pollutants and meet environmental requirements. Furthermore, increasing public awareness of environmental issues is prompting drilling companies to pay greater attention to environmental indicators and implement more environmental measures during drilling operations to achieve sustainable development.

5.11 Drilling Revenue to Costing

In 2024, the average Revenue-to-Costing (R/C) ratio for the Indian drilling industry stood at 1.32. This indicates that, on average, for every unit of cost incurred in drilling operations, the industry generated 1.32 units of revenue.

A ratio above 1 reflects that drilling activities are operating on a profitable margin, with revenues comfortably exceeding the costs of rig deployment, manpower, consumables, logistics, and maintenance.

Times	CY24
Average Revenue to Costing (R/C)	1.32

Source: Maia Research, CareEdge Research

The healthy R/C ratio highlights the favorable demand environment for drilling services, supported by strong government policies, increased exploration activity under OALP rounds, and rising energy consumption in India. At the same time, cost efficiencies achieved through technological upgrades, better rig utilization, and economies of scale have helped sustain profitability despite rising input costs such as fuel, equipment, and labour.

5.12 Aspects of Drilling Industry

India's drilling industry holds a crucial position in its national energy security strategy, driven by both growing domestic energy demand and high import dependence. As the world's third-largest energy consumer, India prioritizes the exploration and development of its domestic oil and gas resources, making drilling a core component of its national energy policy. The industry boasts a diverse structure, encompassing multiple players, including national oil companies, private enterprises, and international oilfield services companies, each playing a significant role in different sectors.

NOCs dominate the overall development of the industry. As the industry leaders, ONGC, with its largest drilling fleet and extensive operational experience, leads exploration and development activities in major basins. Other state-owned enterprises, such as Indian Oil Corporation, also play a significant role in specific regions and sectors. These state-owned companies not only carry out drilling operations but also shoulder the responsibility of implementing the national energy strategy. Their investment plans and project arrangements directly influence the direction and pace of the industry's development.

The participation of private and international companies brings vitality and innovation to the industry. Private companies have made significant progress in deepwater drilling and technological innovation, driving improvements in industry technical standards. International drilling contractors and oilfield service companies participate in the market through technical collaborations and joint ventures, bringing advanced drilling technology and management experience. This diversified market structure fosters technological exchange and competition, driving the continuous improvement of the industry's overall capabilities.

Technological development is characterized by a balance between catching up and innovation. Onshore drilling technology is relatively mature, primarily focusing on improving oil recovery and drilling in complex formations. Offshore drilling technology is developing rapidly, with significant breakthroughs particularly in deepwater drilling. The application of digital and automated technologies is gradually expanding, but overall penetration still has room for improvement. Drilling technology for unconventional resources is still in the exploratory stage, with pilot projects for shale gas and tight gas drilling gaining experience.

Regional development patterns reflect resource distribution. Western offshore basins are key areas for drilling activity, hosting the country's most important oil and gas production bases. Eastern coastal basins possess significant resource potential and are a key source of future drilling growth. Onshore basins are primarily concentrated in the northeastern and western regions, focusing on tapping the potential of mature oil fields and increasing production. Southern basins, with relatively low levels of exploration, represent potential areas for development.

The industry faces numerous challenges. Complex geological conditions create technical challenges for drilling operations, particularly in deepwater and ultra-deepwater areas. Inadequate infrastructure hinders operational efficiency, particularly in offshore support capabilities and logistics networks, which require strengthening. Increasingly stringent environmental requirements necessitate that drilling operations meet higher standards. Talent development needs to be strengthened, particularly given the relative shortage of high-end technical and management talent.

Future development trends indicate that the industry is in a phase of transformation. Deepwater and ultra-deepwater drilling will become key development areas, leading to significant increases in related technology investment and project deployment. Digitalization and intelligent transformation will gradually advance, improving drilling efficiency and operational safety. Breakthroughs in unconventional resource exploration and development are expected to transform the current resource development landscape. International cooperation will continue to deepen, elevating the overall industry through technological exchange and capital inflow. The concept of green development will become more deeply embedded, and environmentally friendly technologies and practices will be further promoted.

In the context of ensuring national energy security, the Indian drilling industry is continuously improving its development quality through technological innovation and management improvements. Despite facing various challenges, with government support and industry efforts, it is moving towards a more efficient, environmentally friendly, and sustainable direction.

5.13 Capital expenditure in the Indian drilling industry

Million USD	CY24
Capex in Drilling Industry	7123

Source: Maia Research, CareEdge Research

The capital expenditure in the Indian drilling industry stood at USD 7,123 million. This robust level of investment reflects the sector’s continued expansion, driven by the government’s emphasis on enhancing domestic oil and gas production to reduce import dependency. The majority of this Capex was directed towards exploration drilling, rig upgrades, well development, and supporting infrastructure.

A significant share of the expenditure came from state-owned enterprises, which remain at the forefront of exploration and development efforts across both onshore and offshore basins. At the same time, private sector participation contributed meaningfully, particularly in offshore and deepwater projects that require advanced drilling technologies and high capital intensity.

5.14 Demand and Supply in Drilling Industry

In terms of demand, India, a country with a large population and a rapidly developing economy, is experiencing accelerating industrialization and urbanization, leading to a growing demand for oil and natural gas. This necessitates increased efforts in oil and gas exploration and development, driving demand for drilling services and equipment. India also possesses abundant offshore oil and gas resources, such as those in the Mumbai and Krishna-Godavari Basins. The continued advancement of offshore oil and gas development requires a large number of offshore drilling rigs and related services, further increasing demand for the drilling industry. Furthermore, the Indian government is actively promoting the Strategic Petroleum Reserve program to ensure energy security. With the continuous commissioning of new reserve projects, more drilling operations are required to complete the construction of related facilities and oil and gas storage, further contributing to the growing demand for the drilling

industry. Furthermore, the Indian government's increasingly stringent environmental protection requirements require drilling operations to meet higher environmental standards, such as the proper disposal of drilling waste. This is driving drilling companies' demand for advanced environmental protection equipment and technical services, leading to a related increase in demand.

On the supply side, state-owned enterprises is a leading in the drilling industry, By boasting a significant fleet of drilling rigs and workover rigs. The company is continuously increasing its rig fleet, for example, in exploratory talks with domestic shipyards to build two jackup rigs to replace some older platforms. In addition to state owned companies, several other Indian drilling companies, including local private drilling companies and international drilling services firms, also provide drilling services to the market. India has also made significant progress in drilling equipment manufacturing. For example, private players making capex in supplies rigid pipe, flexible pipe, and highend connections for the oil and gas industry's oil and gas tubular goods market, reducing reliance on imports and offering export potential. This will help boost India's domestic drilling equipment supply capacity. However, the Indian drilling industry also faces supply challenges. The global shortage of drilling rigs has impacted India, leading to delays in some oil and gas exploration projects. State owned companies also failed to attract sufficient rigs in recent tenders, resulting in significantly higher rig utilization rates and high day rates.

5.15 Key Trends

Key Trends in Onshore Drilling

1. **Digitalization, Real-Time Monitoring, and Data Analytics:** Onshore operations are increasingly using sensors (for weight on bit, torque, vibration, downhole pressure), IoT platforms, cloud computing, and big data analytics. These enable real-time parameter monitoring, early detection of drilling issues, reducing Non-Productive Time (NPT), and optimizing drilling parameters dynamically. Digital twin models and virtual simulation tools are also being adopted to model well paths, formation response, and drilling behaviour before and during operations.
2. **Automation & Robotics:** Rig automation (e.g. automated pipe handling, top drive control, real-time drilling parameter adjustment) is growing. Robotics or remote/automated tools are being mixed in to reduce human error, enhance safety, and manage operations in remote or hazardous zones.
3. **Rig Electrification and Alternative Energy Integration:** To improve efficiency and reduce carbon emissions, there is a noticeable shift toward using electric power instead of diesel generation for rig operations where feasible. This includes electrified rig components, power management systems, and sometimes on-site renewables or cleaner grid power. All aimed at improving ESG credentials and reducing operating costs.
4. **Waste & Fluid Management, Environmental Practices:** With increasing regulation and public scrutiny, managing drilling waste, recovering or recycling drilling fluids, and reducing the environmental footprint are growing in importance. This includes better treatment of cuttings, reusing mud, better designs to minimize fluid losses, etc.
5. **Performance-Based Contracting & Cost Efficiency Pressures:** Operators and rig contractors are increasingly focused on aligning contracts around performance (e.g. drilling speed, uptime, reduced NPT) vs just paying fixed day rates. There is emphasis on optimizing supply chain, equipment uptime, and reducing overheads. Operators are looking for incremental improvements (5-10%) via better performance management and procurement practices.
6. **Geological / Well Design Advances:** Use of more sophisticated well designs (directional, horizontal, multilateral) in onshore settings, better drilling bits, better downhole tools to handle complex formations (hard rock, fractured zones) etc. This help maximize reservoir contact, reduce number of wells, or reduce drilling costs per unit of output. Focus on ESG (Environmental, Social, Governance): Onshore drilling is under pressure to reduce greenhouse gas emissions, reduce noise and air pollution, manage land use more

carefully, ensure safety, and reduce footprint. This is pushing adoption of cleaner fuel (or electricity), stricter environmental compliance, and community engagement.

7. Technology and Equipment Innovation: Higher specification drill bits, hammer (DTH) technology enhancements, better drill pipe materials, more durable downhole tools, more efficient air/hydraulic hammer designs, etc. India's drill-pipe market, for example, shows trends of better materials, and manufacturers increasingly adopting more durable / high performance spec pipes and equipment.

Deepwater Drilling Becomes the Core Engine of Industry Growth

The Indian drilling industry is undergoing a growth transformation centred on deepwater drilling, with offshore drilling, particularly in the deepwater sector, emerging as the most promising sector. India possesses abundant offshore oil and gas resources, with the Mumbai Offshore Basin, the Krishna-Godavari Basin, and the newly opened Andaman Sea region constituting the three key areas for offshore exploration. Development in the Andaman Sea has garnered the most attention, with the Indian government even comparing it to Guyana's energy miracle, hoping to achieve breakthrough growth in oil and gas production through exploration in this region. The advancement of deepwater drilling is not only a necessity for resource development but also an opportunity for India to enhance its drilling technology capabilities.

India's Oil and Natural Gas Corporation (ONGC) plays a leading role in deepwater drilling, having drilled numerous deepwater wells in challenging areas and accumulated valuable operational experience. To address the complex geological conditions of the deepwater, such as submarine salt domes and high-temperature and high-pressure environments, ONGC continuously invests in technological upgrades, introducing technologies such as underbalanced drilling and advanced hybrid drill bits. These applications not only improve drilling efficiency but also reduce reservoir damage. India is also gradually achieving breakthroughs in deepwater drilling equipment. Through collaboration with international companies and the improvement of local manufacturing capabilities, it is continuously improving the supply system of deepwater drilling platforms. With the continuous implementation of deepwater exploration projects, offshore drilling will drive technological upgrades and scale expansion across the industry, becoming a core growth driver for India's drilling industry in the coming years.

The Deep Penetration of Automation and Digital Technologies

The deep penetration of automation and digital technologies is a key trend in enhancing the competitiveness of India's drilling industry. Amidst the global wave of drilling technology upgrades, Indian drilling companies are actively adopting advanced technologies to optimize operational efficiency and safety. As a leading industry player, ONGC has demonstrated outstanding technological innovation. Its "company-within-a-company" model, through specialized management of onshore, shallow-water, and deepwater operations, has created an organizational foundation for the application of digital technology. In terms of specific technical applications, a PLC-controlled safety system has been successfully installed on onshore drilling rigs, enabling precise monitoring of key equipment movements. The initial application of radial drilling technology has significantly increased well productivity by enhancing reservoir reach and expanding flow channels.

The application of digital technology extends beyond equipment to encompass the entire operational process. The combination of big data analytics and sensor technology enables real-time monitoring of the drilling process, enabling engineers to promptly identify equipment failures and optimize drilling parameters, thereby reducing operational risks and costs. The localization of hydraulic fracturing technology is also a key manifestation of this technological advancement. ONGC has successfully completed fracturing operations on challenging wells by developing fracturing fluids suitable for high-temperature, deep wells, demonstrating India's independent innovation capabilities in key drilling technologies. As technology matures and costs decrease, more advanced

digital solutions such as automated drilling systems and remote-control equipment will be more widely adopted in the Indian drilling industry, driving the industry's transition from traditional operations to intelligent ones.

Tightening environmental regulations are forcing the industry to transition to a greener, more sustainable approach

Tightening environmental regulations are driving the Indian drilling industry towards a greener and more sustainable approach. The Indian government is continuously raising environmental requirements for drilling operations, establishing a comprehensive regulatory system covering everything from waste disposal to ecological protection. Regions like the Andaman Sea are highly ecologically sensitive, with the need to protect coral reef ecosystems and endangered species habitats. This requires drilling companies to incorporate environmental considerations into core project planning. While these stringent environmental standards increase operating costs, they are also driving innovation in the industry, encouraging companies to adopt more environmentally friendly technologies and equipment.

For waste disposal, drilling companies need to adopt efficient treatment technologies, such as thermal desorption of oily drill cuttings, to meet emission standards. Furthermore, environmental policies are driving the development of greener chemicals such as drilling fluids and fracturing fluids, with non-toxic, biodegradable, and environmentally friendly products gradually replacing traditional alternatives. In its localization efforts, ONGC has not only achieved independent production of products like fracturing fluids but also reduced the cost of applying environmentally friendly technologies by developing local suppliers. This integration of "Made in India" initiatives and environmental protection requirements provides a viable path for the industry's green transformation. Environmental compliance has become a prerequisite for the approval and operation of drilling projects. Companies must establish comprehensive environmental management systems and strengthen environmental impact assessments and monitoring. While this transformation faces challenges in the short term, it will, in the long term, enhance the industry's sustainable development capabilities and strengthen the competitiveness of Indian drilling companies in the international market.

Structural Adjustment Amidst Regional Development Imbalances

The Indian drilling industry exhibits significant regional development imbalances, which are driving structural adjustments. The southern region, with its abundant oil and gas resources and well-developed infrastructure, has become a growth hotspot in the drilling market. States like Tamil Nadu and Andhra Pradesh boast not only mature oil and gas fields but also major refineries, forming integrated mining and processing clusters. This synergistic effect has attracted significant investment. The government's strategic focus on the southern region, such as increased allocation of exploration blocks and infrastructure investment, has further strengthened its leading position.

In contrast, the drilling market in the northern, eastern, and western regions has lagged behind. Disparities in resource endowments, infrastructure, and policy support have led to a lack of investment appeal. However, this regional imbalance also presents opportunities for adjustment in the industry. On the one hand, the concentration of resources and investment in the south is conducive to economies of scale and driving technological and service upgrades. On the other hand, other regions are also attracting investment through policy innovations, such as introducing region specific tax incentives and facilitating approvals. With the development of emerging regions such as the Andaman Sea, the eastern coastal region may become the next growth hotspot, driving the optimization of regional development. This regional imbalance is also prompting drilling companies to adopt differentiated market strategies, adjusting their business layout based on the resource characteristics and policy environment of different regions. This structural adjustment will help improve resource allocation efficiency across the industry.

Capacity Upgrading in a Diversified Competitive Landscape

The Indian drilling industry is at a critical stage in the formation of a diversified competitive landscape, and intensified market competition is driving companies to accelerate capacity upgrading. As a state-owned enterprise, ONGC, leveraging its resource advantages and policy support, holds a dominant position in core exploration projects. Its investment in deepwater drilling and technological innovation has enabled it to maintain its industry leadership. However, the market is not monopolized by a single company. International drilling service giants such as Schneider and Halliburton have entered the Indian market through technical collaborations and project participation. The advanced technology and global operational experience they bring to the table have created competitive pressure on local companies and driven overall technological advancement in the industry.

Local private drilling companies, leveraging flexible operational mechanisms and cost advantages, have secured a foothold in the mid- and low-end markets and specific sectors. These companies are continuously improving their service capabilities through collaborations with international companies or technology transfer, gradually penetrating the high-end market. The focus of competition is shifting from pure price competition to a comprehensive approach encompassing technological innovation, service quality, and project management capabilities. To stay ahead of the competition, companies are increasing R&D investment, optimizing management processes, and strengthening their talent pool. At the same time, a trend of industry consolidation is emerging, with mergers and acquisitions leading to resource concentration and economies of scale. This diversified competitive landscape has not only invigorated the Indian drilling industry but also encouraged companies to develop towards specialization and refinement, laying the foundation for the industry's long term and healthy development.

5.16 Growth Drivers

Key Drivers of the Indian Drilling Industry are as follows:

India's drilling industry is expanding rapidly, driven by the country's focus on energy security and self-sufficiency. With over 85.00% dependence on crude oil imports, the government has prioritized domestic exploration and production to reduce exposure to global price volatility and supply disruptions. This has created strong demand for drilling services, supported by policies like HELP and OALP, which simplify approvals, incentivize investment, and open access to conventional and unconventional reserves.

The expansion of drilling is no longer confined to onshore and shallow-water fields; significant activity is shifting to deepwater, ultra-deepwater, and unconventional resources such as shale gas and coal bed methane, requiring advanced rigs, technologies, and specialized expertise. Government-backed resource surveys (2D/3D seismic studies) are improving exploration precision, reducing drilling risks, and ensuring higher success rates.

Policy reforms, including tax incentives, arbitration rights, and deregulation of equipment sourcing, are further empowering industry growth. In parallel, "Make in India" and "Atmanirbhar Bharat" are strengthening the domestic drilling equipment ecosystem, reducing import reliance and fostering local manufacturing capacity.

Another key factor is the rising demand for skilled drilling operators. India faces a shortage of high-end technical manpower for complex projects, particularly in offshore and unconventional drilling. To address this, the government, industry associations, and companies are investing in training programs, vocational institutes, and international collaborations. Skilled labour not only boosts safety and efficiency but also accelerates technology adoption across the industry.

India's drilling sector is being propelled by a combination of strategic policy reforms, rising energy demand, expansion into complex reserves, and talent development initiatives, positioning it as a critical enabler of the country's long-term energy security.

5.17 Market Restraints in the industry

India's drilling industry faces multiple structural and operational challenges that constrain its growth.

1. **Complex Geological Conditions** – Diverse and difficult terrains, from fractured deepwater basins like the Andaman & Nicobar region to high-temperature, high-pressure onshore reserves, significantly raise costs and risks. These conditions reduce drilling success rates, extend project timelines, and deter private investment.
2. **Dependence on Foreign Technology and Equipment** – India relies heavily on international service providers and imports for advanced drilling technologies (e.g., rotary steerable systems, horizontal fracturing) and high-end equipment such as deepwater rigs and automated systems. This dependence inflates costs, creates supply chain vulnerabilities, and limits domestic innovation.
3. **Strict Environmental Regulations** – Cumbersome approval processes, stringent waste disposal and emission norms, and rising ecological scrutiny increase project delays and compliance costs. Local protests and NGO interventions further restrict drilling in sensitive areas, narrowing exploration opportunities.
4. **Funding Shortages and Limited Financing Access** – Drilling is highly capital-intensive, but both state-owned and private companies struggle with funding constraints. Banks remain cautious due to long payback cycles and high risks, while capital markets and bond financing remain underdeveloped. This limits investment in advanced equipment, technology upgrades, and R&D, creating a cycle of low efficiency and weak competitiveness.

5.18 Spend by key entities on Drilling

In 2024, the capital and operational expenditure on drilling activities in India was primarily concentrated among three major entities. The Oil and Natural Gas Corporation Limited (ONGC) accounted for the lion’s share with an spend of USD 5,394 million, reaffirming its position as the leading player in India’s upstream exploration and production sector. Oil India Limited (OIL), with its focus on onshore exploration and production, recorded a spend of USD 328 million, while Reliance Industries, a key private sector participant with offshore assets, registered an expenditure of USD 476 million.

Table 13: Spend by key entities on Drilling (Million USD)

Key Entities	CY24
Oil and Natural Gas Corporation Limited (ONGC)	5,394
Oil India Limited (OIL)	328
Reliance Industries	476

Source: Maia Research, CareEdge Research

This expenditure pattern highlights the dominant role of public sector enterprises in sustaining drilling activity, supported by their large resource base and strategic government backing. However, the involvement of private entities such as Reliance underscores the importance of private capital and advanced technology in enhancing efficiency and supporting offshore exploration. Together, these spends reflect the continuing momentum in India’s upstream sector and the critical role of both public and private players in meeting the country’s growing energy demand.

5.19 Drilling rig availability and rates – Trends and Market commentary Platform Availability

The Indian drilling rig market is experiencing a tight supply demand balance. The overall supply of offshore drilling rigs is tight, particularly for specification drillships and semisubmersibles suitable for deepwater operations. This is due to the recovery of the global offshore drilling market, which has led international drilling contractors to relocate some high-end rigs to other regions. Domestic drilling contractors have a limited number of rigs, some of which are older and undergoing technical upgrades and modifications, further impacting immediate availability. While the supply of onshore drilling rigs is relatively sufficient, high-end rigs suitable for complex geological conditions remain in short supply. There is a regional imbalance in platform distribution, with relatively good platform availability in western waters, while newly developed areas in eastern waters face limited platform support capacity. Seasonal factors also impact platform availability, with operating windows limited during the monsoon and reduced platform scheduling flexibility.

Rate Trends

Drilling rig rates have shown a steady upward trend. Offshore rig rates have seen a significant increase, with deepwater drillship dayrates recovering rapidly. This is primarily due to the rebound in global energy prices, which has driven increased offshore exploration activity and increased platform operating costs. Onshore drilling rig rates saw relatively modest increases, but high-end rig rates saw significant increases. The rate structure has shifted, with performance incentives and risk premiums accounting for a larger portion of the base day rate. The gap between long term and short-term contract rates has widened, with long term cooperative projects enjoying certain rate discounts. Rates for different platform sizes diverge significantly, with modern, high-end platforms commanding significantly higher rates than traditional platforms.

Market Demand Characteristics

NOCs are the primary demanders of drilling platforms, and their annual drilling plans directly influence market demand. Deepwater exploration and development demand is growing rapidly, creating strong demand for high-end drilling platforms. Unconventional resource exploration is in its early stages, and demand for related drilling platforms is gradually emerging. Stable demand for production increases in mature oilfields is driving sustained platform demand. Regional demand is uneven, with concentrated platform demand in key development areas and more volatile demand in emerging areas. Seasonal demand is evident, with concentrated demand during suitable operating seasons, leading to tight platform scheduling.

Market Competition Landscape

Market competition is stratified. International drilling contractors dominate the high-end platform market, particularly in deepwater drilling. Local contractors have a competitive advantage in the mid- and shallow-water regions and onshore markets. Equipment leasing companies are strengthening their collaboration with drilling service companies to provide integrated service solutions. Platform operators are focusing on differentiated competition and enhancing their competitiveness by offering additional technical services. The value of long-term partnerships is becoming increasingly prominent, and high-quality clients are receiving priority platform allocation.

Impact of Technological Development

Technological advances are changing the structure of platform demand. Demand for automated drilling rigs is increasing, while the competitiveness of manually operated platforms is declining. Digital management platforms improve equipment utilization and reduce idle time. Environmental protection requirements are driving platform upgrades, with low-emission platforms becoming increasingly popular. The pace of equipment replacement is accelerating, and older platforms are gradually being phased out of the market. These changes are prompting platform operators to increase investment in technological upgrades.

Supply Chain Constraints

Platform supply faces multiple constraints. The long delivery cycle of newly built platforms makes it difficult to quickly meet growing demand. Equipment imports are affected by the supply chain, resulting in unstable supply of key components. Domestic manufacturing capacity is limited, and high-end platforms rely on imports. Inadequate maintenance and support facilities result in long platform downtimes. These factors all affect the effective supply of platforms.

Impact of the Policy Environment

Government policies influence platform market development. The progress of license approvals affects the implementation of drilling plans, indirectly impacting platform demand. Import tariff policies affect platform upgrade costs. Environmental regulations require technological modifications to platforms. Localization requirements drive the development of domestic platform manufacturing. Platform operators must closely monitor these policy factors.

Outlook

The platform market is expected to maintain its growth momentum. Demand for deepwater drilling platforms continues to expand, and rates are expected to remain strong. The onshore drilling rig market is developing steadily, with a strong demand for technological upgrades. Unconventional resource development may create new demand growth areas. Digitalization and automation will reshape platform operating models. Intensified market competition is driving companies to improve service quality.

5.20 QEHS Standards in the Drilling Industry

1. Importance of QEHS in Drilling Operations

In the drilling industry, Quality, Environment, Health, and Safety (QEHS) management is fundamental to achieving operational excellence, regulatory compliance, and sustainable development. Given the high-risk nature of drilling activities that involve well construction, equipment handling, and waste management, robust QEHS systems are essential to minimize accidents, protect the workforce, and reduce environmental impact. Effective implementation helps companies identify and mitigate potential hazards through preventive maintenance, safety audits, and emergency preparedness, thereby ensuring safe, efficient, and compliant operations.

2. Alignment with Global Standards and Certifications

Indian drilling companies are increasingly aligning with internationally recognized standards to enhance their quality and safety performance. Key certifications include ISO 9001:2015 for Quality Management Systems, ISO 14001:2015 for Environmental Management Systems, and ISO 45001:2018 for Occupational Health and Safety Management Systems. These certifications signify a commitment to consistent quality, pollution prevention, and workforce well-being, while also promoting continual improvement and global competitiveness within the sector.

3. Strategic and Sustainability Benefits of QEHS Adoption

The adoption of strong QEHS practices delivers significant operational and strategic advantages. It enhances efficiency through standardized procedures, reduces downtime caused by incidents, and improves workforce morale by ensuring safe working conditions. Moreover, robust QEHS systems foster client confidence, strengthen corporate reputation, and align with broader sustainability and ESG (Environmental, Social, and Governance) goals. Collectively, these efforts not only support responsible operations but also provide Indian drilling companies with a competitive edge in both domestic and global markets.

6 O&M in Drilling Industry Market Size for India

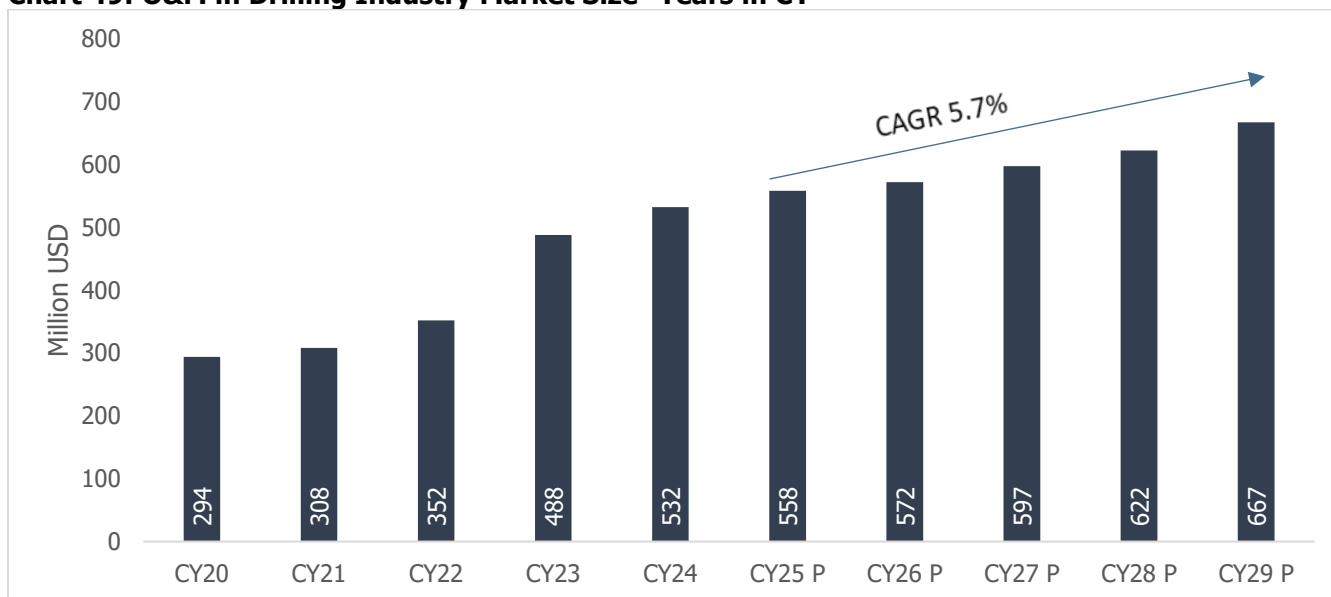
The Operations and Maintenance (O&M) segment within the drilling industry plays a pivotal role in ensuring the long-term reliability, safety, and cost efficiency of drilling assets. Unlike exploration and drilling contracts that are cyclical and exposed to fluctuations in commodity prices, O&M forms a more stable and recurring revenue stream, as companies cannot afford downtime or failure of critical equipment once rigs are deployed.

In the Indian context, the O&M market has grown steadily in line with higher rig utilization, an expanding well count, and the need to sustain performance from both onshore and offshore drilling assets. O&M services encompass a wide range of activities, including preventive and corrective maintenance, inspection and monitoring, spare parts management, refurbishment of drilling equipment, and retrofitting of rigs with advanced technologies. Increasingly, digital technologies are being integrated into the O&M process, with the use of predictive analytics, condition monitoring sensors, and remote diagnostics to minimize unplanned downtime.

Another driver of growth is the aging fleet of rigs deployed across India. Many of these assets were inducted over a decade ago and require frequent overhauls, upgrades, and part replacements to extend operational life and maintain compliance with safety and environmental standards. This has created demand for specialized O&M services that not only keep rigs operational but also ensure adherence to global standards of efficiency and safety. The economics of O&M are also shaped by contract models. Drilling operators are increasingly outsourcing O&M functions under long-term service agreements, transferring the risk of downtime to specialized service providers. Such contracts create a steady pipeline of recurring work for O&M players, covering everything from mechanical repairs to advanced digital monitoring.

Looking forward, O&M in India's drilling sector is expected to evolve further with the energy transition. The market is projected to grow from USD 532 million in 2024 to nearly USD 697 million by 2030, reflecting both volume growth and value-addition in services. With rising drilling activity, increasing complexity of rigs, and the industry's move toward predictive and digital O&M models, this segment is poised to become one of the most critical pillars of India's drilling ecosystem.

Chart 49: O&M in Drilling Industry Market Size- Years in CY



Source: Maia Research, CareEdge Research

6.1 Number of wells operated on the O&M basis

In 2024, India had around 610 wells being operated under the O&M model. Total development wells drilled in 2020 was 526. This reflects the growing preference of operators to outsource the maintenance and operational responsibilities of drilling assets to specialized service providers. The O&M model ensures that wells are managed more efficiently, with reduced downtime and optimized production, while allowing operators to focus on exploration strategy and capital allocation.

Table 14: Wells operated on the O&M basis

Number of wells operated	CY24
O&M basis	610

Source: Maia Research, CareEdge Research

The adoption of O&M contracts also signals a shift in industry practice from purely asset ownership to performance-based management, where the responsibility of uptime and safety compliance is shared with contractors. As drilling intensity increases and rigs become more technologically advanced, the number of wells under O&M agreements is expected to rise steadily over the coming years, further strengthening the role of O&M in India's drilling landscape.

6.2 Demand and supply in India in the O&M Industry

In India, rapid economic development and continued population growth are driving a surge in demand for oil and natural gas. With the advancement of industrialization, many industries are becoming increasingly energy dependent, requiring large quantities of oil and natural gas as fuel and raw materials. Furthermore, accelerating urbanization is leading to increased energy demand for domestic consumption, such as fuel for transportation and natural gas for homes and businesses. This is driving the need for oil and gas companies to continuously enhance their exploration and production capabilities, leading to a surge in demand for drilling O&M services to ensure the efficient operation and stable production of existing wells and the smooth drilling of new wells.

The Indian government's strategic initiative to promote domestic oil and gas production has also significantly stimulated demand for the drilling O&M industry. To reduce dependence on imported energy and enhance energy security, the government is encouraging domestic and international companies to actively participate in oil and gas field development projects in India by issuing more exploration and production licenses. For example, state-owned oil companies and some private enterprises have secured numerous development contracts. These projects require comprehensive support from professional drilling O&M service providers, from pre-drilling preparation and various operations during drilling to post-drilling maintenance and management. This includes routine maintenance of drilling equipment, wellbore monitoring and repair, and related technical support.

Furthermore, the aging of existing oil wells is a significant factor driving increased O&M demand. As wells age, equipment failures and performance degradation become increasingly frequent, necessitating more frequent maintenance and repairs to ensure normal operation. Furthermore, to increase the recovery rate of older wells, oil companies often employ advanced technologies and methods, such as secondary and tertiary recovery. These complex operations require professional O&M service providers with extensive experience and advanced technical expertise to implement and manage, further increasing demand for drilling O&M services.

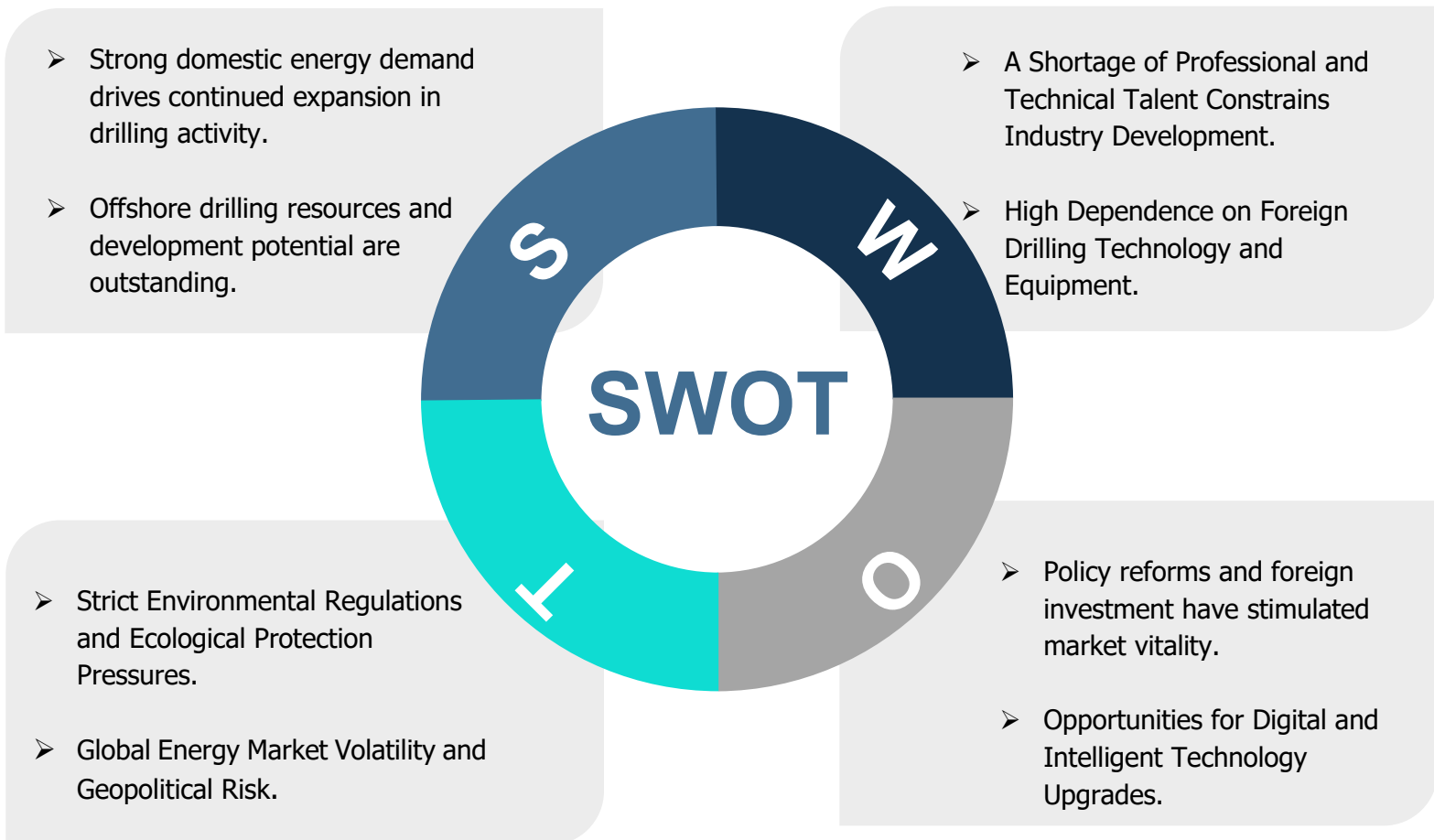
In terms of supply, the Indian drilling O&M industry comprises both international and domestic drilling service companies. A number of strong domestic drilling service companies have gradually emerged. As these domestic companies continue to grow, their technical and management capabilities have gradually improved, enabling them to provide domestic clients with more localized services. These companies have advantages in pricing and communication, thus carving out a niche in the Indian drilling O&M market. For example, by continuously

introducing and absorbing advanced technologies, some domestic companies are now able to undertake relatively complex drilling O&M projects.

However, despite India's vast labour pool, a skilled workforce shortage remains a significant issue. Drilling O&M work requires individuals with specialized knowledge and skills, such as drilling engineers and equipment maintenance technicians. These individuals require systematic training and practical experience to be competent. Despite India's continued efforts in education and training, the pace of skilled workforce development remains relatively slow compared to the rapidly developing industry, resulting in a supply that cannot fully meet market demand.

Furthermore, the availability of drilling equipment also impacts the O&M industry's supply capacity. With the continuous advancement of technology, drilling equipment is constantly being upgraded, and new technologies and equipment can improve drilling efficiency and quality. India has made some progress in drilling equipment manufacturing, with some local companies producing some drilling equipment and accessories. However, it still relies on imports for some high-end equipment and key components. This results in long lead times and high costs for equipment upgrades and repairs, impacting the supply capacity and service efficiency of the drilling O&M industry.

6.3 SWOT Analysis of Drilling Activity



7 Competitive Mapping of Drilling Service Providers

7.1 Key Global Players Present in India

- **Transocean Ltd.** – A global company in offshore drilling, operating a fleet of drillships, jack-ups, and semisubmersibles. In India, the company has executed significant offshore exploration and field redevelopment projects, including deepwater operations in key hydrocarbon basins and support for mature asset development.
- **Schlumberger (SLB)** – The global oilfield services company, offering integrated drilling services including measurement-while-drilling (MWD), logging-while-drilling (LWD), completions, drilling fluids and digital optimization. Schlumberger has presence in India with offices, technology hubs, and contracts across onshore and offshore basins.
- **Halliburton** – A global oilfield services provider, providing drilling fluids, well completions, hydraulic fracturing, and directional drilling. The company is active in India through strategic partnerships with both public and private exploration and production entities, supporting a range of offshore and onshore drilling campaigns.
- **Nabors Industries** – A global company in land drilling rigs and automation technologies, Nabors has selectively participated in India through onshore drilling contracts requiring high-spec AC rigs. The company's technological focus on digitized drilling and advanced rig control systems gives it a niche positioning in India, especially in technically demanding projects.
- **Weatherford International** – Provides drilling tools, well services, and completion systems. The company operates in India through local entities in Vadodara and Kakinada, offering drilling equipment, workover tools, and technical services.
- **Seadrill** – Seadrill is a global offshore drilling contractor operating jack-ups, drillships, and semi-submersibles. In India, its activity is limited compared to Transocean, but it is regularly included in market reports as a global competitor for offshore rig contracts.
- **Helmerich & Payne (H&P)** – A U.S.-based drilling contractor specializing in land rigs and automation technologies. While its footprint in India is limited, it competes for high-specification contracts in collaboration with Indian E&P companies.
- **Patterson-UTI Industries** – One of the largest U.S.-based land drilling contractors, Patterson-UTI operates a significant fleet of high-performance rigs globally. Its presence in India is limited, but the company has engaged in collaborations with Indian E&P operators for technology transfer and selective contract drilling, mainly for unconventional and challenging onshore reservoirs.

7.2 Key Players Service Offering and Geographical Presence

Company	Service Offering	Geographical Presence in India
Transocean Ltd.	Offshore deepwater drilling with drillships, jack-ups, and semisubmersibles	Active in offshore India, with contracts for leading operators, deployment of deepwater drillships, and support for redevelopment projects.
Schlumberger (SLB)	Integrated drilling services: MWD, LWD, directional drilling, completions, drilling fluids, digital optimization	Offices, technology hubs, and contracts across India's onshore and offshore basins.

Halliburton	Drilling fluids, well completions, hydraulic fracturing, directional drilling, integrated well services	Active in India through partnerships with public and private operators; supports offshore and onshore campaigns.
Baker Hughes	Drilling systems, completion tools, subsea equipment, artificial lift, digital oilfield solutions	Operations in key oil & gas hubs; engaged in drilling services and technology integration.
Weatherford International	Drilling tools, workover equipment, well construction services, completions	Presence in Vadodara and Kakinada; provides drilling equipment and technical services.
Seadrill	Offshore drilling with jack-ups, drillships, semisubmersibles	Smaller footprint in India; participates in offshore market tenders.
Nabors Industries	Land drilling with AC rigs, contract drilling, rig technology	Selective deployments for onshore contracts; supports specialized drilling programs.
Helmerich & Payne (H&P)	Land drilling with automated rigs, performance-based drilling	Limited direct presence; competes for high-specification contracts through collaboration with operators.
Deep Industries	Onshore drilling, workover services, rig management	Provides services across major onshore basins; supports both public and private operators.
Quippo Oil & Gas Infrastructure Ltd	Onshore drilling rigs, rig management, workover services	Active in national onshore projects with mechanical and electric rigs; supports contract drilling.
Asian Energy Services Ltd	Seismic data acquisition, onshore drilling, O&M services	Provides services across exploration and production basins; supports national operators and private E&P companies.
Patterson-UTI Industries	Land drilling rigs, contract drilling, integrated services	Participates in select Indian onshore projects; provides drilling support and technology solutions.

8. Summary of Indian Drilling Market with market overview

The Indian drilling services market expanded from USD 1,331 million in 2020 to USD 2,214 million in 2024, reflecting an 13.5% CAGR, supported by post-pandemic recovery, favourable crude prices, and fresh exploration block auctions. It is projected to reach USD 2,856 million by 2030, growing at 4.6% CAGR between 2025–2030. Onshore drilling continues to dominate with over 85% share, while offshore drilling, though smaller, is expected to rise gradually in deepwater and ultra-deepwater segments with higher investments and technology adoption. Integrated drilling services are also increasing, moving from 28.8% in 2020 to over 31% by 2030, as operators seek efficiency, cost optimization, and bundled solutions.

Contract models are shifting from the traditional hire-and-charge structure, which fell from 75.2% in 2020 to a projected 71.7% by 2030, toward performance-based contracts that tie payments to productivity and well outcomes. These contracts, growing from 24.8% in 2020 to 28.3% by 2030, reflect operators' focus on reducing downtime, improving efficiency, and aligning with global practices in oilfield services.

Key Growth Drivers:

1> Rising Energy Demand – India's growing population, industrial expansion, and urbanization are driving higher consumption of oil and gas. To meet this demand and reduce import dependency, exploration and drilling activity is being expanded across both mature and new basins. This rising domestic requirement ensures steady demand for drilling services and technologies.

2> Private and International Participation – Liberalization of India's upstream sector has opened doors for private exploration and production (E&P) players and global drilling contractors. Their entry brings advanced technologies, greater efficiency, and higher investment into the market. This participation also increases competition, leading to improved service standards and cost optimization.

3> Technological Advancements – The adoption of modern drilling technologies such as high-spec AC rigs, rotary steerable systems, digital monitoring, and automation is improving operational efficiency, reducing downtime, and lowering drilling costs. These advancements also enable access to complex reservoirs, deeper wells, and unconventional resources, broadening the scope of exploration.

4>Offshore Exploration Expansion – Offshore basins like the Krishna-Godavari Basin, Mumbai High, and emerging deepwater/ultra-deepwater prospects are critical to India's hydrocarbon strategy. With improved technology and higher investments, offshore drilling is expected to grow, complementing onshore production and diversifying India's resource base.

5>Government Initiatives – Policy reforms such as the Hydrocarbon Exploration and Licensing Policy (HELP) and Open Acreage Licensing Policy (OALP), along with incentives for enhanced oil recovery (EOR) and marginal fields, are encouraging domestic and international investment. Regular exploration block auctions and infrastructure support are further strengthening India's drilling services market.

6>Sustainability Focus – With growing emphasis on ESG standards and environmental protection, operators are increasingly adopting eco-friendly drilling practices, waste management systems, and emission-reduction technologies. Compliance with sustainability requirements not only improves industry reputation but also ensures long-term viability as global investors increasingly favor cleaner and responsible operations.

Market Structure & Players:

- **State-owned Enterprises** – Public sector enterprises continue to dominate rig ownership and drilling operations in India. They manage the bulk of exploration and production activities and hold a majority share of both onshore and offshore rigs. Their investment decisions and project pipelines remain the key drivers of demand for drilling services in the country.
- **Domestic Contractors** – Local service providers supply drilling and workover rigs, seismic survey capabilities, and operation & maintenance services. They support national oil companies as well as private exploration operators, strengthening domestic capacity in onshore projects and selected offshore assignments.
- **Global Service Providers** – International contractors contribute advanced technologies, high-specification rigs, and integrated drilling solutions. Their involvement is most visible in complex projects such as deepwater and ultra-deepwater drilling, where technical expertise and performance-based models are essential for efficiency and risk management.

Addressable Market Overview

The addressable market for India's drilling industry includes all onshore and offshore exploration and production activities, covering rig operations, well completion, and integrated drilling services.

- **Onshore vs. Offshore** – Onshore drilling forms most of the market, supported by established basins, ongoing production, and regular exploration rounds. Offshore drilling, while smaller, is expanding gradually with deeper and more complex projects.
- **Integrated Services** – Integrated drilling solutions, which combine drilling, logging, cementing, well testing, and maintenance under a single contract, are becoming increasingly important as operators seek efficiency, cost optimization, and risk-sharing. The market is clearly shifting toward Integrated Project Models, as reflected in the higher Integrated CAGR of 5.5% compared to 4.3% for Standalone/Simple. This faster growth indicates a structural move toward holistic, end-to-end solutions that reduce complexity, streamline vendor management, and deliver stronger performance outcomes. As customers increasingly prefer integrated offerings over traditional standalone models, Integrated Projects are steadily capturing a larger share of total demand—reinforcing the long-term transition of the market toward integrated delivery.
- **Performance Based Drilling:** Performance-Based Drilling is emerging as a preferred approach in the market, emphasizing the achievement of specific operational and performance outcomes rather than traditional time-and-material arrangements. This model incentivizes contractors to optimize efficiency, reduce non-productive time, and enhance drilling performance while sharing risk and reward with operators. By linking compensation to measurable results such as drilling speed, cost savings, and safety performance, Performance-Based Drilling encourages innovation, accountability, and higher overall productivity, making it increasingly attractive in a competitive and outcome-focused industry.

Outlook:

The Indian drilling industry is positioned for steady and sustained growth, driven by a combination of technological, operational, and market factors. The modernization of rig fleets and adoption of advanced drilling technologies are enhancing overall efficiency, reducing non-productive time, and allowing operators to access deeper and more complex reservoirs. In addition, improvements in automation, real-time monitoring, and digital drilling tools are increasing precision and safety in operations. Rising domestic energy demand, expanding exploration activities, and

a supportive regulatory environment further contribute to the industry's growth prospects. These factors are creating opportunities for both established and emerging drilling companies to increase capacity, optimize costs, and improve service delivery in India's onshore and offshore markets.

9 Peer Analysis

9.1 Business Overview

Domestic Players

Shivganga Drillers Limited

Shivganga Drillers Limited was incorporated on 8 August 2005 in Indore, Madhya Pradesh. The company initially undertook water well drilling and later expanded into drilling and workover operations for oil & gas wells, especially in complex or unstable formations such as heaving ground. Its product and service offerings include drill rig hire, drilling and completion of wells, casing and cementation including chemical products, drilling equipment supply, tubing and well services, directional drilling and logging & LWD, hydraulic fracturing & pressure pumping, and auxiliary services. The business segments cover rig operations & maintenance, contracting of drilling, well completion, equipment rental / hire, and associated well-services.

The company caters primarily to India's upstream drilling market, supplying rigs and field services to major public and private sector clients. Shivganga holds the complete triad of ISO 9001, ISO 14001, and ISO 45001 certifications, and is also a recognized member of the International Association of Drilling Contractors (IADC). Its commitment to operational safety is reflected in its LTI-free (Lost Time Injury) streak of 2100+ days and the Safety Excellence Award 2025 received for maintaining industry-leading health and safety standards. It has successfully completed over 100+ wells to date,

Shivganga has (Air-Hammer) drilling technology for hard rock formations such as basalt and dense sandstone, enabling faster penetration rates, longer bit life, and superior performance in challenging geological conditions compared to conventional rotary drilling methods.

The total size of the Indian onshore drilling market is estimated at around Rs 194,832 million for FY25. Within this overall market, Shivganga Drillers Limited holds a 1.5% of market share based on FY25 revenue. ONGC holds the largest market share with its in-house drilling operations. Additionally, shivganga has served ONGC from FY22 till FY25, with the purpose of drilling of surface and intermediate sections of the locations in Frontier Basins by Air Hammer Technology (for 14 Wells). The Company owns a fleet of 5 rigs comprising such as Foremost DR24 525HP, Atlas Copco Predator -950 HP (USA) which was overhauled in FY 25, S&S 1000 HP Rig (USA), Honghua 1000 HP (China) and the newly acquired Nabors 1000 HP rig (USA). The average age of Nabors, Predator, ZJ-40, S&S, DR 24 has an average age of 5.58 years. The company has recently overhauled rig fleet features newer technology, enhancing operational performance and reliability.

Deep Industries Limited

Deep Industries Limited was established in 1991 to serve the oil & gas industry's field operations demand. Its services include air & gas compression services (on charter/hire basis), drilling and workover services, gas dehydration / conditioning and processing, and integrated project management services. Under its upstream services it offers coring rigs, drilling rigs of varied horsepower, workover rigs, and services such as fishing, perforation, tubing installation, cement plug drilling etc. In its midstream or ancillary segments, it provides gas dehydration and conditioning, compressor services, mud engineering and well services support.

Asian Energy Services Limited

Asian Energy Services Limited (formerly Asian Oilfield Services Limited) was incorporated in 1992. The company offers a suite of upstream value-chain services including seismic data acquisition (2D & 3D), exploration, wireline

logging, directional core drilling, topographic survey, and CBM and mineral coring. It also provides EPC (Engineering, Procurement, Construction) for production facilities, facility Operation & Maintenance (O&M) for both onshore and offshore production assets, enhanced oil recovery services, and material handling / mining / development & operations (MDO) services. Business segments include seismic & exploration, facility EPC / infrastructure, operations & maintenance, and services to non-oil/gas sectors like mineral exploration and material handling.

Quippo Oil & Gas Infrastructure Limited

Quippo Oil & Gas Infrastructure Limited was incorporated in 2005. The company provides onshore drilling contract services via a fleet of land drilling and work-over rigs (capabilities from about 650 HP to 2000 HP), rig operations and maintenance, well completion and re-entering services, mud engineering, coring, fishing, cementing and casing-running services. It also offers services related to directional drilling, integrated project execution/management, and equipment rental or supplies (drilling tools etc.). Business segments include drilling rig hire / contract drilling, well services (completion & re-entry), auxiliary equipment & tool rentals, and project/field services support.

John Energy Limited

John Energy Limited was incorporated on 9 October 1987 and is headquartered in Mehsana, Gujarat. The company provides services across the upstream and midstream oil & gas sectors including onshore drilling, work-over/completion services, natural gas compression and conditioning, manufacturing and hire of drilling rigs, integrated drilling contract services, mud logging, wireline logging, casing/cementing, well-head completion, and equipment & tool supply. Its business segments include contract drilling (both drilling and workover rigs), well completion and workover services, gas compression and dehydration/conditioning, tool & equipment rentals, and associated drilling fluids / logging / ancillary services.

International Players

Helmerich & Payne, Inc.

Helmerich & Payne was founded in 1920, and is headquartered in Tulsa, Oklahoma, USA. The company provides contract drilling services, owning and operating an extensive fleet of land rigs as well as performing operations in international drilling and offshore platforms. Its product and service offerings include the design, fabrication, upgrade and operation of high-performance drilling rigs technologies for directional drilling and survey management drilling automation solutions including steering systems; and rig instrumentation and maintenance. The company's business segments cover U.S. land drilling, international and offshore drilling, rig technology and equipment services, and auxiliary drilling support (such as survey and wellbore optimisation) through its technology subsidiaries.

Nabors Industries Ltd.

Nabors Industries traces its formal incorporation back to 1952, though its operations and predecessor entities date further back in land drilling and field services. The company supplies drilling and drilling-related services for land-based and offshore oil & natural gas wells in the U.S. and internationally. Its offerings include rig ownership and operations, directional drilling, measurement-while-drilling and logging systems, tubular running services, rig instrumentation and optimization, manufacturing and sales of drilling-related equipment (such as top drives, draw works, catwalks, etc.), and technology platforms/software for handling rig performance and operations. The business segments are divided into U.S. land drilling, international drilling, drilling solutions (software/technology & directional tools), and rig technologies / equipment manufacturing & rentals.

Patterson-UTI Energy, Inc.

Patterson-UTI Energy was formed through a merger in 2001 between Patterson Energy and UTI Energy (though its earlier component companies date to 1978). The company offers contract drilling and completion services, pressure pumping services (such as hydraulic fracturing, cementing, acidizing), directional drilling services, wellbore placement technologies and rental equipment, as well as services/supplies for drilling fluids, wireline, and other oilfield rentals. Business segments include land contract drilling, pressure pumping & stimulation services, directional drilling / downhole tools & related technology, and oilfield rental / completion services.

9.2 Operational Benchmarking with Peers

Table 15: Operational Benchmarking

Parameters	Domestic				International		
	Shivganga drillers	Deep Industries	** Asian Energy Services	Quippo Oil & Gas Infrastructure	Nabors Industries	Patterson-UTI Industries	Helmerich & Payne
Company Overview							
Year of Establishment	2005	1991	1992	2005	2001	1978	1920
Headquarters Location	Indore Madhya Pradesh	Ahmedabad, Gujarat	Mumbai, Maharashtra	Gurugram, Haryana	Hamilton, Bermuda	Houston, Texas	Tulsa, Oklahoma
Ownership / Group	Manoj Bahety and Bhanwarlal Rathi	Savla family	Oilmax Energy Group	Hazoor Multi Projects Ltd. (HMPL)	-	-	-
Company Overview							
Key Capabilities	Shivganga Drillers specializes in providing integrated drilling solutions for the oil and gas industry in India. While they began with water well drilling, their capabilities	Deep Industries Ltd.'s key capabilities include providing air and gas compression, drilling and workover services, and gas dehydration. The company also offers integrated project management services and	Asian energy capabilities include a wide range of services from oil and gas exploration and production to the development of renewable energy providing expertise in	Quippo Oil & Gas Infrastructure's key capabilities include a fleet of advanced land drilling and workover rigs with top-drive systems for deep, complex drilling, and diversified services like directional drilling, cementing, and	Nabors Industries' key capabilities include advanced drilling automation, data analytics, and digital solutions. The company is also heavily invested in its rig equipment and energy transition initiatives to drive	Patterson-UTI is oilfield services company providing a diverse range of drilling, completion, and energy services. Their key capabilities are delivered through distinct business segments, offering integrated solutions for oil and gas	Helmerich & Payne provides high-performance drilling solutions for oil and gas companies, specializing in high-spec, automated drilling rigs like their FlexRig® fleet, extensive directional and horizontal drilling capabilities, and global operations in unconventional and conventional plays.

	have expanded to include complex oil and gas drilling and workover operation	chartered-hire of advanced gas processing facilities.	areas like seismic data acquisition, facility construction (EPC), operation and maintenance (O&M), and enhanced oil recovery (EOR).	integrated field development.	operational efficiency and sustainability.	exploration and production.	
Product Offerings	<p>Upstream Services -</p> <ul style="list-style-type: none"> - Drilling Services - Workover Operations - Rig Maintenance & Support Services - Well Completion Service 	<p>Upstream Services -</p> <ul style="list-style-type: none"> - Drilling and Worker services - Intergrated Project Management Services <p>Midstream Services</p> <ul style="list-style-type: none"> - Air and Gas Compression Services - Gas Dehydration, Conditioning & Processing 	<p>Upstream Services -</p> <ul style="list-style-type: none"> - Drilling and workover support - Seismic Data Interpretation and Operation and Maintenance <p>Midstream Services</p> <ul style="list-style-type: none"> - Air and Gas Compression Services - Gas 	<p>Upstream Services</p> <ul style="list-style-type: none"> - Drilling & Associated Services - Workover Services - Completion Services - Seismic Services 	<p>Upstream Services</p> <ul style="list-style-type: none"> - Rig Operations (Land and Offshore) - Directional Drilling & Drilling Technology Services - Automation & Digital Solution - Energy Transition in Upstream 	<p>Upstream Services</p> <ul style="list-style-type: none"> - Drilling Services - Completion Services <p>Other</p> <ul style="list-style-type: none"> - Drilling Products & Ancillary Services 	<p>Upstream Services</p> <ul style="list-style-type: none"> - Drilling Services - Technology & Automatio - Integrated Well Construction Solution

			Dehydration, Conditioning & Processing				
Total Number of Rigs	4	FY23 - 11 FY24 - 11 FY25 - 17	-	14	300	93 Active - 101 average drilling rigs	384 rigs 384 land rigs, following its acquisition of KCA Deutag, and operates an additional 7 offshore rigs in the Gulf of Mexico.
Total Installed Capacity (MT / HP)	SGD I – Foremost DR24 525HP SGD II – Atlas Copco-Predator 950HP SGD III – S&S 1000HP	Operates 11 Workover Rigs with capacity ranging from 30T to 150T , 6 Drilling Rigs with capacity of 1000Hp .	-	Drilling and Work-over Rig fleet ranges from 650 HP to 2000 HP	Onshore SmartRigs - 1500Hp	136 Tier-1 Super-Spec Drilling Rigs 2.9 Million Hydraulic Hp	Total Fleet 368
Order book		3,051 crores as of August 2025,	1688 Crs as on 12th August 2025	NA	-	As of September 30, 2024, Patterson-UTI had \$401 million in contract drilling backlog .	As of February 6, 2025, Helmerich & Payne reported a backlog of approximately \$7.6 billion , which is not a real-time order book.

Total Number of Wells YTD	66	NA	-	200	NA	NA	709
Revenue Mix		In FY25, on a standalone basis, DIL derived 62% of its TOI from natural gas services (FY24: 55%) and 38% from integrated project management services (FY24: 45%).	Oil and Gas: 80% Mineral and Other Energy Services: 20%	-	-	Drilling Services - 33.00% Completion Services - 59.00% Drilling Products - 7.00%	North America Solutions - 88.7% International Solutions Segment - 7.00% Offshore Gulf of Mexico Segment - 3.09%
Total Revenue (Rs. Mn)	3,544.5	5,761.3	4,650.3	NA	NA	NA	2,29,787.75
Revenue per Well	5.37	-	-	-	-	-	-
Revenue per Rig	88.61	33.89	-	-	-	-	-
International	-	-	-	-	-	-	-
Domestic	100%	100%	100%	100%	-	-	-

**Given its presence in the O&M segment, Asian Energy Services Limited has been considered a peer

9.3 Financial Benchmarking with Domestic Players (Figures in INR Millions)

Table 16: Comparison of Revenue from Operations

Peers	FY23	FY24	FY25	Q1'FY26
Shivganga Drillers Limited	600.13	1,929.73	3,544.48	977.26
Deep Industries Limited	3,413.36	4,269.93	5,761.30	1,994.99
Asian Energy Services Limited	1,099.51	3,050.65	4,650.38	1,153.67

Table 17: Comparison of Revenue Growth

Peers	FY23	FY24	FY25	Q1'FY26
Shivganga Drillers Limited	-18.91%	221.55%	83.68%	108.16%
Deep Industries Limited	6.13%	25.09%	34.93%	61.59%
Asian Energy Services Limited	-57.79%	177.45%	52.44%	91.67%

Table 18: Comparison of EBITDA

Peers	FY23	FY24	FY25	Q1'FY26
Shivganga Drillers Limited	113.13	510.92	1,124.26	314.65
Deep Industries Limited	1,305.46	1,594.00	2,314.66	815.89
Asian Energy Services Limited	-181.59	433.88	722.95	120.60

Table 19: Comparison of EBITDA Margin

Peers	FY23	FY24	FY25	Q1'FY26
Shivganga Drillers Limited	18.85%	26.48%	31.72%	32.20%
Deep Industries Limited	38.25%	37.33%	40.18%	40.90%
Asian Energy Services Limited	-16.52%	14.22%	15.55%	10.45%

Table 20: Comparison of PAT

Peers	FY23	FY24	FY25	Q1'FY26
Shivganga Drillers Limited	39.16	274.64	623.43	207.79
Deep Industries Limited	1,252.99	1,251.59	-787.62	617.01
Asian Energy Services Limited	-444.42	255.48	421.64	56.32

Table 21: Comparison of PAT Margin

Peers	FY23	FY24	FY25	Q1'FY26
Shivganga Drillers Limited	6.53%	14.23%	17.59%	21.26%
Deep Industries Limited	36.71%	29.31%	-13.67%	30.93%
Asian Energy Services Limited	-40.42%	8.37%	9.07%	4.88%

Table 22: Comparison of Return on Equity

Peers	FY23	FY24	FY25	Q1'FY26
Shivganga Drillers Limited	8.03%	36.03%	44.86%	13.01%
Deep Industries Limited	9.14%	8.67%	-4.33%	-
Asian Energy Services Limited	-22.28%	9.19%	10.58%	-

Table 23: Comparison of Return on Capital Employed

Peers	FY23	FY24	FY25	Q1'FY26
Shivganga Drillers Limited	13.67%	31.75%	54.50%	12.73%
Deep Industries Limited	7.59%	9.50%	10.65%	-
Asian Energy Services Limited	-17.71%	11.53%	14.51%	-

Table 24: Comparison of Debt to Equity

Peers	FY23	FY24	FY25	Q1'FY26
Shivganga Drillers Limited	0.51	1.20	0.64	0.53
Deep Industries Limited	0.05	0.11	0.11	-
Asian Energy Services Limited	0.10	0.08	0.06	-

Table 25: Comparison of Net Debt to EDITDA

Peers	FY23	FY24	FY25	Q1'FY26
Shivganga Drillers Limited	2.04	1.61	0.74	2.60
Deep Industries Limited	0.21	0.65	0.67	-
Asian Energy Services Limited	0.43	-0.41	-0.75	-

Table 26: Comparison of Assets Turnover Ratio

Peers	FY23	FY24	FY25	Q1'FY26
Shivganga Drillers Limited	0.62	1.51	1.92	0.46
Deep Industries Limited	0.23	0.28	0.36	-
Asian Energy Services Limited	0.41	1.07	1.49	-

Table 27: Comparison of Inventory Days

Peers	FY23	FY24	FY25	Q1'FY26
Shivganga Drillers Limited	32	16	35	121
Deep Industries Limited	49	42	38	-
Asian Energy Services Limited	0	0	0	-

Table 28: Comparison of Debtors Days

Peers	FY23	FY24	FY25	Q1'FY26
Shivganga Drillers Limited	48	44	14	100
Deep Industries Limited	270	237	373	-
Asian Energy Services Limited	89	163	176	-

Table 29: Comparison of Creditors Days

Peers	FY23	FY24	FY25	Q1'FY26
Shivganga Drillers Limited	70	39	35	129
Deep Industries Limited	59	35	45	-
Asian Energy Services Limited	146	87	112	-

Table 30: Comparison of Net Working Capital Days

Peers	FY23	FY24	FY25	Q1'FY26
Shivganga Drillers Limited	11	21	15	92
Deep Industries Limited	259	244	365	-
Asian Energy Services Limited	NM	76	64	-

Note – NM – Not Meaningful

Note: Balance sheet of Q1 is not applicable for domestic peers Deep Industries and Asian Energy Service. Hence the Ratios for Q1 is also not valid.

9.4 Financial Benchmarking with International Players (Figures in Thousand Dollars)

Table 31: Comparison of Revenue from Operations

Peers	CY22	CY23	CY24
Helmerich & Payne, Inc.	20,49,841.00	28,62,677.00	27,46,128.00
Nabors Industries Ltd.	26,53,766.00	30,05,981.00	29,30,126.00
Patterson-UTI Energy, Inc	15,44,820.00	19,19,759.00	17,27,810.00

Table 32: Comparison of Revenue Growth

Peers	CY22	CY23	CY24
Helmerich & Payne, Inc.	69.30%	39.65%	-4.07%
Nabors Industries Ltd.	31.53%	13.27%	-2.52%
Patterson-UTI Energy, Inc	96.99%	24.27%	-10.00%

Table 33: Comparison of EBITDA

Peers	CY22	CY23	CY24
Helmerich & Payne, Inc.	4,06,183.00	9,48,666.00	8,38,792.00
Nabors Industries Ltd.	5,82,293.00	9,15,883.00	7,74,519.00
Patterson-Uti Energy, Inc	5,31,192.00	9,11,072.00	77,299.00

Table 34: Comparison of EBITDA Margin

Peers	CY22	CY23	CY24
Helmerich & Payne, Inc.	19.82%	33.14%	30.54%
Nabors Industries Ltd.	21.94%	30.47%	26.43%
Patterson-Uti Energy, Inc	34.39%	47.46%	4.47%

Table 35: Comparison of PAT

Peers	CY22	CY23	CY24
Helmerich & Payne, Inc.	6,953.00	4,34,100.00	3,44,165.00
Nabors Industries Ltd.	-3,07,218.00	49,904.00	-87,987.00
Patterson-Uti Energy, Inc	1,54,658.00	2,45,952.00	-9,66,399.00

Table 36: Comparison of PAT Margin

Peers	CY22	CY23	CY24
Helmerich & Payne, Inc.	0.34%	15.16%	12.53%
Nabors Industries Ltd.	-11.58%	1.66%	-3.00%
Patterson-Uti Energy, Inc	10.01%	12.81%	-55.93%

Table 37: Comparison of Return on Equity

Peers	CY22	CY23	CY24
Helmerich & Payne, Inc.	0.25%	15.66%	11.80%
Nabors Industries Ltd.	-57.23%	9.21%	-20.89%
Patterson-Uti Energy, Inc	9.29%	5.10%	-27.80%

Table 38: Comparison of Return on Capital Employed

Peers	CY22	CY23	CY24
Helmerich & Payne, Inc.	1.55%	74.20%	20.37%
Nabors Industries Ltd.	-1.98%	9.44%	5.52%
Patterson-Uti Energy, Inc	5.03%	6.73%	-29.71%

Table 39: Comparison of Debt to Equity

Peers	CY22	CY23	CY24
Helmerich & Payne, Inc.	0.20	0.20	0.61
Nabors Industries Ltd.	4.73	4.63	5.95
Patterson-Uti Energy, Inc	0.50	0.25	0.35

Table 40: Comparison of Net Debt to EBITDA

Peers	CY22	CY23	CY24
Helmerich & Payne, Inc.	0.76	0.30	1.87
Nabors Industries Ltd.	3.58	1.59	2.73
Patterson-Uti Energy, Inc	1.31	1.13	12.66

Table 41: Comparison of Asset Turnover

Peers	CY22	CY23	CY24
Helmerich & Payne, Inc.	0.67	0.97	0.92
Nabors Industries Ltd.	0.83	1.01	1.02
Patterson-Uti Energy, Inc	0.67	0.69	0.54

Table 42: Comparison of Inventory days

Peers	CY22	CY23	CY24
Helmerich & Payne, Inc.	16	12	16
Nabors Industries Ltd.	18	18	16
Patterson-Uti Energy, Inc	15	34	35

Table 43: Comparison of Debtors days

Peers	CY22	CY23	CY24
Helmerich & Payne, Inc.	82	52	56
Nabors Industries Ltd.	45	42	48
Patterson-Uti Energy, Inc	134	185	161

Table 44: Comparison of Creditors days

Peers	CY22	CY23	CY24
Helmerich & Payne, Inc.	23	17	18
Nabors Industries Ltd.	43	36	40
Patterson-Uti Energy, Inc	56	102	89

Table 45: Comparison of Net Working Capital days

Peers	CY22	CY23	CY24
Helmerich & Payne, Inc.	75	47	53
Nabors Industries Ltd.	19	24	25
Patterson-Uti Energy, Inc	93	117	108

Table 46: Formulas

KPIs	Formulas
Revenue from Operations	Revenue from Operations includes revenue from sale of products and services and other operating revenue
EBITDA	EBITDA is calculated as profit before tax plus depreciation and amortization expense plus finance cost less other income
EBITDA Margin	EBITDA Margin is calculated as EBITDA divided by Revenue from Operations
PAT	PAT means profit after tax for the year
PAT Margin	PAT Margin is calculated as profit after tax divided by Revenue from Operations.
Return on Equity	ROE is calculated as profit after tax divided by Net Worth. Net worth means aggregate value of the paid-up share capital and all reserves created out of the profits and securities premium account and debit or credit balance of profit and loss account, after deducting the aggregate value of the accumulated losses, deferred expenditure and miscellaneous expenditure not written off, derived from Restated Financial Information, but does not include reserves created out of revaluation of assets and amalgamation
Debt to Equity	Debt/ Total Equity
Return on Capital Employed (ROCE)	EBIT/ (Total Assets- Total Current Liabilities)
Debtor Days	(Debtors/ Revenue from operations) *365
Creditor Days	(Creditors/ Revenue from operations) *365
Inventory Days	(Inventory/ Revenue from operations) *365
Asset turnover ratio	Revenue from operations/ Average Gross Block

10 Abbreviation

Abbreviation	Full Form
2D	Two-Dimensional
3D	Three-Dimensional
AI	Artificial Intelligence
ATF	Aviation Turbine Fuel
BCM	Billion Cubic Metres
bcm	Billion cubic metres
b/d	Barrels per day
BOP	Blowout Preventer
BPCL	Bharat Petroleum Corporation Limited
CAGR	Compound Annual Growth Rate
Capex / CAPEX	Capital Expenditure
CBM	Coal Bed Methane
CCS	Carbon Capture and Storage / Carbon Capture & Storage
CDU	Crude Distillation Unit
CMIE	Centre for Monitoring Indian Economy
CPCL	Chennai Petroleum Corporation Limited
CY	Calendar Year
D&C	Drilling and Completion
DGH	Directorate General of Hydrocarbons
DTH	Down-The-Hole (Air Hammer Drilling)
E&P	Exploration and Production / Exploration & Production
EIA	U.S. Energy Information Administration
EJ	Exajoule (10 ¹⁸ joules)
EoI	Expression of Interest
ERD	Extended Reach Drilling
ESG	Environmental, Social, and Governance
EV	Electric Vehicle
FEED	Front-End Engineering Design
Feedstock	Raw input used for manufacturing processes
FY	Financial Year
GAIL	Gas Authority of India Limited
GGSR	Guru Gobind Singh Refinery
HELP	Hydrocarbon Exploration and Licensing Policy
HDD	Horizontal Directional Drilling
HMEL	Hindustan Mittal Energy Limited
HPCL	Hindustan Petroleum Corporation Limited

Abbreviation	Full Form
HPHT	High Pressure High Temperature
HSE	Health, Safety & Environment
IEA	International Energy Agency
IOCL	Indian Oil Corporation Limited
IoT	Internet of Things
IPM	Integrated Project Management
ISO	International Organization for Standardization
ISPRIL	Indian Strategic Petroleum Reserves Limited
KG	Krishna–Godavari
KG Basin	Krishna–Godavari Basin
KG-D6	Krishna–Godavari D6 Block
KPI	Key Performance Indicator
LNG	Liquefied Natural Gas
LPG	Liquefied Petroleum Gas
LWD	Logging While Drilling
M&A	Mergers & Acquisitions
mmBTU / MMBTU	Million British Thermal Units
MMT	Million Metric Tonnes
MMPA	Million Metric Tonnes Per Annum
MMSCM	Million Metric Standard Cubic Metres
MUSD / USD M	Million US Dollars
MWD	Measurement While Drilling
Naphtha	Petrochemical feedstock refinery product
NBP	National Balancing Point
NDR	National Data Repository
NELP	New Exploration Licensing Policy
NGL	Natural Gas Liquids
NGPL	Natural Gas Pipeline
NOCs	National Oil Companies
NPT	Non-Productive Time
NRL	Numaligarh Refinery Limited
OALP	Open Acreage Licensing Policy
O&M	Operations and Maintenance
OPEX / OpEx	Operating Expenditure
OECD	Organisation for Economic Co-operation and Development
OIL	Oil India Limited
ONGC	Oil and Natural Gas Corporation
OPEC	Organization of the Petroleum Exporting Countries

Abbreviation	Full Form
OPEC+	OPEC members + cooperating non-OPEC producers
PBG	Performance Bank Guarantee
PLC	Programmable Logic Controller
PNGRB	Petroleum and Natural Gas Regulatory Board
PPAC	Petroleum Planning and Analysis Cell
RC	Reverse Circulation
R/C	Revenue-to-Costing Ratio
RIL	Reliance Industries Limited
ROP	Rate of Penetration
S&C America	South & Central America
SPS	Strategic Petroleum Reserve
STPL	Spur / Tie-in / Pipeline Lateral
TTF	Title Transfer Facility
USD	United States Dollar
VDS	Very Deflection-Free Fast Drilling System
QEHS	Quality, Environment, Health, and Safety

11. Glossary of Difficult Words / Phrases (O&M in Drilling)

Word / Phrase	Explanation
Aging fleet	Equipment or rigs that have been in use for many years.
Compliance with safety and environmental standards	Following rules for safety and protecting the environment.
Condition monitoring sensors	Devices that track equipment health in real time.
Corrective maintenance	Repairs done after a problem occurs.
Development wells	Wells drilled to increase production in known oil/gas fields.
Energy transition	Shift from fossil fuels to cleaner energy sources.
Exploration and production (E&P)	Searching for oil/gas and extracting it.
Exploration and production licenses	Legal permits to search for and extract oil/gas.
Extend operational life	Make equipment last longer.
Industrialization	Growth of industries that need energy to operate.
Inspection and monitoring	Checking equipment and wells regularly to ensure proper functioning.
Long-term service agreements	Multi-year contracts for maintenance and operation services.
Operations and Maintenance (O&M)	Managing and maintaining drilling equipment and wells to ensure smooth operation.
Outsource	Hire an external company to do a task.
Performance-based management	Managing based on results or performance rather than just owning equipment.
Predictive analytics	Using data to predict equipment failures before they happen.
Preventive maintenance	Regular maintenance to prevent breakdowns.
Recurring revenue stream	Continuous income from ongoing services.
Refurbishment	Repairing or renewing old equipment.
Remote diagnostics	Checking and troubleshooting equipment from a distance.
Retrofitting	Adding new technology or features to old equipment.
Rig deployed	Drilling rig placed at the site and operational.
Secondary and tertiary recovery	Advanced techniques to get more oil from old wells.
Spare parts management	Handling and storing replacement parts for equipment.
Systematic training	Organized training program to develop skills.
Uptime	Time when equipment is working correctly.
Value-addition in services	Extra benefits or improvements beyond basic service.
Wellbore	The hole drilled into the ground to extract oil or gas.

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